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## The effect of fraud experience on investment behavior

Gady Jacoby<sup>a</sup>, Chi Liao<sup>b,\*</sup>, Xiaomeng Lu<sup>c,1</sup>, Fang Wan<sup>b</sup><sup>a</sup> School of Economics, College of Management Academic Studies, Israel<sup>b</sup> Asper School of Business, University of Manitoba, Canada<sup>c</sup> Southwestern University of Finance and Economics, China

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## ABSTRACT

Given the recent increases in fraud targeted at households, we examine the effect of household-level fraud experience on investment behavior for a representative sample of Chinese households. Using a difference-in-differences approach with matching, we find that households exposed to fraud are less likely to invest in high-risk assets such as stocks and derivatives and allocate less of their portfolio to high-risk assets. We find that the relationship between fraud experience and investment behavior is driven by households with high risk aversion and not low trust.

## 1. Introduction

There have been significant increases in the frequency of fraud targeting households around the world. The [Federal Trade Commission \(2021\)](#) reports that in 2020, U.S. consumers reported 2.23 million cases of fraud resulting in losses of \$3.43 billion, up from 1.3 million cases and losses of \$1.08 billion in 2017. Developing countries have also seen rapidly increasing cases of fraud. According to a Government of China report, 49.96% of internet users in China experienced online fraud in 2018, an increase of 20.06% over the previous year ([Zhou and Zhang, 2019](#)). Given the 20 to 30% annual increases in the incidents of fraud in China over the past decade ([Xu and Gao, 2020](#)), it is imperative to examine the effects that fraud experience can have on investment behavior for households in developing countries where financial market participation is becoming more prevalent.

Corporate scandals and financial misconduct have been shown to decrease lifetime labor income ([Knüpfer et al., 2021](#)) and stock market participation ([Giannetti and Wang, 2016](#)), as well as increase the withdrawal of assets from financial advisers ([Gurun et al., 2018](#)). These studies posit that exposure to Ponzi schemes and corporate fraud decreases trust, which subsequently affects household financial decision-making ([Guiso et al., 2008](#); [Choi and Robertson, 2020](#)). [Guiso et al. \(2008\)](#) show that a lack of trust in markets and financial institutions results in a higher perceived risk of being cheated, thus decreasing participation rates. However, there is a lack of studies examining the effect of fraud targeted at households on subsequent household investment behavior and the direct roles that trust and risk aversion can have on this relationship. More specifically, the effects of fraud may differ for households with varying levels of risk aversion and trust. For example, the investment decision-making of households with high risk aversion or low trust may be the most affected by fraud experience since these groups are already the least likely to participate in stock markets. If these people experience fraud, such victimization may push them from being a marginal investor to not investing at all, thus suffering the greatest consequences in terms of lifetime assets and wealth accumulation as a result of the fraud experience.

\* Corresponding author.

E-mail addresses: [gady.jacoby@colman.ac.il](mailto:gady.jacoby@colman.ac.il) (G. Jacoby), [chi.liao@umanitoba.ca](mailto:chi.liao@umanitoba.ca) (C. Liao), [luxiaomeng@swufe.edu.cn](mailto:luxiaomeng@swufe.edu.cn) (X. Lu), [fang.wan@umanitoba.ca](mailto:fang.wan@umanitoba.ca) (F. Wan).<sup>1</sup> Lu was supported by 111 Project (Number: B16040); the National Natural Science Foundation of China (Number: 72003149).<https://doi.org/10.1016/j.ememar.2023.101007>

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In this study, we fill this gap and examine the effects of household-level fraud experience on investment behavior, and importantly, whether the effects are driven by households with high risk aversion or low trust. While most survey datasets do not contain data on household fraud experience, risk aversion, and trust, the China Household Finance Survey (CHFS) contains detailed data on household fraud experience in its 2015 survey wave. Further, the CHFS contains data on household risk aversion and trust, as well as investment behavior and demographic characteristics for a representative sample of Chinese households. The CHFS is representative of the Chinese population due to its high participant response rate (Gan et al., 2016), and as a result, it has been increasingly used in finance and economics studies (e.g., Zhou, 2014; Xie and Zhou, 2014; Du and Zhang, 2015; Cooper et al., 2018; Han et al., 2018; Chen et al., 2019; Clark et al., 2019).

Using the CHFS data, we leverage a combination of propensity score matching (PSM) and difference-in-differences (DD) methodologies to estimate the effect of fraud experience on investment decision-making. Since those who experience fraud are likely different from those who do not, we leverage the comprehensive demographic and socioeconomic data in the CHFS to match those who experience fraud to a control group that is similar in terms of their age, education, wealth, family structure, and other characteristics. Using this matched sample and a DD approach with household and year fixed effects, we estimate the difference in the changes in investment behavior before and after the fraud experience for the treated group that experiences fraud relative to the matched control group.

We find that fraud experience decreases both the probability of owning high-risk assets and the proportion invested in high-risk assets. Further, we find that the relationship between fraud experience and investment behavior is driven by households with high risk aversion. More specifically, we find that when households with high risk aversion experience fraud, they are less likely to invest in high-risk assets and invest less in high-risk assets, relative to low-risk-aversion households that do experience fraud. However, we find no evidence that the relationship between fraud experience and subsequent investment behavior is driven by low-trust households.

Our paper contributes to two strains of literature. First, we contribute to the body of research examining the effects of fraud and trust on investment behavior and financial outcomes. Recently, corporate scandals and financial misconduct have been shown to decrease stock market participation (Giannetti and Wang, 2016), and increase withdrawals of assets from financial advisers (Gurun et al., 2018). Knüpfer et al. (2021) find that victims of a Ponzi scheme earn less income and experience higher rates of indebtedness and divorce. Using the quality of political institutions to proxy for changes in trust, Georgarakos and Pasini (2011) find that the effect of trust is stronger in countries with limited participation and low trust. While these studies use proxies for trust or posit that fraud experience affects investment behavior via loss of trust, we contribute to this literature by using survey data that can measure household-level fraud experience, risk aversion, and trust to directly examine whether variation in risk aversion and trust impact the relationship between fraud experience and investment behavior.

Second, this paper contributes to the larger literature on the determinants of household stock market participation and portfolio allocation. The ability to earn returns on equity is central to household wealth accumulation and welfare. While theory dictates that investors should hold at least some or near all of their wealth in stock markets (e.g., Merton, 1969, 1975; Heaton and Lucas, 1997), more than half of the populations of the U.S., U.K., Germany, Italy, and the Netherlands do not own any stocks or higher-risk financial instruments (Mankiw and Zeldes, 1991; Haliassos and Bertaut, 1995; Guiso et al., 2002; Guiso et al., 2008; Christelis et al., 2013; Badarinta et al., 2016). The proportion of households that participate in financial markets is even lower in developing countries. Using the 2011 wave of the CHFS, Gan et al. (2016) find that among Chinese households, the rate of financial market participation is 11.5% and the rate of stock market participation is 8.8%. While financial market participation is low in China relative to developed countries, the rapid development of China's financial markets and households' growing interest in them requires a more thorough understanding of the cross-sectional variation in the investment behavior of Chinese households, as well as the impediments to market participation, such as fraud. We build on this literature by showing that after experiencing fraud, households decrease investment in high-risk assets; this relationship is primarily driven by households with high risk aversion. Thus, for households with high risk aversion that are, ceteris paribus, less likely to participate in financial markets, the experience of fraud may be enough to cause divestment of their high-risk assets and surrender their ability to reap financial market returns.

## 2. Data and methodology

### 2.1. Data

We use data from the China Household Finance Survey (CHFS), a longitudinal panel survey of Chinese households conducted by the Survey and Research Center for China Household Finance at the Southwestern University of Finance and Economics in China. The CHFS contains data on demographic and socioeconomic characteristics, as well as biennial data on the financial portfolios of a representative sample of Chinese households starting in 2011.<sup>2</sup> Gan et al. (2016) find that response rates and data quality in the CHFS are high and show that the demographic characteristics of CHFS participants are representative and comparable to census data. Given the representativeness and validity of CHFS data, an increasing number of studies in recent years use the data to study Chinese

<sup>2</sup> In order to ensure the representativeness of the sample, the survey adopts a sampling design combining stratification, a three-stage proportional to scale (PPS) method, and key sampling. In the first stage, the country's cities and counties are divided into ten tiers according to per capita GDP, and sample cities and counties are randomly selected in layers; in the second stage, four communities are randomly selected from the selected sample cities and counties; in the third stage, residents are randomly selected from the selected communities. The implementation of sampling at each stage adopts the PPS method, and its weight is the population of the sampling unit.

households. For example, [Xie and Zhou \(2014\)](#) examine the drivers of increasing income inequality in China, [Du and Zhang \(2015\)](#) explore the effects of home purchase restrictions on housing prices, and [Chen et al. \(2019\)](#) study the effects of social norms on household savings rates.

We use data from the 2013, 2015, and 2017 CHFS survey waves which contain data on both risk aversion and trust, as well as financial assets.<sup>3</sup> To measure household investment behavior, we classify stocks, stock funds, and derivatives as high-risk investments. We create a dummy variable to measure high-risk asset participation that indicates whether a household holds high-risk investments. In addition, we create a high-risk portfolio allocation variable that is constructed by taking the ratio of the total value of high-risk assets to the household's total financial portfolio value.

To measure household-level fraud experience — our independent variable of interest — we use the 2015 wave of the CHFS, which reports whether participants experienced fraud over the past year.<sup>4</sup> This survey wave is the only year in which respondents were queried on fraud experience, so, as we describe in more detail below, we will examine the differences in investment behavior before and after the fraud experience for households that experienced fraud relative to those that did not. To measure risk aversion, participants were asked on a scale of 1 (high risk and return) to 5 (unwilling to carry any risk) how much risk and return they prefer. Participants were also asked whether they trust strangers on a scale of 1 (trust very much) to 5 (distrust very much). For ease of interpretation, we reverse the trust scale so that higher values correspond to higher trust. Given this data, we are able to measure household-level fraud experience as well as risk aversion and trust, allowing us to directly examine how risk aversion and trust impact the relationship between fraud experience and investment behavior.

## 2.2. Empirical methodology

We use a combination of matching and difference-in-differences (DD) estimation to quantify the effect of fraud experience, as well as the moderating effects of risk aversion and trust, on investment decision-making. Using a propensity score matching (PSM) approach ensures that our control group of households that do not experience fraud and our treated group of households that do experience fraud are otherwise similar. Further, the DD estimation includes time-varying controls in addition to household and year fixed effects. Together, this ensures that neither observable characteristics, such as education or wealth, nor time-invariant unobservable characteristics are driving our results.

### 2.2.1. Propensity score matching

In the 2015 wave of the CHFS, participants were asked whether they experienced fraud over the past year. Thus, we use data from the 2013 survey wave, the only pre-treatment observation, to perform a one-to-one nearest-neighbor PSM with replacement for households. We match those who experience fraud in the year prior to 2015 to a control group of households based on demographic and socioeconomic characteristics including risk aversion, trust, age, age squared, family size, and log wealth, as well as dummies for male, primary school education, secondary school education, higher education, marital status, affiliation with the Communist party, home ownership, and rural residence. This ensures that in our analysis, we are comparing those who experienced fraud to a control group of households that are similar among these dimensions and that these characteristics are not driving the relationship between fraud experience and investment behavior.

To ensure there is good matching quality, we show in [Fig. 1](#) that there is a common support and good overlap in propensity score distributions between the treated and matched households ([Heinrich et al., 2010](#)). In addition, [Table 1](#) reports univariate tests to examine the covariate balance in the pre-treatment period (i.e., 2013) between treated households that experienced fraud and control households that did not. Panel A of [Table 1](#) shows that there is an imbalance between the two groups prior to matching and Panel B shows that the imbalances become insignificant after matching. This PSM procedure ensures that prior to the fraud experience, treatment and control households are drawn from similar distributions. Since the 2013 survey wave is our only pre-treatment observation, we are unable to examine pre-treatment trends.

In [Table 2](#), we report summary statistics, which are similar to those found in other studies using CHFS data (e.g., [Gan et al., 2016](#)), for the matched sample of household-year observations. In our sample of Chinese households, we find that only 10.8% own high-risk investments including stocks, stock funds, and derivatives and sample households hold 4.5% of their portfolios in high-risk assets, on average. The relatively low allocation to risky assets is consistent with the high levels of risk aversion that households in our sample report. On a score of 1 (low) to 5 (high), the average level of risk aversion for households in our sample is 4.16, which suggests that households in our sample are only willing to accept a very low level of risk, on average. The average level of household trust, also measured on a scale of 1 (low) to 5 (high), is 2.16, which suggests our sample is somewhat distrustful of strangers.

In terms of the demographic and socioeconomic characteristics, the average age of the household head is 54.5 and 81% of household heads are male. 60.3%, 19.3%, and 14.0% of household heads completed primary school, secondary school, and higher education, respectively. The average family size is 3.58, 11.5% of household heads have political ties to the Communist party, and

<sup>3</sup> While the 2011 and 2019 CHFS survey waves are available, they do not contain key variables used in our analysis. Further, household fraud experience is only reported in the 2015 survey wave, which serves as a benchmark year for this study along with comparisons to the 2013 and 2017 survey waves.

<sup>4</sup> In our fraud measure we combine all types of fraud, including but not limited to telephone fraud, SMS fraud, online fraud, and fraud by acquaintances, because we take no view on which types of fraud have the greatest effects on investment behavior and examining each type of fraud independently will lead to small sample size issues.

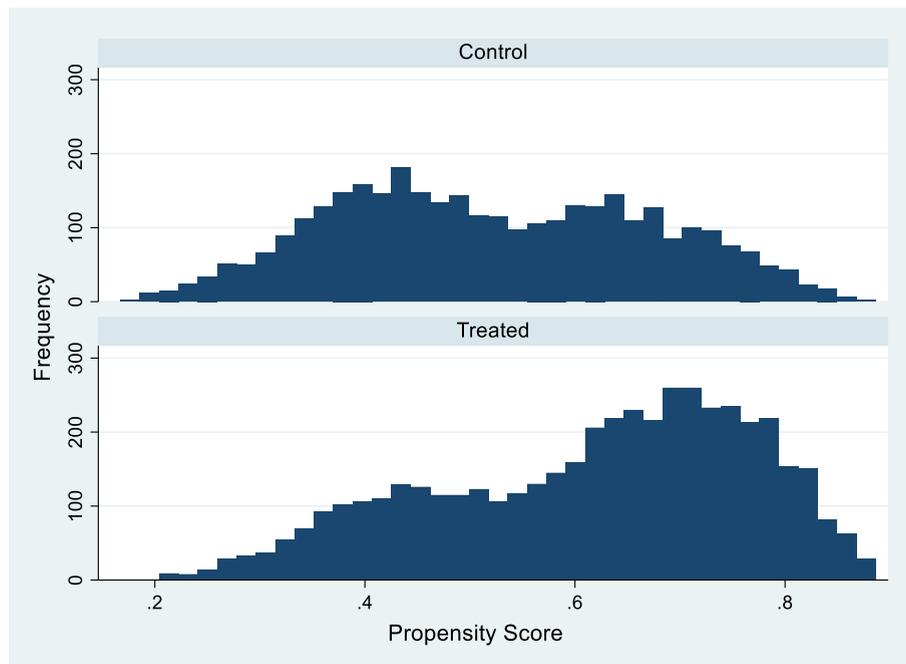


Fig. 1. Regions of Common Support Between Treated and Control Groups.

37.2% of households reside rurally. 94.2% of households in our sample own their homes and their average wealth is 816,114 Chinese yuan (125,444 U.S. dollars, as of the end of December 2017).

Table 3 shows correlations for the full matched sample of household-year observations. Fraud experience is negatively associated with high-risk asset ownership and allocation. Further, as expected, higher risk aversion (trust) is negatively (positively) associated with high-risk asset ownership and allocation.

### 2.2.2. Difference-in-differences

Using our matched sample, we examine whether fraud experience affects subsequent investment behavior using a difference-in-differences (DD) methodology. Since information about fraud experience is only available in the 2015 survey wave, 2015 is the treatment year and we compare the differences in investment behavior in 2013 versus investment behavior in 2015 and 2017 for treated households as well as for control households. The second difference in the DD approach takes the difference in the change in investment behavior pre- and post-fraud experience for the treated versus the control households. We employ this DD setup and estimate:

$$Y_{it} = \beta_1 \text{Fraud}_{it} + \gamma_i + \tau_t + \phi' \mathbf{X}_{it} + \varepsilon_{it}, \quad (1)$$

where  $i$  indexes households and  $t$  indexes year.  $Y_{it}$  is a measure of household high-risk asset investment behavior.  $\text{Fraud}_{it}$  is a dummy variable that equals one if household  $i$  has experienced fraud by year  $t$ , and since data on fraud experience is only available in the 2015 survey wave,  $\text{Fraud}_{it}$  equals one in 2015 and 2017 if household  $i$  reported experiencing fraud in the year prior to 2015, and zero otherwise. We expect that  $\beta_1$ , the coefficient estimate on the fraud dummy, will be negative when the dependent variable measures high-risk asset participation and allocation.

$\gamma_i$  and  $\tau_t$  are household and year fixed effects, respectively, to control for unobservables that may be correlated with investment behavior. Household fixed effects control for time-invariant, unobservable household-level characteristics and ensure that treated households that experience fraud are similar to control households that do not experience fraud. Year fixed effects control for unobserved macroeconomic effects that may impact investment behavior from year to year.  $\mathbf{X}_{it}$  is a vector of control variables including risk aversion, trust, age, age squared, family size, and log wealth, as well as dummy variables for male, primary school education, secondary school education, higher education, marital status, affiliation with the Communist party, home ownership, and rural residence.

Since we have a large number of household fixed effects relative to the number of observed time periods, models with binary

**Table 1**  
Univariate tests before and after matching in the pre-treatment period.

Panel A: Univariate tests before matching				
	No fraud (Control) N = 3394	Fraud (Treated) N = 4707	Difference	t-statistic
Risk aversion	4.192	4.086	0.106***	4.023
Trust	2.448	2.433	0.015	0.617
Age	54.082	52.596	1.486***	5.042
Age squared	30.919	29.408	1.511***	4.703
Male	0.847	0.798	0.050***	5.717
Primary education	0.675	0.561	0.114***	10.436
Secondary education	0.153	0.228	-0.074***	-8.342
Higher education	0.064	0.161	-0.097***	-13.420
Married	0.889	0.898	-0.009	-1.241
Family size	3.892	3.617	0.275***	7.240
Communist party	0.185	0.283	-0.098***	-10.200
Own home	0.948	0.940	0.008	1.451
Rural	0.524	0.287	0.237***	22.306
Log wealth	12.007	12.669	-0.663***	-20.322

Panel B: Univariate tests after matching				
	No fraud (Control) N = 4707	Fraud (Treated) N = 4707	Difference	t-statistic
Risk aversion	4.064	4.058	0.006	0.30
Trust	2.477	2.436	0.041*	1.91
Age	52.155	52.304	-0.149	-0.70
Age squared	29.014	29.160	-0.146	-0.63
Male	0.785	0.780	0.005	0.73
Primary education	0.541	0.548	-0.008	-0.96
Secondary education	0.225	0.228	-0.003	-0.48
Higher education	0.185	0.177	0.008	1.28
Married	0.889	0.889	-0.000	-0.08
Family size	3.508	3.505	0.002	0.09
Communist party	0.277	0.270	0.007	0.95
Own home	0.930	0.925	0.005	1.26
Rural	0.277	0.275	0.003	0.37
Log wealth	12.749	12.736	0.013	0.59

This table reports univariate *t*-test results in 2013 before fraud was experienced by any households in our sample. Panel A shows *t*-tests before propensity score matching and Panel B shows *t*-tests after propensity score matching. *Risk aversion* and *Trust* are each measured on a scale of 1 (low) to 5 (high). *Age* is the age of the survey respondent in a particular survey year. *Male*, *Primary education*, *Secondary education*, *Higher education*, and *Married* are dummy variables indicating whether the survey respondent is male, has primary school education, has secondary school education, has higher education, and is married, respectively. *Communist party*, *Own home*, and *Rural* are dummy variables indicating whether the survey respondent is a member of the Communist party, owns a home, and resides in a rural area, respectively. *Family size* is the number of individuals in the respondent's household. *Log wealth* is the natural logarithm of household wealth. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

dependent variables are estimated using linear probability models and those with continuous dependent variables are estimated using OLS.<sup>5</sup> Standard errors are clustered by household to account for the correlation of error terms within a household over time.

Next, we examine whether variation in household risk aversion and trust impact the relationship between fraud experience and investment behavior. We use a difference-in-difference-in-difference methodology (DDD) whereby the interaction terms  $Fraud_{it} \times RiskAversion_{it}$  and  $Fraud_{it} \times Trust_{it}$  below in Eq. (2) estimate whether the change in investment behavior as a result of fraud between the treated and control groups is different for households with high and low risk aversion and trust, respectively. To implement this DDD approach, we estimate:

$$Y_{it} = \gamma_i + \tau_t + \beta_1 Fraud_{it} + \beta_2 RiskAversion_{it} + \beta_3 (Fraud_{it} \times RiskAversion_{it}) + \beta_4 Trust_{it} + \beta_5 (Fraud_{it} \times Trust_{it}) + \phi' X_{it} + \varepsilon_{it}, \quad (2)$$

where all variables are as previously described, with the inclusion of interaction terms for the fraud dummy with both risk aversion and

<sup>5</sup> We use OLS to estimate models with a binary dependent variable because estimating a non-linear model with a large number of fixed effects can cause the incidental parameters problem resulting in biased estimators. This issue is most acute when the number of observations is large in relation to the number of observed time periods, which is the case in our setting.

**Table 2**  
Summary statistics.

	Mean	Median	Standard deviation	N
Own high-risk assets	0.108	0.000	0.311	25,948
Proportion high risk	0.045	0.000	0.161	25,948
Fraud	0.419	0.000	0.493	25,948
Risk aversion	4.161	5.000	1.137	25,948
Trust	2.164	2.000	0.982	25,948
Age	54.499	54.000	13.109	25,948
Male	0.811	1.000	0.392	25,948
Primary education	0.603	1.000	0.489	25,948
Secondary education	0.193	0.000	0.394	25,948
Higher education	0.140	0.000	0.347	25,948
Married	0.881	1.000	0.324	25,948
Family size	3.578	3.000	1.677	25,948
Communist party	0.115	0.000	0.319	25,948
Own home	0.942	1.000	0.233	25,948
Rural	0.372	0.000	0.483	25,948
Wealth (000's)	816.114	339.788	1394.738	25,948

This table reports summary statistics for the full matched sample of household-year observations. *Own high-risk assets* is a dummy variable indicating whether the respondent household owns high-risk assets including stocks, stock funds, and derivatives. *Proportion high risk* is the portfolio share invested in high-risk assets constructed by taking the total value of high-risk assets divided by the household's total financial portfolio value. *Fraud* is a dummy variable that equals one in 2015 and 2017 if the respondent reported experiencing fraud in the year prior to 2015, and zero otherwise. *Wealth* is shown in thousands. All other variables are as defined in Table 1.

trust. The coefficient  $\beta_3$  measures how the effect of fraud experience varies with household risk aversion (i.e., whether the effect of fraud is different for households with high versus low aversion) and the coefficient  $\beta_5$  measures how the effect of fraud varies with household trust (i.e., whether the effect of fraud is different for households with high versus low trust). If households with high risk aversion (low trust) drive the relationship between fraud experience and a subsequent flight to safer assets with higher perceived quality as hypothesized, we expect the coefficient  $\beta_3$  ( $\beta_5$ ) to be negative (positive) when the dependent variable measures high-risk asset participation and allocation.

### 3. Results

#### 3.1. The effect of fraud experience on investment behavior

Table 4 reports OLS coefficient estimates for Eqs. (1) and (2). The results in column (1) reveal that fraud causes a 2.54 percentage point decrease in the probability of high-risk asset ownership; this implies a 23.5% decrease in the probability of high-risk asset ownership relative to the average frequency of high-risk asset ownership (10.8%) shown in Table 2. On the intensive margin, we find in column (2) that fraud experience decreases the portfolio share invested in high-risk assets by 1.84 percentage points on average for households in our sample. Relative to the average portfolio share of high-risk assets of 4.5% for the sample, this implies a 40.9% decrease in the allocation to high-risk assets. All results reported in this subsection are significant at a 5% significance level.

#### 3.2. The moderating effects of risk aversion and trust on the relationship between fraud experience and investment behavior

Next, we examine whether the effect of fraud experience on investment behavior is different for households with high versus low risk aversion and trust. The interaction term between fraud experience and risk aversion in column (3) of Table 4 is significantly negative which implies that the negative effects of fraud experience on the probability of high-risk asset ownership is larger for households with higher risk aversion. With respect to the economic magnitudes of this estimate, all else equal, an increase in risk aversion of 1 point on a scale of 1 to 5 is associated with a drop in the probability of high-risk asset ownership of 2.67 percentage points (i.e., the sum of the coefficients for risk aversion and the interaction between risk aversion and fraud) after experiencing fraud. This suggests a 24.7% decrease in the probability of high-risk asset ownership relative to the average frequency of high-risk asset ownership (10.8%) shown in Table 2.

The results in column (4) of Table 4 suggest that an increase in risk aversion of 1 point on a scale of 1 to 5 causes a 0.83 percentage point decrease (i.e., the sum of the coefficients for risk aversion and the interaction between risk aversion and fraud) in the proportion allocated to high-risk assets after experiencing fraud. This implies an 18.4% decrease relative to the average proportion allocated to high-risk assets for the sample (4.5%). This indicates that the negative effects of fraud experience on the proportion of household portfolios allocated to high-risk assets are larger for households with higher risk aversion.

Interestingly, in both columns (3) and (4), we find that trust does not moderate any of the relationships between fraud experience and investment behavior. Thus, the relationship between fraud experience and investment behavior seems to be driven by households with high risk aversion and is unaffected by household trust levels. We show in Appendix A that our results remain unchanged when including the interaction between fraud experience and risk aversion, and the interaction between fraud experience and trust in separate models.

**Table 3**  
Correlations.

	Own high-risk assets	Proportion high risk	Fraud	Risk aversion	Trust	Age	Male	Primary education	Secondary education	Higher education	Married	Family size	Communist party	Own home	Rural	Wealth (000's)
Own high-risk assets	1.00															
Proportion high risk	0.80***	1.00														
Fraud	-0.06***	-0.06***	1.00													
Risk aversion	-0.19***	-0.18***	0.01***	1.00												
Trust	0.09***	0.07***	-0.05***	-0.12***	1.00											
Age	-0.11***	-0.07***	0.05***	0.24***	-0.10***	1.00										
Male	-0.06***	-0.05***	0.06***	-0.04***	0.02***	-0.08***	1.00									
Primary education	-0.22***	-0.20***	0.15***	0.12***	-0.09***	0.07***	0.12***	1.00								
Secondary education	0.06***	0.05***	-0.08***	-0.03***	0.01***	-0.04***	-0.04***	-0.60***	1.00							
Higher education	0.30***	0.27***	-0.19***	-0.17***	0.14***	-0.21***	-0.01***	-0.50***	-0.20***	1.00						
Married	0.01***	0.01***	0.02***	-0.03***	-0.01***	-0.13***	0.33***	0.05***	0.02***	-0.00*	1.00					
Family size	-0.09***	-0.10***	0.09***	-0.04***	-0.01***	-0.20***	0.17***	0.12***	-0.05***	-0.11***	0.25***	1.00				
Communist party	0.03***	0.02***	-0.06***	-0.06***	0.07***	-0.06***	-0.03***	-0.14***	0.07***	0.16***	0.01***	0.02***	1.00			
Own home	-0.02***	-0.03***	0.04***	0.00***	-0.02***	-0.01***	0.04***	0.02***	-0.02***	0.01***	0.10***	0.12***	0.01***	1.00		
Rural	-0.22***	-0.19***	0.25***	0.05***	-0.06***	0.05***	0.17***	0.25***	-0.15***	-0.28***	0.05***	0.20***	-0.08***	0.10***	1.00	
Wealth (000's)	0.35***	0.34***	-0.13***	-0.11***	0.12***	-0.02***	-0.03***	-0.20***	0.04***	0.30***	0.06***	-0.07***	0.02***	0.11***	-0.28***	1.00

This table reports correlations for the full matched sample of household-year observations. All other variables are as defined in Table 1. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

**Table 4**  
The effect of fraud experience on investment behavior.

	(1)	(2)	(3)	(4)
	Own high risk assets	Proportion high risk	Own high risk assets	Proportion high risk
Fraud experience	-0.0254** (-2.02)	-0.0184** (-2.29)	0.1023*** (2.58)	0.0274 (1.25)
Risk aversion	-0.0025 (-0.43)	0.0003 (0.09)	0.0033 (0.50)	0.0024 (0.62)
Trust	0.0116** (2.33)	-0.0012 (-0.41)	0.0103* (1.66)	-0.0018 (-0.52)
Fraud × Risk aversion			-0.0300*** (-3.59)	-0.0107** (-2.31)
Fraud × Trust			0.0051 (0.66)	0.0026 (0.68)
Age	0.0089* (1.87)	0.0030 (1.51)	0.0081* (1.70)	0.0027 (1.38)
Age squared	-0.0100** (-2.18)	-0.0036* (-1.81)	-0.0093** (-2.02)	-0.0033* (-1.69)
Male	-0.0500** (-2.47)	-0.0007 (-0.10)	-0.0500** (-2.46)	-0.0007 (-0.09)
Primary education	-0.0113 (-0.66)	-0.0023 (-0.35)	-0.0089 (-0.52)	-0.0014 (-0.22)
Secondary education	-0.0054 (-0.26)	0.0065 (0.62)	-0.0038 (-0.18)	0.0071 (0.68)
Higher education	0.0598 (1.35)	0.0211 (0.82)	0.0615 (1.38)	0.0217 (0.84)
Married	0.0276 (1.12)	-0.0031 (-0.30)	0.0271 (1.10)	-0.0033 (-0.32)
Family size	0.0016 (0.47)	-0.0017 (-0.97)	0.0012 (0.35)	-0.0018 (-1.04)
Communist party	-0.0068 (-0.41)	-0.0127 (-1.22)	-0.0072 (-0.43)	-0.0129 (-1.24)
Own home	-0.0580*** (-3.33)	-0.0281** (-2.58)	-0.0577*** (-3.32)	-0.0279** (-2.57)
Rural	-0.0112 (-0.60)	-0.0018 (-0.42)	-0.0103 (-0.55)	-0.0015 (-0.34)
Log wealth	0.0252*** (6.51)	0.0076*** (4.82)	0.0249*** (6.43)	0.0075*** (4.75)
Constant	-0.3647*** (-2.86)	-0.0800 (-1.39)	-0.3638*** (-2.85)	-0.0790 (-1.37)
Household fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	25,948	25,948	25,948	25,948
R <sup>2</sup>	0.042	0.021	0.045	0.022

This table reports OLS regression estimates for the effect of fraud experience on high-risk asset ownership and allocation, as well as the moderating effects of risk aversion and trust on this relationship. All variables are as defined in Tables 1 and 2. All results are estimated using the full matched sample. Standard errors are clustered at the household level and *t*-statistics are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

#### 4. Conclusions

Motivated by the increasing incidence of fraudulent activity targeted at households and the need to understand how risk aversion and trust affect this relationship, we show that household-level fraud experience reduces investment in high-risk assets. We also provide evidence that this relationship is driven by households with high risk aversion but is unaffected by household trust. While we provide additional insights into the effects of fraud on investment behavior as well as the moderating roles of risk aversion and trust, we are not able to examine the role of beliefs in these relationships due to data limitations. While beliefs about the market undoubtedly affect household market participation, future work could explore the possibility that beliefs about markets can also affect the impact of fraud experience on investment behavior. These findings will provide a more complete understanding of the externalities of fraud on households and may have implications for financial regulation and market policy in emerging financial markets, including China.

#### CRedit authorship contribution statement

**Gady Jacoby:** Conceptualization, Methodology, Formal analysis, Writing – review & editing. **Chi Liao:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Xiaomeng Lu:** Conceptualization, Data curation, Methodology, Formal analysis. **Fang Wan:** Project administration, Conceptualization, Writing – review & editing.

## Data availability

The authors do not have permission to share data.

## Appendix A: The individual moderating effects of risk aversion and trust on the relationship between fraud experience and investment behavior

This table reports OLS regression estimates for the moderating effects of risk aversion and trust, separately, on the relationship between fraud experience and investment behavior. All variables are as defined in Tables 1 and 2. All results are estimated using the full matched sample and include the same control variables used in Table 4. Standard errors are clustered at the household level and *t*-statistics are shown in parentheses. \*, \*\*, and \*\*\* indicate significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Fraud experience	Own High Risk Assets 0.1017** (2.56)	Proportion High Risk 0.0271 (1.23)	Own High Risk Assets −0.0236* (−1.85)	Proportion High Risk −0.0178** (−2.24)
Risk aversion	0.0034 (0.51)	0.0024 (0.63)		
Fraud × Risk aversion	−0.0302*** (−3.61)	−0.0108** (−2.33)		
Trust			0.0102* (1.65)	−0.0019 (−0.53)
Fraud × Trust			0.0057 (0.74)	0.0028 (0.75)
All control variables	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Observations	25,948	25,948	25,948	25,948
R <sup>2</sup>	0.043	0.022	0.042	0.021

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