Employee Output Response to Stock Market Wealth Shocks*

Teng Li,† Wenlan Qian,‡ Wei A. Xiong,§ and Xin Zou **

October 2021

* We benefited from comments from Sumit Agarwal, Zhiwu Chen, Sudipto Dasgupta, Zhenyu Gao, Bing Han, Wenxi Jiang, Xiaomeng Lu, Jun Qian, David Reeb, Jay Ritter, Johan Sulaeman, Yizhou Xiao, Hong Yan, and seminar participants at 2021 CICF, Erasmus University Rotterdam, Shanghai Advanced Institute of Finance, Chinese University of Hong Kong, Shanghai Jiaotong University, Hong Kong University, and National University of Singapore. Li acknowledges the support of the Youth Program of the National Natural Science Foundation of China (72003202). Qian acknowledges the financial support from MOE Tier 2 Grant (R-315-000-129-112). Wei A. Xiong acknowledges support from the National Natural Science Foundation of China (Project Number 71703104). The views in this paper are those of the authors and do not reflect those of the Shenzhen Stock Exchange. All errors are our own.

† Teng Li, International School of Business and Finance and Institute of Advanced Finance, Sun Yat-sen University, Email: liteng27@mail.sysu.edu.cn.

‡Wenlan Qian (Corresponding author), NUS Business School, Department of Finance, Email: bizqw@nus.edu.sg.

§ Wei A. Xiong, Shenzhen Stock Exchange, Email: wxiong@szse.cn

**Xin Zou, Hong Kong Baptist University, Department of Finance and Decision Science, Email: zouxin@hkbu.edu.hk.

Employee Output Response to Stock Market Wealth Shocks

Abstract

This paper uses individual-level data linking stock investments with work performance to examine how changes in stock market wealth affect worker output. We document that a 10% increase in monthly income from stock market investments is associated with a decrease of 3.8% in the same investor's next-month work output. The negative output response is not driven by concurrent economic conditions and is unexplained by investor-specific liquidity needs. Consistent with the reference dependence interpretation, the response is short-lived and the effect is stronger when the total income has reached a reference income. Overall, our results highlight a novel channel of transmitting stock market fluctuation through labor supply.

Keywords: Stock Investment Return, Stock Market Wealth, Consumption, Worker Output, Work Performance, Labor Supply, Reference Dependence, Household Finance

JEL Classification: D14, G12, G51, J22, J31

1. Introduction

Stock holdings constitute a considerable portion of a household's financial assets. For example, in the last quarter of 2019, direct and indirect stock holdings of US households account for 36% of their financial assets. Moreover, households are the largest holders of US equities, with a total holding of $34.2 trillion comprising over 90% of the market capitalization (*The Federal Reserve*, 2020). These facts have two implications. First, fluctuations in the stock market have a significant impact on household wealth accumulation (Poterba, 2000). Second, the household sector serves as an important transmission channel from the stock market to the real economy, whereby changes in stock market wealth either directly affect aggregate tax revenues or indirectly reshape households' real decision-making such as consumption. Given the importance, asset prices have been frequently discussed as a consideration factor in setting monetary policies (Greenspan, 1999).

In this paper, we study labor supply response to changes in stock market wealth at the individual level. Household consumption consists of both market goods and leisure. After an increase in stock market wealth, households enjoy more leisure by choosing to supply less labor. Incorporating the leisure response thus not only enables a more comprehensive understanding of the household response to changes in stock market wealth, but also carries important implications for the labor market.

Moreover, the nature of the labor supply response is less straightforward. The standard model of lifecycle labor supply predicts that individuals typically spread out leisure (earnings) response following a wealth shock over time. However, the effect of high-frequency changes in the stock market wealth on households' labor decisions, which often adjust at a lower frequency, remains unclear. In particular, the labor supply response hinges on how investors perceive the frequent shocks to stock market wealth. When individuals have a short-term mental account, the reference dependence theory suggests that they will reduce their labor supply over a short horizon when their income has reached a reference point.

Studying labor response to stock market fluctuations faces severe empirical challenges. Stock market wealth and labor market choices are both affected by a variety of macroeconomic conditions and (unobserved) heterogeneity in individual characteristics. A strong economy bodes well for the stock market performance as well as household wealth (e.g., housing), the latter of which independently affects labor market choices. Alternatively, individuals with greater wealth endowments likely have higher exposure to stock market movements and simultaneously make

different labor supply decisions. These confounding factors make it difficult to infer a causal effect from the association between the aggregate stock market and labor market outcomes.

Valid identification requires granular data that allow us to track within-individual variation in the stock market wealth together with labor supply behavior so that we can reasonably attribute the labor supply response to the same individual's recent stock market wealth fluctuation. Given the volatile stock market, analysis at high frequency strengthens causal identification but at the same time raises the hurdle for an accurate measurement of labor supply. At the extensive margin, lumpy labor market decisions (e.g., participation) may not be the primary margin of adjustment in response to high-frequency stock market fluctuations. At the intensive margin, measurement of the effective amount of labor supply is difficult; earnings as a proxy do not change frequently to accurately reflect variation in labor supplied by employees for many occupations given the typical employment contract in practice. One popular approach in prior research relies on workers from a specific occupation—such as taxi drivers or agricultural workers—with labor earnings directly related to labor supply (Camerer, Babcock, Loewenstein, and Thaler, 1997; Farber, 2008; Graff Zivin and Neidell, 2012; Agarwal, Diao, Pan, and Sing, 2015).

This paper provides the first study that directly examines the impact of changes in stock market wealth on labor supply. We exploit a novel micro-level dataset that links information on individuals' work performance and their direct stock market investments and wealth at the monthly frequency. We obtain the monthly work income of the universe of insurance sales agents (over 17,000) from a leading Chinese life insurance company's major city branch during 2013–2016. Specifically, we focus on the sales commission income in the analysis because insurance sales agents are paid a fixed rate for each insurance policy sold. As a result, sales commission, which varies month by month, directly tracks concurrent work output and labor supply.

We then link each sales agent in our sample to their entire stock investment activities for stocks listed on the Shenzhen Stock Exchange (SZSE, hereafter)—one of the two major stock exchanges in China—during the four-year period. For each investor, we obtain the stock account information at the security-month level, whereby we observe the month-end value of each stock held, as well as the dollar value and shares bought and sold for each stock in each month. Collectively, the final linked dataset allows us to track the individual-specific stock market investments and the same individual's labor output at the monthly frequency.

As motivational evidence, we document that at the aggregate level, a 1% increase in the stock

market's weighted average returns is associated with a 2.01% reduction in the total sales commission for the employee investors in our sample, compared with the non-investors. To provide an identified estimate, we run individual-level regressions of insurance sales commission on stock investment returns in the last month among the employee investors, controlling for individual and year-month fixed effects. We find that a 10% increase in the monthly stock investment returns is associated with a 3.8% decrease in the insurance sales commission in the subsequent month, and the effect is statistically significant and economically meaningful. In addition, the impact is larger when the stock investment returns are higher relative to the baseline work income.

We do not detect any significant change in the worker's propensity to get promoted (demoted) or exit. There is also no change in the quality of the products sold—stock investment returns in the last month do not predict the withdrawal of insurance policy purchases by customers. Notably, sales agents' installment commission income, which derives from insurance policies sold in previous years and thus does not measure current performance, is unresponsive to the last-month stock investment returns. This suggests our main finding captures the work output response.

A natural alternative interpretation of the main results stems from concurrent macro and local economic conditions that affect both stock investment returns and labor output. While the fixed effects in our regression control for the macro trend, they do not fully absorb the confounding economic factors that vary at a more local level. In addition to the previously described omitted-variable issues, a booming local economy may also influence insurance policy sales due to better labor market opportunities elsewhere. A booming stock market may also shift customer's demand towards direct stock market investments and away from insurance products (that also offer savings). In these cases, a negative response in insurance policy sales needs not suggest a decrease in labor supply.

We directly address the identification concerns in several ways. Each investor works in one of the 12 sub-branches in the city. We randomly assign their monthly stock investment returns to either a non-investor or an investor working at the same sub-branch, where they share economic fundamentals at the very local level and face the same group of potential insurance customers. If stock investment returns on average correlate with concurrent local economic conditions or insurance demand, we expect to find a similar negative association between sales commission and the randomly assigned stock investment returns. On the contrary, the empirical relationship is close

to zero in our data.

In addition, we extract variation in the individual stock investment returns that is plausibly idiosyncratic (and hence uncontaminated by local economic conditions). First, we restrict our analysis to the stock investment returns of non-local stocks, which are unlikely to highly correlate with local economic conditions, and still find a strong response. Second, among investors with low investment skills, whose stock investment returns are likely more idiosyncratic, the sales commission response remains to be negative and significant. Collectively, these results provide strong evidence that our results are not driven by confounding economic conditions, and that the documented work output change captures a labor supply response.

Another potential endogeneity concern relates to individual-specific time-varying circumstances that influence the decision to access stock market wealth and supply labor. However, the magnitude and statistical significance of the output response to total stock investment returns remain unchanged after controlling for realized gains. Moreover, during months with lower liquidity needs, the output response remains significant. These findings lend further credence to a causal interpretation of the impact of stock investment returns on labor supply.

To investigate the external validity of our findings, we verify that the effect of stock investment returns is not driven by potential part-time workers who are less likely to rely on insurance sales as their major source of income, nor is it specific to workers with higher income volatility, who might be particularly sensitive to stock market wealth fluctuations. Our findings also sustain within the weighted investor sample which is more representative of the Chinese investing households. Finally, our results are also not specific to extreme stock market movements in our sample period.

We then explore the potential economic mechanisms to explain the negative relation between stock investment returns and subsequent labor output. The standard lifecycle model suggests that individuals adjust their labor supply over time in response to income shocks, resulting in a persistent response (Imbens, Rubin, and Sacerdote, 2001; Cesarini, et al., 2017). However, we find a short-lived labor supply response as sales commission is only responsive to the last-month stock investment returns. Understanding the non-persistent nature also allows a more complete assessment of the effect magnitude. While the point estimate in the main finding suggests that the immediate labor supply response is of comparable size as those documented in the existing literature (e.g., Cesarini, et al.,2017), the cumulative effect is smaller due to its short-lived nature.

The temporal pattern of the labor output response is consistent with the reference dependence

model's prediction. In particular, individuals have a short-term mental account and will significantly reduce their labor supply over a short horizon when their income has reached the reference point (Camerer, et al., 1997; Farber, 2008; Agarwal et al., 2015). We provide further evidence supportive of the reference dependence hypothesis by documenting a stronger negative response of sales commission when the total income in the last month has reached a reference income.

We also consider and reject an interpretation based on investor distraction (DellaVigna and Pollet, 2009; Hirshleifer, Lim, and Teoh, 2009), since the sales commission response to stock investment returns does not vary by proxies of attention level. Next, we study the heterogeneous response across worker demographics: the effect is larger among older and more educated workers, and similar across gender and income. Finally, we perform a series of robustness tests to verify our findings after accounting for the influence of outliers and alternative specifications.

Our study contributes to the vast literature on the effect of income and wealth shocks on household decisions. Various studies have documented individuals' spending responses to income shocks.[1] More relevant to this paper is the strand of literature on the effect of wealth shocks on labor supply (e.g., Imbens, Rubin, and Sacerdote, 2001; Cesarini, et al., 2017; Li, Li, Lu, and Xie, 2020; Gu, He, Qian, and Ren, 2021). In comparison, our paper focuses on how labor supply responds to high-frequency and repeated wealth shocks by exploiting variation in monthly individual stock investment returns. Moreover, we document a significant but short-lived labor supply response, which is consistent with the reference dependence model's predictions. To the extent that the existing research on the role of reference dependence studies wage rate shocks (Camerer et al., 1997; Farber 2008; Agarwal et al., 2015), our findings provide new evidence on how the reference dependence theory explains the effect of wealth (unearned income) shocks on labor supply.

In addition, this paper contributes to the literature on the real economic impact of the stock market through household response. Behavioral factors, including investor mood and reference dependence, have been shown to affect stock market investment behaviors (e.g., Heath, Huddart,

[1] See, for example, Shapiro and Slemrod (1995, 2003), Souleles (1999), Hsieh (2003), Stephens (2003, 2006. 2008), Johnson, Parker and Souleles (2006), Agarwal, Liu and Souleles (2007), Parker, Souleles, Johnson, and McClelland (2013), Gelman et al. (2014), Agarwal and Qian (2014, 2017), Di Maggio et al., (2017), and Agarwal, Qian, and Zou (2021). For a complete review of the literature, please refer to Browning and Collado (2001) and Jappelli and Pistaferri (2010).

and Lang, 1999; Hirshleifer and Shumway, 2003; Kamstra, Kramer, and Levi, 2003; Hirshleifer, Jiang, and Meng DiGiovanni, 2018). On the other hand, stock market shocks can also impact real household decisions including consumption and human capital investment (Poterba, 2000; Di Maggio, Kermani, and Majlesi, 2020; Choi, Lou, and Mukherjee, 2020). To our knowledge, we offer the first causal estimate of the labor supply response to changes in stock market wealth, and our finding complements the existing literature by showing a novel channel of transmitting stock market fluctuations through labor supply.

The rest of the paper proceeds as follows: Section 2 introduces the institutional background of the insurance sales agents and the stock market in China. Section 3 describes the data and methodology. The main results are presented in Section 4. Section 5 discusses the possible economic mechanisms, and Section 6 explores the heterogeneity and additional robustness. Section 7 concludes.

2. Institutional Background

2.1.Insurance sales agents in China

The insurance industry is large and growing fast in China. In 2018, the industry had collected around 3.8 trillion RMB (US$567 billion) insurance premiums; the magnitude is equivalent to 4% of the national GDP. Around 58% of the premiums are generated by the five leading insurance companies (*China Insurance Regulatory Commission*, 2019). Revenues from selling insurance products depend highly on the effort of sales agents. By 2018, the Chinese insurance industry had employed over 8 million sales agents (*Chyxx.com*, 2019).

The Chinese insurance companies sign agency contracts with the sales agents; hence, they are not guaranteed a minimum wage (as stipulated by the government). In other words, the insurance sales agents have zero base salary and earn income based on their work performance. A sales agent has three major work income sources, and the largest income component is the sales commission (except for high-level managers that earn significant bonuses from team performance). Because of the piece-rate compensation contract, the sales commission is a fixed fraction of each insurance policy sold. Therefore, the sales commission income varies month by month and directly tracks the sales agent's work output and labor supply. The second source of work income is the installment commission of long-term insurance policies sold in previous years. Because the policies were sold years ago, this source of income is *not* relevant to the current-month worker performance. Various bonuses constitute the third source. Bonuses are granted, based on a non-

linear formula, to reward lagged performance of either the individual or the entire team, making them a much less informative measure of a worker's current performance.

The sales agents in Chinese insurance firms operate in teams. The insurance firm in our sample has 12 job levels in total for sales agents, five job levels below team managers, and another seven job levels for managers and above. The primary job for sales agents at all job levels is to sell insurance products, with team managers and those with higher ranks also performing management and administrative duties for the firm. At the beginning of each calendar quarter, the firm reassesses agents' last-quarter performance including insurance sales and new agent referrals, based on a pre-determined job-rating algorithm, and makes promotion and demotion decisions. The fixed evaluation months in each year are January, April, July, and October (for example, performance during January to March of calendar year *y* will be evaluated in April of calendar year *y*). Excellent performance in the last quarter will promote a worker to a higher job level, whereas failing to meet the requirements for the current job level leads to a demotion; workers in between remain at their existing job level. The average workweek for insurance industry employees in China is 42 hours (*National Population Survey,* 2005).

Agents typically sell insurance contracts to a broad customer base. They do not usually deal with repeat customers, given the fact that each client only purchases very few insurance products, especially the long-term life insurance product. By 2019, among all clients for the firm in our sample, around half of the clients only hold 1 insurance policy.

2.2.Stock market in China

China has two stock exchanges: the Shanghai Stock Exchange and Shenzhen Stock Exchange (SZSE), both founded in December 1990. Stocks listed on the two exchanges and tradable for Chinese investors are called A-share stocks. By the end of 2016, 1,222 A-share stocks were listed on the Shanghai Stock Exchange, and 1,902 A-share stocks were listed on SZSE. The direct and indirect stock holdings of Chinese urban households represent around 10 percent of their financial assets in 2019, equivalent to an average of 64,000 RMB per household (*People's Bank of China,* 2020). We also compare income with stock market wealth for a representative investing household using the China Household Finance Survey (CHFS, 2015): the median value of annual income as a fraction of stock market wealth is 1.34. Given that an average CHFS investor is 42.2 years old and has 17.8 years before the typical retirement age in China, we use the approach in Cesarini et al. (2017) to infer that the stock market wealth takes around 4% of the income expected in the

remaining work life ($=\frac{1}{1.34\times17.8}$).

The stock investment information for our study is provided by SZSE, which is the eighth largest stock exchange in the world, with a total market capitalization of around 17 trillion RMB by 2018. Although SZSE has a smaller total market capitalization than the Shanghai Stock Exchange, it enjoys higher participation of individual investors (by contract, the Shanghai Stock Exchange attracts more institutional investors). Individual investors own 276 million stock accounts at SZSE by the end of 2018 (*SZSE Fact Book*, 2018). In addition, they hold 6% of the total tradable amount, and contribute to around 25% of total dollar turnover in the stock exchange.

3. Data and Methodology

We combine two datasets to construct our main sample: a large panel dataset of monthly performance for sales agents from a leading Chinese insurance company and the stock investment information from SZSE. We obtain supplemental stock characteristics and market return information from China Stock Market & Accounting Research Database (CSMAR). Detailed descriptions of the key variables' definitions are included in the Appendix.

3.1.Raw data

3.1.1. Worker-performance data

We use a unique dataset of worker performance from a large branch of a leading life insurance firm in China. As one of the largest insurance companies in China, this firm employs 25% of the industry's sales agents and earns 20% of the total industry's collected premiums as of 2012. The company operates branches across China, and our sample covers all sales agents during 2013–2016 from the firm's branch in a large eastern city that has a 7-million resident population and produces about 1% of the country's GDP. During the four-year sample period, sales agents at the branch generated around 153 million RMB insurance premiums. This branch is further divided into 12 sub-branches, each covers a different area of the city.

This dataset provides the monthly work income components for every sales agent from the city branch from January 2013 to December 2016. Specifically, we focus on sales commission, which is the largest source of insurance sales income, and directly tracks the current-month work output. Another income component, the commission from installment payments of long-term insurance policies sold in previous years, does not measure current-month performance and will be used for

falsification analysis.[2] In our sample, we observe 17,486 workers at the branch who have earned at least one month of positive sales commission during the four-year sample period.

In addition to the quantitative income measures, we also observe the individual's job level, the insurance contract withdrawal status, and the time the worker exits the firm. This information enables us to assess the effect on the worker's promotion or demotion likelihood as well as the quality of service. The data also contain detailed demographic information, including gender, age, and years of education received. Team-structure information and contract starting time are also provided.

3.1.2. Stock investment data

We then merge the work performance of the sales agents with the de-identified data of their entire stock investments of stocks listed on SZSE during the four years. Among the 17,486 workers, 3,120 (i.e., 18%) have stock investments during the four-year sample period; in comparison, 18% of China's urban population held stock accounts in 2018 (*China Securities Depository and Clearing; National Bureau of Statistics of China,* 2019). For each stock ever held by the sales agent, the data provide the buy value, sell value, and the total number of shares bought and sold every month, together with the value and number of shares held at the month-end. The insurance firm in our sample is not listed on SZSE, hence the stock investments of sales agents are unrelated to their employer's stock performance.

The combined dataset offers several key advantages for our study. First, the sales commission, earned from piecemeal contracts, allows us to closely track worker output at a high frequency. Second, we can directly link the worker output to their monthly stock investment returns, which facilitates the identification of the stock investment return–worker output relationship. In particular, the large variation in stock investment returns, both over time and across investors in the same month, increases the test power to isolate the effect of changes in stock market wealth from unobserved heterogeneity. Third, we can utilize the rich investment information and worker characteristics to further disentangle the economic mechanisms.

One potential caveat of the data is that we do not directly observe the stock dividend income at

[2] The bonus component of income is a non-linear function of current and lagged (agent and team) performance, which introduces measurement error and therefore is not included in our measure of individual's work output. Nevertheless, we have conducted a robustness test by including the bonus in our measure of worker output and continue to find a significant negative relationship.

the individual level. However, dividend income is unlikely to have a material impact on our estimation for two reasons. First, the dividend yield from SZSE-listed stocks stays low during our sample period, with an average of 0.9% (*Wind*, 2020). Second, dividend distribution is an infrequent event (annually or at an even lower frequency), whereas our identification mainly relies on the monthly variation of capital gains and cross-sectional variation within the same month.

3.2.Sample construction and summary statistics

To construct the analysis sample, we exclude investors with extremely large stock market wealth from the study, who are more likely to have insider information or the ability to influence the stock price. Specifically, we exclude the 48 investors who have sell value, buy value, or holding value of stocks in any month equal to or over 5 million RMB during our sample period. Our final sample consists of data on worker performance and stock investment returns from the remaining 3,072 investors during 2013–2016. To mitigate the outlier effect, we winsorize the monthly worker performance and stock investment return measures at the 0.5 and 99.5 percentiles.

Panel A of Table 1 presents the demographic characteristics of the 3,072 investors in the final sample. 65% of the investors are female. Their average age is 38 years old, and they have 14 years of education on average. The average sales agent works at the firm for 37 months, and 2.7% of them carry a job level of team managers and above. Most demographic characteristics for the other 14,345 sales agents who have not invested in any stocks during the sample period are similar to those of the investors, except that the non-investors have a shorter work tenure (reported in Panel A of Table IA1 in the Internet Appendix).

[insert Table 1 about here]

We report the investors' work performance information in Panel B of Table 1. Investors in our sample earn a total sales commission of 719 RMB per month on average. During the sample period, investors have an average promotion rate of 4.6%, a demotion rate of 4.3%, and an exit rate of 3.6%. They experience a 2.1% likelihood of insurance policy withdrawal from clients. In comparison, Panel B of Table IA1 shows that non-investors earn around 100 RMB less in sales commission on average. Additionally, while the promotion and insurance policy withdrawal rates are similar for the two groups of workers, non-investors have relatively lower demotion rates and higher exit rates.

The stocks held by investors in our final sample are overall representative of the A-share stock population in the Chinese stock market (from both stock exchanges). Investors in the sample have invested in 1,862 out of 1,902 A-share stocks listed in SZSE by the end of 2016, almost covering the entire Shenzhen A-share market. Moreover, as displayed in Figure IA1 in the Internet Appendix, the industry distribution of stocks held by investors in our final sample is very similar to that of all A-share stocks in the Chinese stock market. According to the comparison of stock characteristics in Panel C of Table IA1 in December 2012, the A-share stocks that have ever been held by investors in our sample have similar PE ratio, M/B ratio, and turnover rate to the never-held stocks. The only visible difference is that stocks held by investors in our sample tend to have smaller market capitalization, likely because stocks listed on SZSE generally have smaller market capitalization than stocks listed on the Shanghai Stock Exchange.

We construct the monthly stock investment returns for each investor as the total dollar returns received from trading or holding stocks over the month. Specifically,

$$Stock\ inv.return_t = holding\ value_t - holding\ value_{t-1} + sell\ value_t - buy\ value_t.$$

Returns are denoted as missing for months when investors do not have stock investments. We further decompose the total stock investment returns into realized returns through stock sales, and unrealized returns. As displayed in Panel C of Table 1, investors in the sample hold 2.6 stocks per month on average, with an average month-end stock holding of 44,666 RMB. They lose 1,731 RMB per month in the stock market, which can be decomposed into a 711 RMB realized gain and a 2,417 RMB unrealized loss. They show a moderate tendency to invest in stocks of firms headquartered in the local city. On average, they are 4.5% likely to hold local stocks during our four-year sample period, and the number of local stocks they hold constitutes 2.1% of the total number of stocks held.

Although the stock investment returns are likely to be random within an individual, the magnitude of the stock investment return amount is tightly linked to the investor's initial stock holdings amount and thus their wealth level. Therefore, in our empirical analyses, to ensure randomness of the stock market wealth shocks across individuals, we scale the stock investment returns with the last-month stock market wealth (proxied by the stock holdings at the end of the corresponding month) and interpret the scaled stock investment returns as the percentage change in the stock market wealth. The idea is that, under the efficient market hypothesis, no investor can systematically earn abnormal investment returns (out of their investment amount). Indeed, the

correlation between the magnitude of the scaled stock investment returns and the last-month stock market wealth is around 0.007 and statistically insignificant in our sample.

Over time, the mean of the scaled stock investment returns of all investors varies considerably. More importantly, we observe a large dispersion in investors' stock investment returns in the cross-section. The standard deviation of the scaled stock investment returns across investors for a given month has a mean (median) of 26% (22%), or equivalently 21,600 RMB (16,700 RMB) in dollar terms, which is 12.5 (9.6) times the magnitude of the average stock investment returns during the sample period. To interpret, investors in our sample have significantly dispersed stock investment returns despite sharing the same aggregate stock market performance and common economic conditions, which empowers our empirical analysis to isolate the stock investment returns' effect. We also visualize the time-series and cross-sectional distribution of investors' scaled stock investment returns in Figure IA2 of the Internet Appendix.

3.3.Empirical strategy

Before describing our identification strategy, we provide simple statistics on the correlation between the aggregate stock market returns and the next-month total sales commission from agents in our sample as motivating evidence. Specifically, we find that compared with the non-investors, a 1% increase in the stock market's weighted average returns is associated with a 2.01% reduction in the total sales commission for the employee investors in our sample. While suggestive of a potential negative impact of stock market wealth shocks on investors' labor output, we caution against drawing causal interpretation from the correlation coefficient. For example, stock market wealth and labor market choices can both be affected by a variety of economic conditions and (unobserved) individual characteristics.

To facilitate identification, we exploit the unique dataset that links the individuals' work outputs and their stock investments. Our objective is to investigate the effect of stock investment returns on workers' earned sales commission. We also divide the sales commission in each month by the agent's baseline commission and use the scaled sales commission as the main dependent variable. The baseline commission is defined as the average monthly sales commission for the individual before the first stock investment return in our sample. To avoid look-ahead bias, we drop the months used to construct the baseline commission for each investor.

Using the investor sample, we examine the effect of the last-month stock investment returns on the current-month sales commission as follows:

$$\frac{Sales\ commission_{i,t}}{Baseline\ commission_i} = \alpha_i + \gamma_t + \beta \frac{Stock\ inv.\ return_{i,t-1}}{Stock\ mkt\ wealth_{i,t-2}} + \epsilon_{i,t} \quad (1)$$

where $\frac{Sales\ commission_{i,t}}{Baseline\ commission_i}$measures the scaled sales commission income for individual *i* in month *t*, and $\frac{Stock\ inv.\ return_{i,t-1}}{Stock\ mkt\ wealth_{i,t-2}}$measures the scaled stock investment return for the same individual in month *t-1*. α_i represents a vector of individual fixed effects, and γ_t denotes the calendar year-month fixed effect. The two sets of fixed effects will absorb any time-invariant confounding factors at the individual level, or the common time trends. In the subsequent heterogeneity analyses by worker characteristics, we allow for worker group-specific time fixed effects. Because all workers in our sample are from the same firm and same city, their income could be clustered in time; thus, we allow for two-way clustering of standard errors by individual and year-month (Thompson, 2011; Cameron, Gelbach, and Miller, 2011).

Under the assumption that the returns from stock market investments are idiosyncratic to factors influencing work performance, the results can be interpreted as follows: a 1% change in stock investment returns leads to a $\beta\%$ change in the sales commission in the subsequent month.

4. Main Results

4.1.Baseline results

We begin the analysis by estimating the average effect of the last month scaled stock investment returns on the current month's scaled sales commission. As shown in Panel A of Table 2, a 1% increase in the last-month stock investment returns is associated with a 0.38% decrease in the sales commission for the current month. The documented effect is both statistically significant (*p* value=0.003) and economically meaningful.

[insert Table 2 about here]

In Panel B of Table 2, we investigate the effect of the last-month stock investment returns on the current-month worker performance along other margins. Specifically, in columns (1)-(3), we find workers' propensity to get promoted, demoted, or exit does not significantly respond to their last-month stock investment returns. We also do not detect a significant change in the quality of service, in that the response of customers' insurance policy purchase withdrawal is close to zero.

Under our hypothesis, the portion of income that does not relate to the current-month work output should not be responsive to stock investment returns. When insurance agents sell a long-

term insurance product, part of their commission income is collected in subsequent years in installments. Hence, this part of the sales income is not reflective of their current work behavior. We use the commission from installment payments of long-term insurances sold in previous years for a falsification test. Consistent with the prediction, Panel C of Table 2 shows that the last-month stock investment returns do not significantly affect the current-month commission received from installment payment of previously sold policies. This corroborates that our main finding captures the work output response.

Additionally, we find that the response is larger when investors have higher stock investment returns relative to the baseline total work income (Table IA2 in Internet Appendix). To further validate that the response of sales commission captures the change in work performance, we derive a more direct measure of worker output: the sales value of insurance policies. Because the sales commission is essentially a fixed proportion of the corresponding insurance policy sales, with varying rates for different insurance products, we infer the dollar value of insurance policy sales by an agent from the sales commission earned in that month. Similar to the effect on sales commission, a 1% increase in stock investment returns decreases the total premium sold in the subsequent month by 0.34% (for brevity we report the results in Table IA3 of the Internet Appendix).

4.2.Disentangling confounding economic factors

One natural endogeneity concern for our identification is omitted variables arising from the within-city common economic conditions that coincide with stock price movements and simultaneously affect labor supply. For example, housing wealth, which may positively comove with stock market performance, and directly influences households' labor market decisions. Moreover, a booming local economy (and a well-performing stock market) could induce sales agents to seek better labor market opportunities and reduce insurance sales. Local residents may also shift their demand from insurance products (with savings features) to direct investment in the stock market (Previtero, 2014). As such, lower insurance policy sales after positive stock investment returns do not necessarily suggest a labor supply response.

First, any concerns about common factors are greatly mitigated by the large cross-sectional variation in stock investment returns within a given month. The cross-sectional standard deviation of monthly scaled stock investment returns for investors in our sample is on average 26%, or equivalently 21,600 RMB in dollar terms, which is close to half of their average stock holdings.

Our identification does not entirely hinge on the time-series variation, which could be contaminated by concurrent macro and local economic conditions. In other words, the results indicate that holding local market conditions constant, investors who happen to have higher stock investment returns earn a lower next-month sales commission than those investors with lower stock investment returns in the same month.

Moreover, we directly address the endogeneity concerns using several empirical tests. Specifically, we randomly assign the scaled stock investment returns in each month to non-investor workers or within the investor workers from the same sub-branch. The city in our sample has 12 sub-branches with each sub-branch covering a different area of the city. Sales agents in the same sub-branch likely face the same group of potential insurance customers and share the same economic exposure at the very local level. If stock investment returns, on average, correlate with local economic conditions or insurance demand, we expect to find a similar negative association between sales commission and the randomly assigned stock investment returns.

Contrary to this prediction, we find the relationship is close to zero under the random assignment of stock investment returns. First, for each month, we randomly assign the scaled stock investment returns from an investor to another non-investor (i.e., same sub-branch insurance sales agent without stock investments during the sample period) as their pseudo stock investment returns and regress non-investor's scaled sales commission this month on the lagged pseudo scaled stock investment returns. We repeat this procedure for 100 times. Column (1) of Panel A, Table 3 shows that the average estimated coefficient is indistinguishable from 0 (mean of coefficients = 0.013, *p* value = 0.713). We also conduct the same random assignment within the same sub-branch investor group and find a similar result. Column (2) shows that the mean coefficient of 0.006 from the 100 iterations is still statistically insignificant (*p* value = 0.832). In addition to reporting the mean coefficients, Figure 1 plots the distributions of coefficients for the random assignment results.

[insert Table 3 about here]

[insert Figure 1 about here]

Finally, we randomly reshuffle the scaled stock investment returns within each investor. Column (3) reveals that the mean coefficient from the 100 iterations is 0.003, which is still economically small and not statistically different from 0 (*p* value = 0.902). This suggests that our finding is also unexplained by the individual-specific persistent trend in both the stock investment

returns and labor supply and further corroborates the output response to the last-month stock investment returns.

The next set of tests aims to identify variation from stock investment returns that is uncontaminated by (local) economic conditions. One might be concerned that the stock price of local firms is highly correlated with the local economic conditions that affect labor supply choices. We exclude local stocks from the portfolio in computing stock investment returns and study whether work output responds to the local-stock-excluded portfolio performance. As shown in the first column of Panel B, Table 3, a 1% increase in the stock investment returns after excluding local stocks still leads to a 0.33% decrease in sales commission in the following month (*p* value=0.010).

We also identify investors for whom stock investment returns are more idiosyncratic. In this aspect, we classify investors based on their investment record—those who have generated at least three months of positive stock investment returns during their first six investment months are classified as high-skill investors. Stock investment returns for the other investors with a poorer investment record are likely to be more idiosyncratic. We examine the sales commission–stock investment return relationship of low-skill and high-skill investors separately. In column (2) of Panel B, we find that the sales commission response of the low-skill investors remains strong and significant (coefficient=-0.440, *p* value=0.014).[3]

4.3.Another endogeneity concern: liquidity needs

Another possible omitted variable that affects both individual-level stock investment decisions and worker performance is the individual-specific liquidity needs. For example, liquidity shocks out of life events may prompt individuals to withdraw from their stock market wealth and at the same time reduce labor supply. In addition, investors are potentially more likely to tap into their stock market wealth to meet the liquidity needs when they are making money in the stock market.

We investigate this hypothesis in the following two ways. First, we follow Di Maggio, Kermani, and Majlesi (2020) by adding the last month's realized stock investment returns (scaled by lagged stock market wealth) as an additional control into the regression. If the effect of stock investment

[3] We tried an alternative (more stringent) definition of high-skill investors as the individuals who have earned at least three consecutive positive stock investment returns during the first six investment months, and the effect remains similar. The responses from the two groups of investors are statistically indistinguishable when we define the high-skill investors on a 6-month rolling-window basis. Moreover, we also capture investors with close to random return variation as those with close to zero mean investment returns and find significant response among them.

returns on sales commission is driven by realized stock investment returns, which strongly indicates investors' liquidity needs, the estimated effect of total stock investment returns will be muted considerably after controlling for realized stock investment returns. However, as shown in column (1) of Table 4, although the realized stock investment returns have a comparable impact on the next-month sales commission (coefficient = -0.416, *p* value = 0.537), the effect for total stock investment returns remains large both statistically and economically (coefficient = -0.339, *p* value = 0.002). Note that the correlation between scaled total stock investment returns and scaled realized stock investment returns is 0.37, alleviating the concern about multicollinearity.

[insert Table 4 about here]

Second, when investors command immediate liquidity, they should withdraw money from their stock-sale proceeds. The signal for liquidity needs is even greater when investors only sell without reinvesting in the stock market. In column (2) of Table 4, we examine the sales commission response during the months with only stock sales in the previous month versus the rest of the months for each individual. Again, a 1% increase in total stock investment returns significantly decreases the following month's sales commission by 0.35% (*p* value=0.003) during the months when investors do not only have stock sale transactions. In an unreported result, we also find a significant negative response during the months without any stock sales in the previous month.

4.4.External validity

4.4.1. Is the effect driven by part-time workers?

The sales commission which closely tracks the work output is critical for our identification. While prior studies also rely on workers from a specific occupation such as taxi drivers or agricultural workers to precisely measure labor supply (Camerer et al., 1997; Farber, 2008; Zivin and Neidell, 2012), restricting the study to employees from the insurance industry may face concerns over the external validity of our finding. For example, some of the agents in our sample may not rely on selling insurance products as their major source of income. Thus, a natural question arises on the extent to which the documented effect can generalize to a wider population of workers in the economy.

In this subsection, we start by investigating whether our results pertain only to the less devoted sales agents. To proceed, we classify sales agents into part-time and full-time workers based on

their work intensity. We proxy full-time workers as those with the number of working months and the fraction of positive sales commission months higher than the sample median. Within the full-time workers, a 1% increase in stock investment returns leads to a 0.51% decrease in the subsequent month's sales commission (column (1) of Table 5). This pattern is also robust if we use a more stringent definition of full-time workers as those with both the number of working months and fraction of positive sales commission months in the top tercile of the cross-sectional distribution. Alternatively, managers for the firm are more likely to devote full-time to the insurance firm, and we also find a strong and significant response from the insurance agents with a rank of manager or above.

[insert Table 5 about here]

4.4.2. Is the effect specific to workers with a volatile income stream?

Another external validity concern is that the effect of stock investment returns on subsequent sales commission earned may be specific to workers with a volatile income stream. Compared with many other occupations, insurance sales agents on average have more volatile earnings. If investors with a more volatile income stream are more sensitive to wealth shocks, our findings could be less applicable to the broader worker population. Thus, we test the prediction of a stronger output response among insurance sales agents with higher income volatility in our sample.

For each investor in the sample, we compute the time-series standard deviation of the monthly total work income from the insurance company during the sample period and scale the work income standard deviation by the time-series average monthly work income for the same individual to account for the income level differences across individuals. We classify workers with higher-than-median (lower-than-median) scaled work income standard deviation as higher (lower) income volatility investors and test the response difference between the two groups of investors (column (2), Table 5). The response of sales commission to last-month stock investment returns is statistically indistinguishable between the two subgroups of investors (coefficient for lower income volatility workers = -0.438, p value = 0.052; coefficient for higher income volatility workers = -0.330, p value = 0.015; p value for the difference = 0.709). The finding is also robust when we classify workers in the bottom tercile of the scaled work income standard deviation

distribution as lower income volatility workers, and the rest as higher income volatility workers.[4]

4.4.3. Representative investor

The insurance sales agents in our sample could have a different distribution of characteristics from the average investing households in China. For example, compared with the average Chinese household with stock investments from the 2015 CHFS, an average investor worker in our sample is 4 years younger, owns around 20,000 RMB fewer stock market wealth, and is 30 percent more likely to be a female.[5] To adjust for the compositional differences, we follow Cesarini et al. (2017) and use the weighted regression to match the age, gender, and stock market wealth distribution of the Chinese investing households. As reported in column (3) of Table 5, we still find a significant negative response with similar magnitude under the weighted regression specification. We also weight the sample using the distribution of age, gender, and work income/stock market wealth, and find a similar result.

5. The Economic Mechanism

5.1.Persistence of the effect

One potential framework to understand the finding that investor workers reduce labor output in response to higher stock investment returns is the standard lifecycle model. This lifecycle model predicts that individuals adjust their labor supply over time in response to wealth shocks (e.g., from stock market investments), resulting in a persistent response (Imbens, Rubin, and Sacerdote, 2001; Cesarini, et al., 2017). To explore this possibility, we directly investigate the persistence of the sales commission response by adding the stock investment returns from the past three months into the regression. Panel A of Table 6 shows that only the last-month scaled stock investment returns exhibit a statistically and economically significant negative effect on the current-month scaled sales commission. This suggests that the influence of stock market fluctuations on workers' sales commission is immediate but not persistent, which is inconsistent with the standard lifecycle model prediction.[6]

[4] The result also holds if we use the boom-and-bust period to define volatile states (i.e., year 2015 versus other years). This also suggests that our finding is not driven by the boom and bust of the aggregate stock market.

[5] We use the characteristics of the household head from the survey. Given that all investors in our sample are working labors, we restrict the comparison to households from the 2015 CHFS with household heads' age no older than 60 (i.e., the typical retiring age in China).

[6] One additional behavioral interpretation to explain our finding is the extrapolative effect: employees form naive beliefs about future returns from past stock investment returns, hence they will put more energy on stock investment and less effort into selling insurance when the recent stock investment returns are good (Previtero, 2014). However,

[insert Table 6 about here]

Understanding the non-persistent nature of the effect also allows a more complete assessment of the effect magnitude. First, our main finding in Table 2 shows that a 1% increase in the last month stock investment returns leads to a 0.38% decrease in the current month's sales commission. Given that the average stock market wealth is 53,477 RMB and the average baseline commission is 1,139 RMB, the point estimate suggests that a 100 RMB increase in the last month's income from stock market investments is associated with a 0.81 RMB decrease in the sales commission for the current month. The direct effect is comparable to Cesarini, et al. (2017), who find that every 100 SEK lottery prize reduces the annual wage earnings by 0.96 SEK.[7] Nevertheless, given that the sales commission response to the stock market wealth shocks documented in our paper is not persistent, the lifetime MPE is smaller in our setting.

5.2.Response when investors reach a reference income

The short-lived labor supply response documented in our study is consistent with the predictions of the reference dependence theory. When individuals have a short-term mental account, the reference dependence theory suggests that they will reduce their labor supply when their income has reached a reference point, leading to a significant yet short-lived labor supply response to stock market wealth shocks (Camerer et al., 1997; Farber, 2008). To further test this hypothesis, we investigate the response of sales commission to the last-month stock investment returns under the occasions when the investor's total income (i.e., the sum of total work income and stock investment returns) has reached a reference point. The reference dependence theory shall predict a stronger negative response of the sales commission when the total income in the last month has hit the reference point, compared to the case when the total income has not reached the reference point.

Specifically, given that the reference points could be determined by past income (Camerer, et al., 1997), and the insurance company in our sample evaluates the agents' performance every three months at the beginning of each calendar quarter (i.e., performance during January to March of

this explanation is also unlikely given the short-lived impact of past stock investment returns: stock investment returns from two or three months before do not have significant impacts on the current-month sales commission.

[7] To facilitate the comparison, we compare our result with the estimation from the closest specification in Cesarini et al. (2017), where the authors use reduced form regression and investigate the effect of lottery wealth shock on annual income (in column (2) of Table 3). Additionally, our estimate is also within the range of MPE documented in the literature (e.g., Pencavel, 1986; Blundell and MaCurdy, 2000).

calendar year *y* will be evaluated in April of calendar year *y*), we define the reference income for each agent for months in calendar quarter *q* as the average work income from months in calendar quarter *q-1*.[8] As shown in column (1) of Panel B, Table 6, the magnitude of the negative response is in months when the last-month total income has reached the reference point is around 9 times as large as that in the months when it has not reached the reference point. In column (2), we use a different definition of reference income based on the average work income in the previous 3 months rolling window and find a similar pattern.

5.3.Distracted by the stock market ?

We also consider another behavioral explanation. Motivated by the findings that investors have limited attention, higher investment returns may distract the workers from selling insurance products, leading to lower sales commission earned afterward (DellaVigna and Pollet, 2009; Hirshleifer, Lim, and Teoh, 2009).

We investigate the distraction interpretation using three heterogeneity tests in Table 7. First, if workers focus on investing in the stock market, which significantly affects their work performance, we expect to observe significantly lower sales commissions during periods with stock investments, compared to the time when workers do not invest in any stocks. This prediction is inconsistent with our finding: the estimated coefficient for the last-month investment-period dummy is statistically insignificant and has an opposite sign (column (1) of Table 7). Second, the distraction hypothesis predicts a stronger effect among the more active investors, whereas we find an equally strong sales commission response among active and less active investors as reported in column (2) of Table 7.[9] Last but not least, we also expect a stronger output response during volatile market conditions that attract more investor attention under the distraction hypothesis. In column (3) of Table 7, we identify months with higher stock market volatility when the standard deviation of the daily aggregate market returns (for all A-share stocks in the Chinese stock market) ranks in the top quartile among all months since 2000. Similarly, the effect of the last-month stock investment returns on sales commission is equally strong during volatile and non-volatile times.

[8] The finding is also robust when we use the average total income from months in calendar quarter *q-1* as the reference income.

[9] Given our data don't provide the within-month disaggregated trades, we classify workers as active investors if they trade no less than two stocks per month in the first six investment months (median number of stocks bought or sold = 1). The results are robust when we use three or four stocks as the cut-off to define active investors or use the rolling window approach to identify active investors.

[insert Table 7 about here]

Collective evidence suggests that the negative impact of stock investment returns on agents' sales commission is consistent with predictions of the reference dependence theory, whereby workers enjoy more leisure and cut back their labor supply when they have reached the reference income within a short time frame.

6. Heterogeneity and Additional Robustness

6.1.Cross-sectional heterogeneity by worker demographics

As stated by Cesarini, et al. (2017) that small average effects could mask large effects in certain subpopulations, we investigate the heterogeneous effects among different worker groups in this section. In Table IA4 in the Internet Appendix, we divide individual workers into subsamples using their gender, average age, years of education, and average work income during our sample period. We find a stronger effect among older and more educated workers, and similar effects across gender and income.

6.2.Robustness tests

6.2.1. The influence of outliers?

We conduct additional tests to corroborate the robustness of our findings. First, our result is not driven by new investors. In Table IA5 of the Internet Appendix, we find that instead of the inexperienced new investors, investors who opened the stock accounts earlier exhibit a larger sales commission response. Second, we use the randomization-based *p*-values approach to examine the outlier issue (Young, 2019). The randomized *p*-value for randomization-*t* (i.e., the superior test statistic in practice) for our main result is 0.0016, suggesting that our findings are not sensitive to outliers. Last, we estimate the sales commission response for each individual by interacting the individual dummies with the last month scaled stock investment returns. A median effect of -0.08%, with 53% of the individuals having a negative sales commission response, further suggests the main finding does not derive from a few outlier investors.

6.2.2. Alternative specifications

In an alternative econometric specification, we include the non-investors in the regression to strengthen our estimation of counterfactuals—their work output helps capture the sales commission trend absent the influence of stock market wealth fluctuations. We include either all

non-investors or the propensity-score matched (PS matched) non-investors (to create a more comparable control group) in the regression and find the effect of the stock investment returns on subsequent worker sales commission remains quantitatively and qualitatively similar. Specifically, the PS matching is based on a logistic regression using a set of worker characteristics including age, gender, education level, urban status, average tenure, job level, and team identifier, and we use the nearest-neighbor-matched non-investor for each investor in the sample. Results are reported in Table IA6 of the Internet Appendix.

Additionally, we examine the robustness of our results under alternative specifications. First, in column (1) of Panel A, Table IA7, we employ the first-difference regression, and show that the first difference of the last-month scaled stock investment returns still significantly decreases the first difference of the current-month scaled sales commissions. We also control for the current-month scaled stock investment returns (column (2)) or lagged scaled sales commission (column (3)) in the regression, and the effect of last-month stock investment returns on current-month sales commission remains strong and robust. Moreover, the sales commission response stays robust under alternative standard error clustering units: by worker, by team, or two-way clustering by team and time (Panel B, Table IA7). The last panel shows that the results are robust when we restrict our analysis to workers with a longer work history (Panel C, Table IA7).

Given that the insurance premium payment schedule for long-term and short-term insurance products could be different, we also investigate the responses of sales commissions generated from long-term and short-term products to stock investment returns separately. We find the response is mainly driven by the long-term insurance products, which account for the major portion of the sales commissions and require more effort to sell on average.

7. Conclusion

This paper provides micro-level evidence of worker output response to changes in stock market wealth. Linking individual-level worker performance data with stock investment information, we find a significant negative effect of the stock investment returns on workers' subsequent sales commission. Specifically, a 10% increase in the monthly stock investment returns is associated with a 3.8% decrease in the insurance sales commission in the subsequent month. We provide a collection of evidence to support the causal interpretation of a labor supply response; the relation between stock investment returns and subsequent sales commission is unlikely driven by omitted variables, including common macro or local economic factors or individual-specific liquidity

needs.

The negative relation between stock investment returns and subsequent sales commission is short-lived: only the last-month stock investment returns exhibit a statistically and economically significant impact on the current-month sales commission. The findings are consistent with the reference dependence theory: workers have a short-term mental account and choose to enjoy more leisure and reduce labor supply when they have reached a reference income. Overall, our results highlight a novel channel of transmitting stock market fluctuations to the real economy through labor supply.

References

Agarwal, Sumit, Chunlin Liu, and Nicholas S. Souleles. 2007. "The Reaction of Consumption and Debt to Tax Rebates: Evidence from the Consumer Credit Data." *Journal of Political Economy* 115: 986-1019.

Agarwal, Sumit, Mi Diao, Jessica Pan, and Tien Foo Sing. 2015. "Are Singaporean Cabdrivers Target Earners?" Working paper.

Agarwal, Sumit, and Wenlan Qian. 2014. "Consumption and Debt Response to Unanticipated Income Shocks: Evidence from a Natural Experiment in Singapore." *American Economic Review* 104: 4205-4230.

Agarwal, Sumit, and Wenlan Qian. 2017. "Access to Home Equity and Consumption: Evidence from a Policy Experiment." *Review of Economics and Statistics* 99(1): 40-52.

Agarwal, Sumit, Wenlan Qian, and Xin Zou. 2021. "Thy Neighbor's Misfortune: Peer Effect on Consumption." *American Economic Journal: Economic Policy* 13(2): 1-25.

Blundell, Richard, and Thomas MaCurdy. 2000. "Labor Supply: A Review of Alternative Approaches." In *Handbook of Labor Economics*, Vol. 3A, edited by Orley Ashenfelter and David Card, 1559–695. Amsterdam: Elsevier.

Browning, Martin, and Dolores Collado. 2001. "The Response of Expenditures to Anticipated Income Changes: Panel Data Estimates." *American Economic Review* 91: 681-692.

Camerer, Colin, Linda Babcock, George Loewenstein, and Richard Thaler. 1997. "Labor Supply of New York City Cabdrivers: One Day at A Time." *The Quarterly Journal of Economics* 112(2): 407-441.

Cameron, A. Colin, Jonah B. Gelbach, and Douglas L. Miller. 2011. "Robust Inference with Multiway Clustering." *Journal of Business & Economic Statistics* 29(2): 238-249.

Cesarini, David, Erik Lindqvist, Matthew J. Notowidigdo, and Robert Östling. 2017. "The Effect of Wealth on Individual and Household Labor Supply: evidence from Swedish lotteries." *American Economic Review* 107(12): 3917-46.

Chetty, Raj, Adam Guren, Day Manoli, and Andrea Weber. 2011. "Are Micro and Macro Labor Supply Elasticities Consistent? A Review of Evidence on the Intensive and Extensive Margins." *American Economic Review* 101(3): 471-75.

Choi, Darwin, Dong Lou, and Abhiroop Mukherjee. 2020. "The Effect of Superstar Firms on College Major Choice." Working paper.

DellaVigna, Stefano, and Joshua M. Pollet. 2009. "Investor Inattention and Friday Earnings Announcements." *The Journal of Finance* 64(2): 709-749.

Di Maggio, Marco, Amir Kermani, Ben Keys, Tomasz Piskorski, Rodney Ramcharan, Amit Seru, and Vincent Yao. 2017. "Interest Rate Pass-Through: Household Consumption and Voluntary Deleveraging." *American Economic Review,* 107(11): 3550-88.

Di Maggio, Marco, Amir Kermani, and Kaveh Majlesi. 2020. "Stock Market Returns and Consumption." *The Journal of Finance,* 75(6):3175-3219.

Farber, Henry S. 2008. "Reference-dependent Preferences and Labor Supply: The Case of New

York City Taxi Drivers." *American Economic Review* 98(3): 1069-82.

Gelman, Michael, Shachar Kariv, Matthew D. Shapiro, Dan Silverman, and Steven Tadelis. 2014. "Harnessing Naturally Occurring Data to Measure the Response of Spending to Income." *Science* 345(6193): 212-215.

Graff Zivin, Joshua, and Matthew Neidell. 2012. "The Impact of Pollution on Worker Productivity." *American Economic Review* 102(7): 3652-73.

Gu, Quanlin, Jia He, Wenlan Qian, and Yuan Ren. 2021. "The Effect of Wealth Shocks on Shirking: Evidence from the Housing Market." Working Paper.

Heath, Chip, Steven Huddart, and Mark Lang. 1999. "Psychological Factors and Stock Option Exercise." *The Quarterly Journal of Economics* 114(2): 601-627.

Hirshleifer, David, Danling Jiang, and Yuting Meng DiGiovanni. 2020. "Mood Beta and Seasonalities in Stock Returns." *Journal of Financial Economics* 137(1): 272-295.

Hirshleifer, David, Sonya Seongyeon Lim, and Siew Hong Teoh. 2009. "Driven to Distraction: Extraneous Events and Underreaction to Earnings News." *The Journal of Finance* 64(5): 2289-2325.

Hirshleifer, David, and Tyler Shumway. 2003. "Good Day Sunshine: Stock Returns and the Weather." *The Journal of Finance* 58(3): 1009-1032.

Hsieh, Chang-Tai. 2003. "Do Consumers React to Anticipated Income Changes? Evidence from the Alaska Permanent Fund." *American Economic Review* 93: 397-405.

Imbens, Guido W., Donald B. Rubin, and Bruce I. Sacerdote. 2001. "Estimating the Effect of Unearned Income on Labor Earnings, Savings, and Consumption: Evidence from a Survey of Lottery Players." *American Economic Review* 91(4): 778-794.

Jappelli, Tullio, and Luigi Pistaferri. 2010. "The Consumption Response to Income Changes." *Annual Review of Economics* 2: 479-506.

Johnson, David S., Jonathan A. Parker, and Nicholas S. Souleles. 2006. "Household Expenditure and the Income Tax Rebates of 2001." *American Economic Review* 96: 1589-1610.

Kamstra, Mark J., Lisa A. Kramer, and Maurice D. Levi. 2003. "Winter Blues: A SAD Stock Market Cycle." *The American Economic Review* 93(1): 324-343.

Li, Han, Li, Jiangyi, Lu, Yi, and Xie, Huihua. 2020. "Housing wealth and labor supply: Evidence from a regression discontinuity design." *Journal of Public Economics* 183: 104139.

Parker, Jonathan A; Nicholas S. Souleles; David S. Johnson; and Robert McClelland. 2013. "Consumer Spending and the Economic Stimulus Payments of 2008." *American Economic Review* 103: 2530-2553.

Pencavel, John. 1986. "Labor Supply of Men: A Survey." *Handbook of Labor Economics* 1: 3-102.

Poterba, James M. 2000. "Stock Market Wealth and Consumption." *Journal of Economic Perspectives* 14(2): 99-118.

Previtero, Alessandro. 2014. "Stock Market Returns and Annuitization." *Journal of Financial Economics* 113(2): 202-214.

Shapiro, Matthew D., and Joel Slemrod. 1995. "Consumer Response to the Timing of Income:

Evidence from a Change in Tax Withholding." *American Economic Review* 85: 274-83.

Shapiro, Matthew D., and Joel Slemrod. 2003. "Consumer Response to Tax Rebates." *American Economic Review* 93: 381-96.

Souleles, Nicholas S. 1999. "The Response of Household Consumption to Income Tax Refunds." *American Economic Review* 89: 947-58.

Stephens, Melvin. 2003. "3rd of the Month: Do Social Security Recipients Smooth Consumption between Checks?" *American Economic Review* 93: 406-22.

Stephens, Melvin. 2006. "Paycheck Receipt and the Timing of Consumption." *The Economic Journal* 116: 680-701.

Stephens, Melvin. 2008. "The Consumption Response to Predictable Changes in Discretionary Income: Evidence from the Repayment of Vehicle Loans." *The Review of Economics and Statistics* 90: 241-52.

Thompson, Samuel B. 2011. "Simple Formulas for Standard Errors that Cluster by Both Firm and Time." *Journal of Financial Economics* 99(1): 1-10.

Young, Alwyn. 2019. "Channeling Fisher: Randomization Tests and the Statistical Insignificance of Seemingly Significant Experimental Results." *The Quarterly Journal of Economics* 134(2): 557-598.

Appendix. Variable Definitions and Constructions

1. Stock Information:

Holding value is the monthly dollar value of stock holdings (in RMB).

Stock inv. return is the monthly dollar value of stock investment returns (in RMB). $Stock\ inv.\ return_t = holding\ value_t - holding\ value_{t-1} + sell\ value_t - buy\ value_t$, where the $sell\ value_t$ is the total dollar value of stocks sold in month *t*, and $buy\ value_t$ is the total dollar value of stocks bought in month *t*.

Stock mkt wealth is the stock market wealth for an individual, proxied by the stock holdings at the end of the corresponding month. If the current-month stock holding is zero, we use the most recent positive stock holding.

Realized return is the monthly dollar value of realized stock investment returns from stock sales (in RMB). We construct this variable by summing up the realized stock investment returns from all stocks held by an individual-month. Specifically, for each stock *s* with stock sales in month *t,* the realized return in month *t* is defined as the difference in selling price and cost price, multiplied by the volume of stocks sold: $realized\ return_{st} = (sell\ price_{st} - cost\ price_{st}) \times sell\ volume_{st}$. The cost price is a weighted average of the buying price in the current month and the holding price in the last month: $cost\ price_{st} = buy\ price_{st} \times \frac{buy\ volume_{st}}{buy\ volume_{st} + holding\ volume_{s,t-1}} + holding\ price_{st-1} \times \frac{holding\ volume_{s,t-1}}{buy\ volume_{st} + holding\ volume_{s,t-1}}$, and $holding\ price_{st-1} = \frac{holding\ value_{s,t-1}}{holding\ volume_{s,t-1}}$. The realized return is 0 for stock-months without stock sales.

Unrealized return is the monthly dollar value of unrealized stock investment returns from stock price changes (in RMB). $Unrealized\ return_t = stock\ return_t - realized\ return_t$.

Only stock sales is a dummy variable equal to 1 if the individual-month only has stock sales.

No. of stocks held is the total number of stocks held for a month by an individual.

Hold local-city stocks is a dummy variable equal to 1 if the individual held any stocks headquartered in the local city in a month.

Proportion of local-city stocks is the fraction of the number of local-city stocks out of the number of all stocks held in a month.

Stock inv. return ex. local is the monthly dollar value of stock investment returns after excluding local-city stocks (in RMB).

Stock mkt wealth ex. local is the stock market wealth after excluding local-city stock holdings (in RMB).

Investment period is a dummy variable equal to 1 if the individual has stock investments in a month.

Volatile mkt is a dummy variable equal to 1 for the months with volatile stock market returns. We define a month as under volatile market condition if it has the top-quartile standard deviation of daily aggregate market returns (for all A-share stocks in the Chinese stock market) since 2000. The rest time during the sample period is classified as under ***nonvolatile mkt*** condition.

2. Work Performance:

Sales commission is the monthly commission income from current-month insurance product sales (in RMB). Sales commission is a linear function of the corresponding insurance policy sold in the same month.
Baseline commission is the average monthly sales commission before the individual's first stock investment return in

the sample, or the first positive sales commission if all sales commissions before the first stock investment return are 0.

Total premium sold is the monthly total dollar amount of insurance policy sales inferred from sales commission (in RMB). ***Baseline premium*** is the average monthly total premium sold before the individual's first stock investment return in the sample, or the first positive total premium sold if all total premiums sold before the first stock investment return are 0.

Installment commission is the monthly commission income from installment payments of insurance policies sold in previous years (in RMB).

Baseline installment commission is the average monthly installment commission before the individual's first stock investment return in the sample, or the first positive installment commission if all installment commissions before the first stock investment return are 0.

Total work income is the monthly total income from work (in RMB). $Total\ work\ income_t = sales\ commission_t + installment\ commission_t + bonus_t$. ***Baseline work income*** is the average monthly total work income before the individual's first stock investment return in the sample, or the first positive total work income if all total work income before the first stock investment return is 0.

Promotion is a dummy variable equal to 1 if the individual has been promoted to a higher job level in a month.

Demotion is a dummy variable equal to 1 if the individual has been demoted to a lower job level in a month.

Exit is a dummy variable equal to 1 for the last month that the individual works for the firm, except the sample end month (i.e., 2016:12).

Withdraw is a dummy variable equal to 1 for the month with any insurance contract withdrawal.

Reach reference income is a dummy variable equal to 1 for the months if the total income (defined as the sum of total work income and stock investment return) has reached the reference point. The rest months are classified as ***not reach reference income***.

3. Worker Characteristics:

Age is the age in years.

Female is a dummy variable equal to 1 for female workers.

Years of education is the years of education received.

Tenure is the number of months that the worker has worked for the firm.

Team manager and above is a dummy variable equal to 1 for individuals whose average job level during the sample period is team manager or above.

High skill investor is an individual who has generated at least three months of positive stock investment returns during the first six investment months. The rest investors are defined as ***low skill*** investors.

Full time is a dummy variable equal to 1 for the full-time workers defined as an individual whose number of working months and fraction of positive sales commission time during the sample period are both above the sample median. The rest workers are classified as ***part time*** workers under the corresponding full-time worker definition.

Higher income vol. is a dummy variable equal to 1 for workers with higher income volatility, defined as the ones with scaled total work income standard deviation (=time series standard deviation of total work income/time series mean

of total work income) higher than the cross-sectional sample median. The rest workers are classified as with ***lower income vol***.

Active investor is a dummy variable equal to 1 for the individual if he/she trades no less than two stocks per month on average in the first six investment months. The rest workers are classified as ***inactive investors***.

>40 years old is a dummy variable equal to 1 for workers whose average age during the sample period is over 40 years. The rest workers are classified as ***≤40 years old***.

More educated is a dummy variable equal to 1 for workers with residualized years of education received higher than the cross-sectional sample median. We residualize education to isolate the role of education from confounding factors. Specifically, for all investors in the sample, we regress the years of education on the female dummy and average age during the sample period, and the regression residual is the residualized years of education received. The rest workers are classified as ***less educated***.

Higher income is a dummy variable equal to 1 for workers with monthly average total work income higher than the cross-sectional median. The rest workers are classified as with ***lower income***.

Earlier entry investors is a dummy variable equal to 1 for investors who opened their stock account earlier than the median year among all workers who have ever opened a stock account with the exchange (i.e., the year 2010). The rest workers are classified as ***later entry investors***.

4. Stock Characteristics:

Market capitalization is the total market value of stocks outstanding for the firm (in billions of RMB).

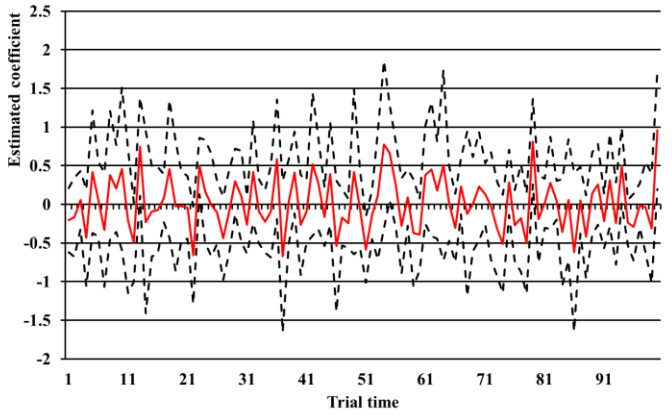
Price-to-earnings ratio is the price per share divided by earnings per share for the firm.

Market-to-book ratio is the total market value divided by the total book value for common stocks.

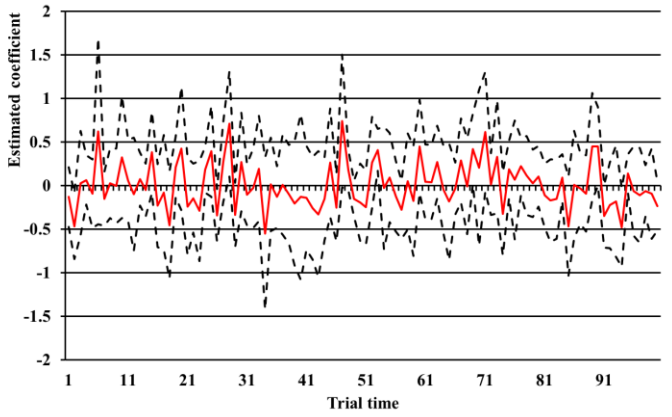
Share turnover rate is the number of stocks traded, divided by the total number of shares outstanding.

Figure 1: Estimated Coefficients from Random Match

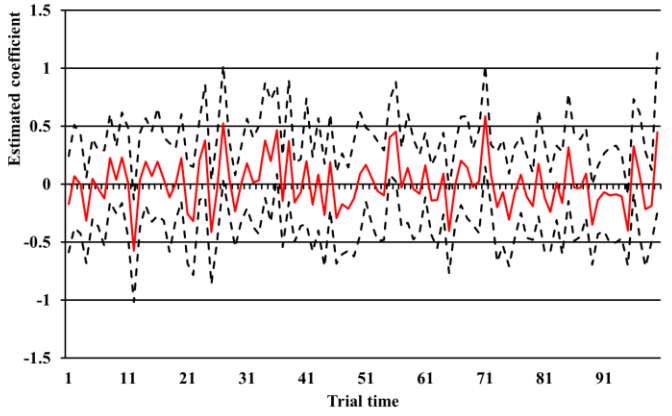
Panel A: Assigning stock investment returns to a random non-investor in the same sub-branch



Panel B: Assigning stock investment returns to a random investor in the same sub-branch



Panel C: Assigning random time for stock investment returns within each investor



Notes: This figure plots the distributions of estimated coefficients with 95% confidence intervals from random return assignment tests. Panel A assigns one investor's scaled stock investment returns to a random non-investor in the same sub-branch and iterates 100 times. Panel B assigns one investor's scaled stock investment returns to a random investor in the same sub-branch and iterates 100 times. Panel C randomly assigns the time of scaled stock investment returns within each investor and iterates 100 times.

Table 1: Summary Statistics: Investors

Panel A: Demographics

	Mean (1)	Median (2)	Std. Dev. (3)
Age	38.3	38.4	9.1
Female(%)	64.6	100.0	47.8
Years of education	14.0	15.0	1.5
Tenure (months)	36.6	11.0	52.4
Team manager and above (%)	2.7	0.0	16.2
No. of workers	3,072		

Panel B: Worker performance

	Mean (1)	Median (2)	Std. Dev. (3)
Sales commission (RMB)	719	258	1,385
Promotion (%)	4.6	4.2	4.4
Demotion (%)	4.3	4.2	4.2
Exit (%)	3.6	0.0	6.5
Withdraw (%)	2.1	0.0	4.8
No. of workers	3,072		

Panel C: Stock information

	Mean (1)	Median (2)	Std. Dev. (3)
Holding value (RMB)	44,666	12,926	98,477
Stock inv. return (RMB)	-1,731	-64	12,088
Realized return (RMB)	711	133	2,898
Unrealized return (RMB)	-2,417	-258	12,122
No. of stocks held	2.6	2.0	2.1
Hold local-city stocks (%)	4.5	0.0	16.5
Proportion of local-city stocks (%)	2.1	0.0	10.3
No. of workers	3,072		

Notes: This table reports the summary statistics for investors in our sample. Panels A-C provide the summary statistics of demographic characteristics, work performance, and stock investment information for investors in our sample during the sample period (i.e., January 2013–December 2016), respectively. All variables are reported as the individual average. Please refer to the appendix for detailed variable definitions. All monetary variables are expressed in RMB, and the average exchange rate between RMB and USD during our sample period is around 0.159 USD per RMB. All monetary variables are winsorized at the 0.5% level.

Table 2: The Effect of Stock Investment Returns

Panel A: Sales commission

	$Sales\ commission_t / Baseline\ commission$
	(1)
$Stock\ inv.return_{t-1} / Stock\ mkt\ wealth_{t-2}$	-0.382***
	[0.12]
Constant	3.941***
	[0.00]
Observations	40,620
R-squared	0.38
Year*Month FE	Yes
Worker FE	Yes

Panel B: Job status and insurance policy withdrawal

	Promotion (%)	*Demotion (%)*	*Exit (%)*	*Withdraw (%)*
	(1)	(2)	(3)	(4)
$Stock\ inv.return_{t-1} / Stock\ mkt\ wealth_{t-2}$	0.187	-0.502	-0.105	-0.008
	[0.32]	[0.40]	[0.18]	[0.23]
Constant	4.940***	4.740***	2.507***	2.679***
	[0.01]	[0.01]	[0.00]	[0.00]
Observations	40,620	40,620	40,620	40,620
R-squared	0.08	0.16	0.18	0.14
Year×Month FE	Yes	Yes	Yes	Yes
Worker FE	Yes	Yes	Yes	Yes

Panel C: Non-performance-related commission income

	$\frac{Installment\ commission_t}{Baseline\ installment\ commission}$
	(1)
$Stock\ inv.return_{t-1} / Stock\ mkt\ wealth_{t-2}$	0.094
	[0.06]
Constant	1.548***
	[0.00]
Observations	24,737
R-squared	0.41
Year×Month FE	Yes
Worker FE	Yes

Notes: This table reports the average effect of the last month scaled stock investment returns. Panel A reports the effect of last-month scaled stock investment returns on the current-month scaled sales commission. Panel B reports the effect of last month scaled stock investment returns on four indicator variables: promotion, demotion, exit the firm, and insurance contract withdrawal. Panel C reports the effect of last month scaled stock investment returns on the scaled installment commission. Please refer to the appendix for detailed variable definitions. Months used to calculate the baseline commissions are excluded from the regressions. Individual and year-month fixed effects are included. Standard errors clustered at the individual and year-month level are reported in brackets. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table 3: Disentangling Confounding Macro and Local Economic Factors

Panel A: Within sub-branch random assignment of stock investment returns (iterate 100 times)

	Investor's returns to a random non-investor	Investor's returns to a random investor	Random return time within investor
	(1)	(2)	(3)
Mean of coefficients: $Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}$	0.013	0.006	0.003
T statistic	(0.37)	(0.21)	(0.12)

Panel B: Exogenous variation in stock investment returns

	$Sales\ commission_t/Baseline\ commission$	
	Exclude local stocks	High skill vs. low skill investors
	(1)	(2)
$Stock\ inv.return\ ex.\ local_{t-1}/Stock\ mkt\ wealth\ ex.local_{t-2}$	-0.334**	
	[0.12]	
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: low\ skill$		-0.440**
		[0.17]
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: high\ skill$		-0.700*
		[0.38]
Constant	3.947***	3.913***
	[0.00]	[0.00]
Observations	40,155	34,234
R-squared	0.38	0.40
Year×Month FE	Yes	Yes
Worker FE	Yes	Yes

Notes: This table presents the results for tests disentangling the confounding macro and local economic factors. Panel A reports the mean and t-statistics of the 100 estimated coefficients for the last-month scaled stock investment returns from three sets of random matches. Column (1) reports the result when one investor's scaled stock investment returns are assigned to a random non-investor in the same sub-branch. For the randomly picked non-investor, the baseline commission is calculated as the average monthly sales commission before the corresponding investor's first stock investment return in the sample, or the first positive sales commission if all sales commissions before the corresponding investor's first stock investment return are 0. Column (2) reports the result when one investor's scaled stock investment returns are assigned to a random investor in the same sub-branch. Column (3) reports the result when the time of receiving scaled stock investment returns is randomly assigned within each investor. Panel B investigates the effects from the subsample of stocks or investors that the stock investment returns' variations are more exogenous. Column (1) excludes the local-city stocks from the analysis. Column (2) examines the effect from high-skill investors and low-skill investors respectively. High-skill investors are defined as those who generate at least three months of positive stock investment returns during the first six investment months. Returns from the first six investment months are excluded from this regression. Please refer to the appendix for detailed variable definitions. Months used to calculate the baseline commission are excluded from the regressions. Individual and year-month fixed effects are included. Standard errors clustered at the individual and year-month level are reported in brackets of Panel B. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table 4: Alternative Explanation: Individual-specific Liquidity Needs

	$Sales\ commission_t / Baseline\ commission$	
	Control for realized stock investment returns	Months with only stock sales vs. other months
	(1)	(2)
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}$	-0.339***	
	[0.10]	
$Realized\ stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}$	-0.416	
	[0.67]	
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: other\ months$		-0.345***
		[0.11]
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: only\ stock\ sales$		-1.243
		[1.31]
Constant	3.946***	3.940***
	[0.00]	[0.00]
Observations	40,620	40,620
R-squared	0.38	0.38
Year×Month FE	Yes	Yes
Worker FE	Yes	Yes

Notes: This table investigates whether the effect is driven by individual-specific liquidity needs. Column (1) controls for the effect of the last month scaled realized stock investment returns. Column (2) examines the effects from individual-months if the last month has only stock sales and the rest months when investors do not only have stock sale transactions respectively. Please refer to the appendix for detailed variable definitions. Months used to calculate the baseline commission are excluded from the regressions. Individual and year-month fixed effects are included. Standard errors clustered at the individual and year-month level are reported in brackets. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table 5: External Validity Tests

	$Sales\ commission_t/Baseline\ commission$		
	Full time vs. part time workers	Workers with higher vs. lower income volatility	Weighted regression
	(1)	(2)	(3)
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: part\ time$	-0.220		
	[0.18]		
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: full\ time$	-0.506*		
	[0.27]		
$Stock\ inv\ return_{t-1}/Stock\ mkt\ wealth_{t-2}: lower\ income\ vol.$		-0.438*	
		[0.22]	
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: higher\ income\ vol.$		-0.330**	
		[0.13]	
$Stock\ inv\ return_{t-1}/Stock\ mkt\ wealth_{t-2}$			-0.562***
			[0.18]
Constant	3.941***	3.941***	3.566***
	[0.00]	[0.00]	[0.03]
Observations	40,620	40,620	39,089
R-squared	0.38	0.38	0.37
Year×Month FE	No	No	Yes
Worker group×Year×Month FE	Yes	Yes	No
Worker FE	Yes	Yes	Yes

Notes: This table examines the external validity of the main result. Column (1) reports the effect of the last month scaled stock investment returns on scaled sales commission for part-time and full-time workers, respectively. Full-time worker is defined as an individual whose number of working months and fraction of positive sales commission time during the sample period are both above the sample median. Column (2) investigates the heterogeneous effect for workers by income volatility. A worker is defined as with higher income volatility if his/her scaled total work income standard deviation (=time series standard deviation of total work income/time series mean of total work income) is higher than the cross-sectional sample median. Column (3) reweight the worker investor sample in our study to match the age, gender, and stock market wealth distribution of the Chinese investing households. Please refer to the appendix for detailed variable definitions. Months used to calculate baseline commission are excluded from the regressions. Individual and worker group-specific year-month fixed effects are included in columns (1)-(2); Individual and year-month fixed effects are included in column (3). Standard errors clustered at the individual and year-month level are reported in brackets. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table 6: Investigating the Economic Mechanism

Panel A: Effect persistence

	$Sales\ commission_t / Baseline\ commission$
	(1)
$Stock\ inv.return_{t-1} / Stock\ mkt\ wealth_{t-2}$	-0.403**
	[0.20]
$Stock\ inv.return_{t-2} / Stock\ mkt\ wealth_{t-3}$	0.094
	[0.31]
$Stock\ inv.return_{t-3} / Stock\ mkt\ wealth_{t-4}$	0.319
	[0.29]
Constant	3.906***
	[0.02]
Observations	36,135
R-squared	0.38
Year×Month FE	Yes
Worker FE	Yes

Panel B: Reach reference income vs. not reach reference income

	$Sales\ commission_t / Baseline\ commission$	
	Average work income in last evaluation period as reference income	Average work income in previous 3 months as reference income
	(1)	(2)
$\frac{Stock\ inv.return_{t-1}}{Stock\ mkt\ wealth_{t-2}} : not\ reach\ reference\ income$	-0.068	-0.062
	[0.36]	[0.34]
$\frac{Stock\ inv.return_{t-1}}{Stock\ mkt\ wealth_{t-2}} : reach\ reference\ income$	-0.561**	-0.551**
	[0.22]	[0.26]
Constant	3.964***	4.044***
	[0.02]	[0.02]
Observations	36,030	33,045
R-squared	0.38	0.38
Year×Month FE	Yes	Yes
Worker FE	Yes	Yes

Notes: Panel A investigates the effect of scaled stock investment returns in the past three months on scaled sales commission. Panel B investigates the effect of last month scaled stock investment returns on scaled sales commission when the total income (defined as the sum of total work income and stock investment return) has reached the reference point versus not reached the reference point separately in last month. Column (1) defines the reference income for each month as the average total work income in the last performance evaluation period (i.e., average total work income during January to March as target income from April to June of calendar year *y*). Column (2) defines the reference income for each month as the average total work income in the past three months rolling window. Please refer to the appendix for detailed variable definitions. Months used to calculate the baseline commissions are excluded from the regressions. Individual and year-month fixed effects are included. Standard errors clustered at the individual and year-month level are reported in brackets. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table 7: Investor Distraction Effect?

	$Sales\ commission_t/Baseline\ commission$		
	Inv. vs. non-inv.period	Active vs. inactive investor	Volatile vs. non-volatile market
	(1)	(2)	(3)
$Investment\ period_{t-1}$	0.022		
	[0.29]		
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: inactive\ investors$		-0.624***	
		[0.22]	
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: active\ investors$		-0.218	
		[0.20]	
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: nonvolatile\ mkt$			-0.404**
			[0.17]
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: volatile\ mkt$			-0.365***
			[0.10]
Constant	3.245***	3.915***	3.942***
	[0.16]	[0.00]	[0.00]
Observations	69,746	34,234	40,620
R-squared	0.40	0.40	0.38
Year×Month FE	Yes	No	Yes
Worker group×Year×Month FE	No	Yes	No
Worker FE	Yes	Yes	Yes

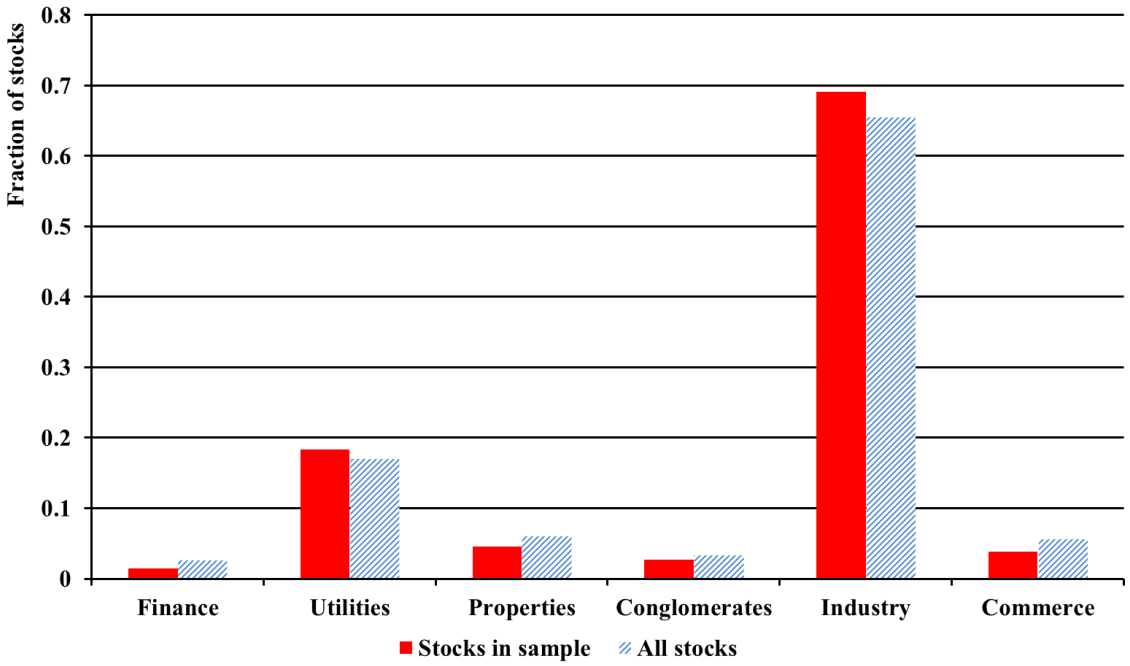
Notes: This table investigates the distraction effect. Column (1) tests the effect of stock investments on scaled sales commission. Column (2) reports the effect of the last month scaled stock investment returns on scaled sales commission for inactive and active investors, respectively. A worker is defined as an active investor if he/she trades on average no less than two stocks per month in the first six investment months. Returns from the first six investment months are excluded from this regression. Column (3) reports the effect of the last month scaled stock investment returns on scaled sales commission during volatile and non-volatile market times. Please refer to the appendix for detailed variable definitions. Months used to calculate baseline commission are excluded from the regressions. Individual and worker group-specific year-month fixed effects are included in column (2); individual and year-month fixed effects are included in columns (1) and (3). Standard errors clustered at the individual and year-month level are reported in brackets. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

INTERNET APPENDIX

FOR
EMPLOYEE OUTPUT RESPONSE TO STOCK MARKET WEALTH SHOCKS

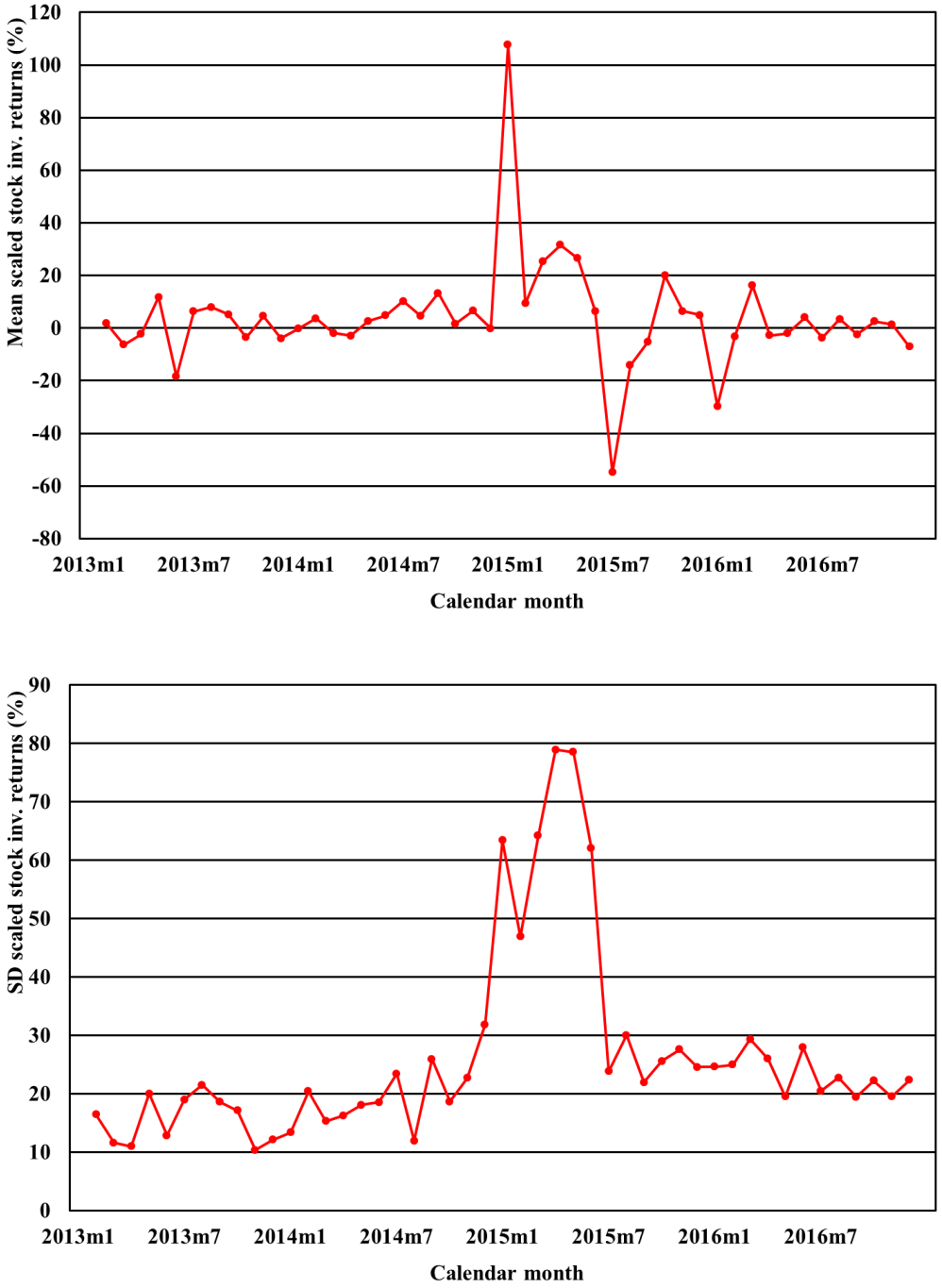
NOT FOR PUBLICATION

Figure IA1: Stock Industry Distribution



Notes: This figure plots the industry distribution of stocks held by workers in the sample and all A-share stocks in the Chinese stock market during the sample period (i.e., 2013–2016).

Figure IA2: Variation of Stock Investment Returns over Time and across Investors



Notes: This top panel plots the monthly average scaled stock investment returns of all investors during our sample period (2013:01-2016:12). The bottom panel plots the standard deviation of the scaled stock investment returns across all investors for each month during our sample period. Please refer to the appendix for detailed variable definitions.

Table IA1: Additional Summary Statistics

Panel A: Demographics (non-investors)

	Mean	Median	Std. Dev.
	(1)	(2)	(3)
Age	35.8	35.0	8.6
Female(%)	64.8	100.0	47.8
Years of education	14.2	15.0	1.4
Tenure (months)	18.6	4.5	37.7
Team manager and above (%)	1.1	0.0	10.2
No. of workers	14,345		

Panel B: Worker performance (non-investors)

	Mean	Median	Std. Dev.
	(1)	(2)	(3)
Sales commission (RMB)	609	264	1,093
Promotion (%)	5.1	0.0	6.9
Demotion (%)	2.6	0.0	4.4
Exit (%)	5.8	0.0	12.2
Withdraw (%)	1.8	0.0	6.0
No. of workers	14,345		

Panel C: Stock characteristics in 2012

	Stocks held by investors in the sample		Other A-share stocks		Difference in means: (1)-(3)
	Mean	Median	Mean	Median	
	(1)	(2)	(3)	(4)	(5)
Market capitalization (RMB, in billions)	4.7	2.5	12.5	4.3	-7.8***
Price-to-earnings ratio	61.5	30.4	62.5	25.2	-1.0
Market-to-book ratio	2.7	2.2	3.0	1.9	-0.3*
Share turnover rate (%)	27.1	19.4	25.7	17.8	1.4
No. of firms	1,498		934		

Notes: This table reports additional summary statistics. Panels A and B provide the summary statistics of demographic characteristics and work performance for the non-investors without any stock investment during our sample period respectively. Panel C compares the stock characteristics for A-share stocks that have ever been held and that have never been held by investors in our sample by December 31, 2012. Differences in the means of each variable are reported in column (5). ***, **, and * indicate significance at 1%, 5%, and 10%, respectively. Please refer to the appendix for detailed variable definitions. All monetary variables are expressed in RMB, and the average exchange rate between RMB and USD during our sample period is around 0.159 USD per RMB. All non-dummy variables are winsorized at the 0.5% level.

Table IA2: Response Heterogeneity by Return Magnitude Relative to Income

	$Sales\ commission_t / Baseline\ commission$		
	Large if $\lvert Stock\ inv.return_{t-1} / Baseline\ work\ income_{t-1} \rvert > X$		
	X=1	X=6	X=12
	(1)	(2)	(3)
$Stock\ inv.return_{t-1} / Stock\ mkt\ wealth_{t-2} : small\ return$	-0.236	-0.428	-0.339
	[0.53]	[0.29]	[0.23]
$Stock\ inv.return_{t-1} / Stock\ mkt\ wealth_{t-2} : large\ return$	-0.394***	-0.369***	-0.405***
	[0.13]	[0.13]	[0.14]
Constant	3.940***	3.941***	3.940***
	[0.00]	[0.00]	[0.00]
Observations	40,620	40,620	40,620
R-squared	0.38	0.38	0.38
Year×Month FE	Yes	Yes	Yes
Worker FE	Yes	Yes	Yes

Notes: This table reports the heterogeneous effect by the magnitude of stock investment returns relative to baseline work income. Stock investment returns with absolute dollar value higher than *X* times one's baseline work income are defined as large stock investment returns. *X* takes the value of 1, 6, and 12 in columns (1)– (3) respectively. Please refer to the appendix for detailed variable definitions. Months used to calculate baseline commission and baseline work income are excluded from the regressions. Individual and year-month fixed effects are included. Standard errors clustered at the individual and year-month level are reported in brackets. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table IA3: The Effect of Stock Investment Returns on Insurance Policy Sales

	$Total\ premium\ sold_t/Baseline\ premium$
	(1)
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}$	-0.338***
	[0.11]
Constant	3.709***
	[0.00]
Observations	40,620
R-squared	0.40
Year×Month FE	Yes
Worker FE	Yes

Notes: This table reports the average effect of the last month scaled stock investment returns on investors' scaled total insurance premiums sold. Please refer to the appendix for detailed variable definitions. Months used to calculate baseline premiums are excluded from the regressions. Individual and year-month fixed effects are included. Standard errors clustered at the individual and year-month level are reported in brackets. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table IA4: Response Heterogeneity by Worker Demographics

	$Sales\ commission_t / Baseline\ commission$			
	Gender	Age	Education	Income
	(1)	(2)	(3)	(4)
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: male$	-0.184			
	[0.25]			
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: female$	-0.474**			
	[0.18]			
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: \leq 40\ years\ old$		0.051		
		[0.14]		
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: > 40\ years\ old$		-0.847***		
		[0.30]		
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: less\ educated$			0.035	
			[0.22]	
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: more\ educated$			-0.783***	
			[0.23]	
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: lower\ income$				-0.229
				[0.16]
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}: higher\ income$				-0.544**
				[0.22]
Constant	3.940***	3.942***	3.939***	3.941***
	[0.00]	[0.00]	[0.00]	[0.00]
Observations	40,620	40,620	40,620	40,620
R-squared	0.38	0.38	0.38	0.38
Worker group×Year×Month FE	Yes	Yes	Yes	Yes
Worker FE	Yes	Yes	Yes	Yes

Notes: This table investigates the heterogeneous effect by worker demographics. Column (1) reports the effect of the last month scaled stock investment returns on scaled sales commission for male and female workers, respectively. Column (2) reports the heterogeneous effect for workers with age below and above 40 years old, respectively. Column (3) reports the heterogeneous effect for less educated and more educated workers respectively. Column (4) reports the heterogeneous effect for higher-income and lower-income workers, respectively. Please refer to the appendix for detailed variable definitions. Months used to calculate baseline commission are excluded from the regressions. Individual and worker group-specific year-month fixed effects are included. Standard errors clustered at the individual and year-month level are reported in brackets. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table IA5: Response Heterogeneity by Stock Market Entry Time

	$Sales\ commission_t / Baseline\ commission$
	(1)
$Stock\ inv.return_{t-1} / Stock\ mkt\ wealth_{t-2} : later\ entry$	0.033
	[0.20]
$Stock\ inv.return_{t-1} / Stock\ mkt\ wealth_{t-2} : earlier\ entry$	-0.562***
	[0.17]
Constant	3.945***
	[0.00]
Observations	40,620
R-squared	0.38
Worker group×Year×Month FE	Yes
Worker FE	Yes

Notes: This table reports the heterogeneous effect by the stock market entry time of the investors in the sample. Please refer to the appendix for detailed variable definitions. Months used to calculate baseline commission are excluded from the regressions. Individual and worker group-specific year-month fixed effects are included. Standard errors clustered at the individual and year-month level are reported in brackets. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table IA6: Alternative Specification: Including Non-investors as the Control Group

	$Sales\ commission_t / Baseline\ commission$	
	All non-investors	PS matched non-investors
	(1)	(2)
$Stock\ inv.return_{t-1} / Stock\ mkt\ wealth_{t-2}$	-0.416***	-0.448***
	[0.10]	[0.10]
Constant	2.722***	3.352***
	[0.00]	[0.00]
Observations	178,916	88,483
R-squared	0.36	0.37
Year×Month FE	Yes	Yes
Worker FE	Yes	Yes

Notes: This table reports the average effect of the last month scaled stock investment returns on workers' scaled sales commission when non-investors are included in the regression. Column (1) includes all non-investors without stock investments during our sample period in the regression. Column (2) includes the PS-matched non-investors in the regression. The PS matching is based on a logistic regression using a set of worker characteristics including age, gender, education level, urban status, average tenure, job level, and team identifier during our sample period. We use the nearest-neighbor-matched non-investors for each investor in the sample. Stock investment returns for all non-investors are assigned as 0. The baseline commission for non-investors is the average sales commission for the three months starting with the first positive sales commission. Please refer to the appendix for detailed variable definitions. Months on and before those used to calculate baseline commission are excluded from the regressions. Individual and year-month fixed effects are included. Standard errors clustered at the individual and year-month level are reported in brackets. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Table IA7: Robustness Tests

	Δ Sales commission$_t$/Baseline commission	Sales commission$_t$/Baseline commission	
	(1)	(2)	(3)
ΔStock inv.return$_{t-1}$/Stock mkt wealth$_{t-2}$	-0.468**		
	[0.19]		
Stock inv.return$_{t-1}$/Stock mkt wealth$_{t-2}$		-0.368**	-0.392***
		[0.14]	[0.12]
Stock inv.return$_t$/Stock mkt wealth$_{t-1}$		0.094	
		[0.25]	
Sales commission$_{t-1}$/Baseline commission			0.053*
			[0.03]
Constant	-0.103***	3.969***	3.752***
	[0.00]	[0.01]	[0.12]
Observations	37,264	39,128	39,369
R-squared	0.01	0.38	0.38
Year×Month FE	Yes	Yes	Yes
Worker FE	Yes	Yes	Yes

Panel B: Alternative SE clustering units

	Sales commission$_t$/Baseline commission, cluster SE by		
	Worker	Team	Team and year-month
	(1)	(2)	(3)
Stock inv.return$_{t-1}$/Stock mkt wealth$_{t-2}$	-0.382**	-0.382*	-0.382***
	[0.19]	[0.20]	[0.12]
Constant	3.941***	3.941***	3.941***
	[0.01]	[0.04]	[0.00]
Observations	40,620	40,620	40,620
R-squared	0.38	0.38	0.38
Year×Month FE	Yes	Yes	Yes
Worker FE	Yes	Yes	Yes

Panel C: Restrict to active workers

	$Sales\ commission_t/Baseline\ commission$	
	At least 6 months of work	At least 12 months of work
	(1)	(2)
$Stock\ inv.return_{t-1}/Stock\ mkt\ wealth_{t-2}$	-0.357***	-0.363***
	[0.12]	[0.13]
Constant	3.940***	4.181***
	[0.00]	[0.00]
Observations	40,253	36,325
R-squared	0.38	0.38
Year×Month FE	Yes	Yes
Worker FE	Yes	Yes

Notes: This table investigates three sets of robustness tests. Panel A employs alternative specifications of the regression. Column (1) tests the effect of the first difference of scaled last-month stock investment returns on the first difference of investors' scaled sales commission. Column (2) further controls for the current month scaled stock investment returns in the regression. Column (3) further controls for the last month scaled sales commission in the regression. Panel B investigates alternative standard error clustering units. Standard errors are clustered at the individual level, team level, and team and year-month level in columns (1)-(3) respectively. Panel C restricts the analysis to active workers. Active workers are defined as individuals with at least 6 or 12 months of work in columns (1)–(2) respectively. Please refer to the appendix for detailed variable definitions. Months used to calculate baseline commission are excluded from the regressions. Individual and year-month fixed effects are included, except for column (1), Panel A. Standard errors clustered at the individual and year-month level are reported in brackets for Panel A and C. Standard errors clustered at the corresponding unit are reported in brackets for Panel B. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively.