Corporate Scandals and Household Stock Market Participation

Mariassunta Giannetti
Stockholm School of Economics, CEPR and ECGI

Tracy Yue Wang
University of Minnesota

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Abstract

We show that after the revelation of corporate fraud in a state, household stock market participation in that state decreases. Households decrease their holdings in fraudulent as well as non-fraudulent firms, even if they did not hold stocks in fraudulent firms. Within a state, households with more lifetime experience of corporate fraud hold less equity. Furthermore, following the arguably exogenous increase in fraud revelation due to the Arthur Andersen's demise, a one-standard-deviation increase in fraud revelation due to the presence of Arthur Andersen's clients increases the probability that a household exits the stock market by 7 percentage points. We provide evidence that the negative effect of fraud revelation on stock market participation is likely to be due to a loss of trust in the stock market.

JEL classification: G30, D12, D14
Keywords: corporate securities fraud, corporate scandal, household stock market participation, local bias

Contact information: Mariassunta Giannetti, Department of Finance, Stockholm School of Economics, email: Mariassunta.Giannetti@hhs.se; Tracy Yue Wang, Department of Finance, Carlson School of Management University of Minnesota, email: wangx684@umn.edu. We are grateful to two anonymous referees, an associate editor, Kenneth Singleton (the editor), Anup Agrawal, Allen Ferrell, Diego Garcia, Will Gerken, Cam Harvey, Gur Huberman, Zoran Ivkovic, Jonathan Karpoff, George Korniotis, Vojislav Maksimovic, Adair Morse, Stefan Nagel, Chester Spatt, Michael Weisbach, and seminar participants at Western Finance Association, the Miami Behavioral Finance Conference, the Fraud and Misconduct Conference at the University of California, Berkeley, the Law and Economics NBER Meeting, the Harvard Business School Conference on Household Behavior in Risky Asset Markets, the Society for Financial Studies Finance Cavalcade, the Financial Intermediation Research Society Meetings, the European Finance Association, the Minnesota Corporate Finance Conference, Boston College, the U.S. Securities and Exchange Commission, the University of Minnesota, the University of Lausanne, the University of Zurich, the National University of Singapore, the University of New South Wales, De Paul University, Koc University, and the Southwestern University of Finance and Economics for comments. We also thank Diego Garcia and Angie Lo for sharing some of the data we use in the paper. Giannetti acknowledges financial support from the NASDAQ/OMX Nordic Foundation.

1. Introduction

Households' ability to reap equity returns is of central importance for households' welfare and is studied in a growing literature in finance and economics (Campbell, 2006). A number of influential papers rely on fixed participation costs and non-standard preferences and expectations to explain why households do not participate in the stock market to the extent that standard portfolio models would predict (e.g., Mankiw and Zeldes, 1991; Poterba and Samwick, 1995; Vissing-Jørgensen, 2002).

Somewhat surprisingly, existing literature has not studied the extent to which households' limited stock market participation may be related to securities market regulation and corporate governance failures. Episodes of corporate financial misconduct are prominent examples of corporate governance failures, which are known to wipe out between 20% and 40% of the valuations of firms that are caught as fraudulent (Karpoff, Lee, and Martin, 2008a; Dyck, Morse, and Zingales, 2013). Yet, these direct economic costs may be just a minor component of the negative economic consequences of corporate securities fraud. By undermining trust in financial markets, corporate financial misconduct may decrease stock market participation, potentially increasing the cost of capital for all firms.

This paper takes up the challenge of evaluating whether corporate scandals decrease households' willingness to (directly or indirectly) participate in the stock market and whether through this channel they generate a negative externality in financial markets. To generate cross-sectional and time-series variation in households' exposure to corporate financial misconduct, we note that households are likely to be more exposed to frauds committed by firms headquartered in the state where they live. This is the case not only because households are more likely to be

aware of local firms, but also because coverage of local news or personal interaction increase their exposure to these episodes.[1]

We ask whether corporate scandals in a state reduce the stock market participation of households in that state, controlling for nationwide macroeconomic conditions and capturing asynchronous local shocks with a host of household and state level controls. We find unambiguous evidence that household stock market participation decreases following corporate scandals in the state where the household resides. Moreover, households decrease their stock holdings in fraudulent *as well as* non-fraudulent firms. Even households that did not hold the stocks of fraudulent firms decrease their equity holdings. Thus, the decrease in household stock market participation is not driven by financial losses associated with the holdings in fraudulent stocks.

One may wonder to what extent our findings are driven by state level economic conditions that are associated with both the revelation of corporate fraud and household stock market participation. For instance, the revelation of corporate fraud generally occurs at the beginning of economic downturns that may independently drive households' decisions to reduce their equity holdings (Povel, Singh, and Winton 2007; Wang, Winton and Yu, 2010). To rule out these alternative interpretations, we perform two sets of tests that exploit orthogonal sources of variation in fraud revelation.

The first set of tests utilizes an arguably exogenous shock to fraud revelation due to the sudden demise of the large auditing firm, Arthur Andersen, in 2002. All Arthur Andersen's clients were forced to change auditors. Since new auditors have incentives to "clean the house", the firms that switched auditor due to Arthur Andersen's demise had higher probability to be

[1] Households' portfolios are known to have a pronounced local bias (Grinblatt and Keloharju, 2001; Ivković and Weisbenner, 2005; Seasholes and Zhu, 2010).

revealed having committed fraud (Dyck, Morse and Zingales, 2013). This led to an exogenous short-term increase in the probability of fraud revelation that differs across states, depending on the fraction of firms in a state that were Arthur Andersen's clients before its demise. We thus use the fraction of firms in a state that were Arthur Andersen's clients right before its demise as an instrument for fraud revelation in that state in the period following the shock. We find that a one-standard-deviation increase in fraud revelation due to the presence of Arthur Andersen's clients increases the probability that a household exits the stock market by 7 percentage points. However, we do not find a significant drop in the households' equity-wealth ratio consistently across specifications, possibly suggesting that the Arthur Andersen's shock caused some households to exit the stock market, but left other households unaffected.

The second set of tests exploits *within-state* variation in households' lifetime experience of corporate scandals. Even households living in the same state at a particular point in time can have different corporate fraud experiences depending on their age and because they may have moved across states. In these specifications, we are able to absorb any state level shocks by including interactions of state and year fixed effects. We find that a one-standard-deviation increase in a household's lifetime exposure to local fraud decreases the household's probability of holding stocks by 4% and its equity-wealth ratio by almost 10%, compared to the sample average.

The second set of tests exploiting within-state heterogeneity also implies that our findings are not driven by the fact that fraud revelation causes deterioration in state economic conditions as changes in state conditions should affect all individuals in the state, independently from their past experiences. Consistent with this finding, households appear to sell also the stocks of out-of-state firms and firms in unrelated industries indicating that local fraud is unlikely to matter

because it leads to rational updating of the probability that other (similar) firms may have committed fraud. Furthermore, the effect of fraud on stock market participation appears to be unrelated to risk aversion, as it does not vary with households' risk tolerance.

We provide evidence that fraud revelation may lead households to reduce their stock market participation because it undermines trust in the stock market. In states with high fraud revelation, there is a decrease in the proportion of individuals that report high confidence in financial markets, as captured by changes in confidence in big businesses and banks. Moreover, the stock market participation of high-status individuals, who in experiments have been found to trust less because they have higher costs of betrayal (Bohnet and Zechauser, 2004 and Bohnet, Greig, Herrmann, and Zeckhauser, 2008), is more negatively affected by fraud revelation.

Besides contributing to the literature on household stock market participation and to the one studying the consequences of financial fraud, this paper adds to several other strands of literature. First, we add to the literature exploring whether trust has an effect on economic transactions. In an influential paper, Guiso, Sapienza, and Zingales (2008) show that general trust in others helps explain the decision to participate in the stock market in a cross-section of households. In his presidential address to the European Economic Association, Fehr (2009) highlights the challenges in establishing a causal effect of trust on individual behavior because general trust may just be the effect of omitted environmental factors. Fehr suggests that the most convincing strategy would be to induce exogenous shocks to trust and observe whether this leads to changes in economic behavior. We provide evidence that fraud revelation can be considered a negative shock to trust in the stock market.

Our paper also contributes to a growing literature, which highlights the effects of lifetime macroeconomic experiences on economic behavior. Notably, Malmendier and Nagel (2011 and

2013) show that lifetime experiences of stock market returns and inflation affect households' decisions to hold stocks and other financial assets. We highlight the negative effect of corporate scandals on households' demand for equity.

2. Data Sources and Main Variables of Interest

2.1 Corporate Securities Frauds

Corporate securities fraud typically involve a direct conflict of interest between the firm's outside shareholders and its management: Managers derive short-term benefits from misreporting the firm's financial conditions (Karpoff, Lee and Martin, 2008b), while shareholders experience large financial losses upon fraud revelation.[2] Episodes of financial fraud are also widely publicized and the media often plays a key role in drawing the SEC's scrutiny (Dyck, Morse and Zingales, 2010). For these reasons, we believe that financial fraud may lead investors to feel cheated and betrayed, and can undermine trust in the financial system.

We obtain a list of federal enforcement actions for financial misrepresentation (henceforth, fraud cases) from the Federal Securities Regulation (FSR) database, compiled by Jonathan Karpoff, Scott Lee, and Gerald Martin (Karpoff et al., 2014b), which is the most comprehensive database for federal securities enforcement actions brought about by the Securities and Exchange Commission (SEC) and/or the Department of Justice (DOJ). From this database, we select cases that involve (1) US issuers as defendants, (2) enforcement actions under either the Securities Act of 1933 or the Securities Exchange Act of 1934, and (3) common stock as the primary security registered by the firm with the SEC. This selection process leads to

[2] To the contrary, other forms of corporate misconduct, such as anticompetitive practices and bribery, increase firms' profits if undetected and do not involve conflicts of interest between outside shareholders and management. The detection of bribery has also been shown to have only minor effects on shareholder value (Karpoff, Lee and Martin, 2014a).

704 cases involving 695 US companies between 1980 and 2009 (the sample period of our other datasets).

All cases in the sample are about intentional and material financial misrepresentation.[3] FSR provides information about the announcement dates of all key litigation events related to a case. We use the earliest date to define the fraud revelation year of a case.

Since firms locate their main operating facilities close to the headquarters (Hong, Kubik and Stein, 2008; Pirinsky and Wang, 2006), households resident in the same state as the firm's headquarters are closer to the core business activities and the center of information exchange between the firm and its suppliers and investors. Therefore, we conjecture that households are more exposed to fraud cases involving firms headquartered in their state of residence.

We obtain headquarters locations from COMPUSTAT, Compact Disclosure, which records headquarters' changes, and hand-collect any missing information. Table 1 reports the distribution of fraud cases across states and over time. Only 5 out of 51 states have no federal securities fraud litigation during the sample period. Overall, episodes of corporate fraud occur in 24% of the states and years, which provides substantial variation to identify the effects of corporate fraud on household stock market participation.

Since a few states, such as California, New York, and Texas, have many more company headquarters and fraud cases, we measure the effect of fraud using the number of frauds revealed during the past year, divided by the number of publicly traded companies in the state at the end of the year. This captures that in states with more companies households may be exposed not only to more fraud cases, but also to more examples of non-fraudulent firms. Also, fraud revelation in smaller states may attract more attention because media and households in those

[3] In about 25% of the cases, financial misrepresentation is detected together with insider trading. However, there are no episodes of insider trading without financial misrepresentation in the sample.

states follow fewer firms closely. Our results are however robust to different specifications of the variable capturing households' exposure to fraud, which we introduce in Subsection 3.2.

2.2 Households Survey Data

Information on households' equity holdings, wealth, and other demographic characteristics is from the Panel Study of Income Dynamics (PSID), a longitudinal household survey, compiled by the University of Michigan since 1968. The database provides the households' states of residence, which enables us to exploit variation in corporate fraud revelation across states.

The information on household financial wealth and equity holdings is available at five-year intervals starting in 1984, and then every other year from 1999 to 2009. As is common in the literature (e.g., Guiso, Sapienza and Zingales, 2008), our main proxy for household equity market participation, "*Equity Participation"*, is an indicator variable that equals one if the household holds any stocks in publicly held corporations, mutual funds, or investment trusts in a given year. For the first two survey rounds, the questionnaire asks the household to include stocks in pension accounts and individual retirement accounts (IRAs). Since the 1994 survey, the same question has been changed to exclude stocks in IRAs. A separate question asks whether the household has any money in IRAs. We focus on households' (direct and indirect) stock investment outside IRAs because investments in the latters are often affected by default choices (Beshears, Choi, Laibson, and Madrian, 2009). Thus, *Equity Participation* excludes stocks in IRAs except for the 1984 and 1989 surveys. The results are similar when we exclude these two survey years, or when we use an alternative indicator variable "*Equity Participation (IRA)*", which includes stocks in IRAs in all survey years.

Panel A of Table 2 reports the summary statistics for the PSID sample. All variables are weighted using PSID population weights throughout the analysis. On average, about 31% of the households participate in the stock market. If we include stocks held in IRAs, the participation rate increases to about 43%.

We also gauge the extent of equity participation and its changes using alternative measures. First, based on the answer to a survey question about the household's net value of new equity investment during the last year, we create the variable "*Net Equity Purchases*". Since this variable is highly skewed, we use a logarithmic transformation.[4]

Second, the survey asks how much households would receive if they sold all the stock investment and paid off anything they owed on that investment. Based on the answer to this question, we create a variable "*Equity-Wealth Ratio*", which is the value of net equity as a fraction of the household's total wealth in a given year. We include the household's total wealth at the denominator, rather than only liquid assets (e.g., Guiso, Sapienza and Zingales, 2008), to control for any shocks to other parts of the household's portfolio, which could be correlated with fraud revelation in the state.

Finally, similarly to Brunnermeier and Nagel (2008), we create two variables that capture exit and entry in the stock market to gauge changes in stock market participation. *"Entry"* is a dummy that is set to one for households that did not participate in the previous round of the survey but participate in the current round. For households that participated in the previous round, the variable is set to missing. Similarly, *"Exit"* equals one for participants in the previous round but not in the current round; it is equal to zero for participants in both the previous and current

[4] We add one dollar before the logarithmic transformation because some households have zero net equity purchases.

rounds of the survey. It is missing otherwise.[5] We also extract from PSID a number of household characteristics, which we summarize in Panel A of Table 2.

Since from PSID we have information on households' equity holdings every five years from 1984 to 1999 and every other year starting from 1999, we cumulate the proxies for fraud revelation intensity in the four years preceding the survey. We consider fraud exposure over an interval of four years (rather than five) because the field period for surveys published in a given year starts as early as February and ends as early as July. Thus, households are likely to report their equity holdings before the end of the year and may not have been exposed to fraud revealed during that year. However, as we show below, our results are robust if we consider fraud revelation over different intervals.

2.3. Brokerage Data

A limitation of PSID is that we do not observe which stocks households hold. To evaluate whether households that did not hold stocks of fraudulent firms are also affected and which types of stocks households sell, we use information from a large discount brokerage firm. These data provide information on the common stock and mutual fund holdings of over 30,000 households, whose distribution across states is similar to that in the Census data (Korniotis and Kumar, 2013), from 1991 to 1996.

A series of influential papers has exploited this data source to study households' monthly portfolio turnover and its consequences on investment performance (Odean, 1999; Barber and Odean, 2000; Barber and Odean, 2001). We aim to explain changes in the holdings of different portfolios of stocks over longer horizons in order to evaluate the mechanisms through which

[5] The summary statistics that we report for entry and exit imply that stock market participation increases over time. This is clear from the following calculation. The proportion of the entire sample that enters the stock market is the entry rate 0.133 times the proportion of individuals who do not hold equity (1-0.313), equal to 9.1%. The proportion of individuals who exit is the exit rate 0.283 times the proportion of participants (0.313), equivalent to 8.9%.

fraud affects stock market participation. Therefore, we use the change in a household's equity holdings in stock *k* in portfolio *J* between the end of year *t* and the end of year *t+1* relative to the household's equity holdings in portfolio *J* at *t*. We evaluate all positions and their changes using prices at the beginning of the period. Specifically, for household *i* in year *t* with holdings in *k* stocks belonging to portfolio *J*, this variable is defined as $\Delta holding^{i}_{t+1} = \sum_{k \in J} p^{k}_{t}(holding^{ik}_{t+1} - holding^{ik}_{t}) / \sum_{k \in J}(p^{k}_{t} holding^{ik}_{t})$, where p^{k}_{t} is the price of stock *k* at the end of year *t*.

For each household, we define the return of the household's portfolio during the past year, and obtain a number of household characteristics, including the number of household members, marital status, and age of the household head, at the beginning of the sample.

Finally, we define proxies for the households' exposure to fraud as we do for the PSID sample. However, since we consider yearly changes in equity holdings, we relate these changes to fraud revelation over the same year. Panel B of Table 2 reports the summary statistics.

2.4 State Level Data

We complement the above datasets with a number of additional data sources. First, we gauge whether fraud revelation is related to changes in trust in financial markets using Gallup Analytics surveys on "Confidence in Institutions". We describe this dataset in Section 5.1.

Second, to control for state-level business conditions, which may affect households' equity holdings or may be correlated with the timing of fraud revelation, we obtain yearly state GDP growth rates from the Bureau of Economic Analysis. Finally, we control for the stock market performance of local companies, computed as the buy-and-hold state stock market return of all publicly traded companies headquartered in the state. We provide the descriptive statistics for these variables for each of the samples we use in relevant panels of Table 2.

3. Fraud Revelation and Household Stock Market Participation

3.1 Empirical Model

In what follows, we relate measures of household stock market participation to fraud revelation using the following empirical model:

$$Participation_{ijt} = \beta \times FraudInState_{jt} + \gamma X_{ijt} + s_j + \zeta_t + \varepsilon_{ijt}, \quad (1)$$

where participation can be *Equity Participation*, *Equity-Wealth Ratio*, and *Net Equity Purchases.* Since *Fraud in State* can be seen as a shock affecting the extent of equity market participation, to focus on the dynamics of stock market participation, in some specifications for *Equity Participation* and *Equity-Wealth Ratio*, we also include the lagged stock market participation.[6] In alternative models, we consider the effect of *Fraud in State* on changes in equity participation as captured by *Exit*, *Entry*, and the change in *Equity-Wealth Ratio*; in these specifications, we use the first differences of the control variables.

Following existing literature (see, for instance, Guiso, Sapienza and Zingales, 2008 and Malmendier and Nagel, 2011), the matrix of controls, X_{ijt}, includes a household's income, wealth (excluding the household's equity holdings) and demographic characteristics.[7] We also include controls for state economic conditions, which could be correlated to fraud revelation.

We control for systematic differences across states using state fixed effects (s_j) and for macroeconomic conditions using year fixed effects (ζ_t). It is important to note that the year fixed

[6] We compare the estimates obtained including the lagged dependent variable with the estimates obtained including household fixed effects. The estimates are virtually identical indicating that introducing the lagged dependent variable does not lead to inconsistent estimates (see Angrist and Pischke, 2008, pp. 245-247.)

[7] We are unable to control for risk aversion throughout the analysis, because this information is available only for the 1996 round of the PSID survey. Arguably, risk aversion is captured by the demographic controls (or the household fixed effects). Furthermore, our results are invariant if we control for the household head's risk aversion as reported in 1996. Finally, since most of our specifications include the lagged dependent variable or household fixed effects, we do not control for variables, such as race, that do not vary for a household over time.

effects also capture country-wide fraud revelation, implying that we estimate only the differential effect that exposure to fraud in a state has on households in that state. Since households may be exposed to corporate fraud in other states, our estimates are to be interpreted as a lower bound of the negative effects of corporate fraud on the demand for equity.

Since our specifications include a large number of fixed effects, we estimate all equations by ordinary least squares even when they involve a limited dependent variable. We cluster standard errors at the household level because the decision to hold stocks for a given household is likely to be correlated over time. The results we present, however, remain statistically significant if we cluster standard errors by states or by time.

3.2 Baseline Results

Panel A of Table 3 shows that an increase in fraud revelation in a state is associated with a decrease in the probability that households in that state participate in the stock market. The magnitude of the effect is very similar whether we include household fixed effects (column (2)) or the lagged dependent variable (column (3)).[8] The parameter estimates in column (3) imply that a one-standard-deviation increase in the state's fraud revelation intensity (2.2 percentage points) decreases the probability that a household participates in the stock market by about 1.23 percentage points. Since approximately 30% of the households participate in the stock market, this implies an almost 4% decrease in the probability of household stock market participation.

In columns (4) and (5), we take into consideration that the variable *Equity Participation* includes stockholdings in IRAs in the first two survey rounds. In column (4), we exclude the first two rounds of the survey; in column (5) we use *Equity Participation (IRA)*, which includes

[8] We do not include the dummy *College Education* in specifications with household fixed effects, with lagged dependent variable and in first-differences because for 99.9% of the observations *College Education* is invariant over time for a given household head.

stockholdings in IRAs consistently across all survey rounds. Our results remain invariant both qualitatively and quantitatively.

Columns (6) and (7) consider changes in stock market participation by focusing on exit and entry in the stock market, respectively. As we would expect, following an increase in fraud revelation in the state, households are more likely to exit from the stock market and less likely to enter. The effect is economically large. A one-standard-deviation increase in fraud revelation in a state increases the probability that households in that state exit from the stock market by about 2.6 percentage points. Since the exit rate in our sample is 28%, this estimate implies a 9.3% increase in the probability of exiting from the stock market. A similar increase in fraud revelation decreases the probability of entering the stock market by 0.8 percentage points. While this effect is equivalent to a relatively large 6.5% decrease in entry, given an entry rate of 13% in our sample, we note that the statistical significance is weaker, suggesting that households that participate in the stock market when fraud is revealed are more affected.[9]

Panel B of Table 3 shows that the effect of fraud revelation does not depend on the specific measure of fraud exposure we use. First, in column (1), we use a dummy that takes value equal to one if at least one episode of financial fraud occurred in the state over the previous four years. Fraud revelation in the state leads to an over 3-percentage-point decrease in equity market participation.

Second, we consider that some firms are not truly local because they have operations in many states (Garcia and Norli, 2012). Households outside the state are likely to be exposed to

[9] In Table IA.1 of the Internet Appendix, we explore to what extent the geography of fraud revelation may be driving our findings. First, we exclude the largest three states, which have most fraud cases and listed companies. If anything, fraud has a larger effect on stock market participation when we exclude the largest states. This is intuitive because California and Texas are highly geographically dispersed and fraud revelation in these states would be expected to produce weaker exposure to fraud for local households. Estimates are equally robust if we exclude 12 states with fewer than 26 listed companies (the bottom quartile of the distribution of the number of listed firms across states and years in our sample).

fraud revelation in these geographically dispersed firms as much as local households. The effect of fraud revelation in geographically dispersed firms is therefore likely to be captured by the year fixed effects. To better capture the effect of local fraud, we identify firms that operate in no more than two states as local firms using data on the number of states in which a firm operates, collected by Garcia and Norli (2012).[10] We count frauds committed by these firms as twice more influential than frauds committed by non-local firms for households residing in the same state as the firm's headquarters. Consistent with our empirical strategy, in column (2), a one-standard-deviation change in this measure of fraud exposure decreases stock market participation by 1.5 percentage points. In the same spirit, in column (3), we give a larger weight to fraud cases committed by firms with more geographically concentrated operations that received higher media coverage.[11] In this way, we hope to capture firms whose fraud cases received higher media coverage in the state, but not necessarily nationally. The effect of fraud exposure in the state becomes even larger. A one-standard-deviation change in this proxy is associated with a 3.3 percentage-point decrease in stock market participation.

The decision to cumulate the intensity of fraud revelation over the previous four years does not appear to drive our findings. In column (4), fraud revelation in a state decreases stock market participation to an even larger extent if we restrict our attention to the latter part of the sample and consider fraud revelation during the past year.[12] Column (5) exploits the same specification as in column (4) to explore the dynamic of corporate fraud. The Lagged Yearly Fraud Revelation is not statistically significant indicating that the negative effects of fraud on stock market participation are long-lasting.

[10] About 25% of the sample firms operate within two states. The results are invariant if we use different cutoffs to define local firms (e.g., 3 states, 4 states, 1 state).
[11] The precise definition of the variable is provided in the appendix.
[12] Also here we do not consider frauds revealed during the survey year because the field period starts as early as February and households may not have had the time to be exposed to fraud during that year.

Panel C shows that fraud revelation in local corporations negatively affects not only the extensive margin of household stock market participation, but also its intensive margin. Following periods of high fraud revelation in a state, households purchase less equity (column (1)) and the proportion of equity investment in the household's total wealth decreases (column (2)). The latter result holds true when we exclude the years in which we cannot distinguish stocks held in IRAs in column (4), when we include the value of stocks held in IRAs in column (5), or when we consider changes in the equity-wealth ratio in column (6).

These results indicate that fraud revelation is negatively related to households' equity market participation and suggest that corporate financial misconduct has the potential to create a negative externality on financial markets by decreasing households' demand for equity. This effect is obtained controlling for the household's wealth and income and state economic conditions, which should help capturing negative income and wealth shocks or other state-level economic shocks. Furthermore, as shown in column (7) of Panel C, households that previously held stocks increase their holdings of bonds, insurance policies and other fixed income securities after the revelation of fraud in their state, suggesting that fraud leads households to rebalance their portfolios away from equity.

Yet, the correlation between household equity market participation and fraud revelation in the state could be driven by unobservable state level factors. For this reason, in what follows, we propose two alternative identification strategies. First, we exploit an arguably exogenous increase in fraud revelation, which differs across states. Second, we exploit within-state differences in households' experiences of corporate fraud, a slow-moving household characteristic. If the results were to be consistent across these two alternative methodologies

exploiting orthogonal sources of variation in fraud revelation, they would be more strongly suggestive of a causal effect of fraud on stock market participation.

3.3 Identification through an Exogenous Shock to Fraud Revelation

Dyck, Morse and Zingales (2013) point out that the sudden demise of the large auditing firm Arthur Andersen (AA), following the Enron debacle, provides an exogenous shock to fraud revelation. In October 2001, Enron announced that it had to restate its financial statements for the years 1997 to 2000. AA, as Enron's external auditor, was indicted in March 2002 and convicted in June 2002. As a consequence, all AA clients had to find new external auditors. New auditors have incentives to "clean the house". Dyck, Morse, and Zingales (2010; 2013) report that, as a consequence of the change in auditors, the probability of fraud detection among AA clients increased by about three times in comparison to other firms during 2002-2004.

AA's clients were located in different states. This implies that the effect of the shock to fraud revelation should be different across states: States with a larger fraction of firms that were AA clients during 2001-2002 should have experienced more fraud revelation during 2002-2004. Thus, we use the fraction of public firms in a state that were AA clients and had to change auditors during 2001-2002 ("*AA Shock*") as an instrument for *Fraud in State*. In particular, focusing on the period 2001-2007, we set *AA Shock* to zero for the period before 2002 and after 2005, and equal to the proportion of firms in the state that were AA clients during 2001-2002 for the period 2002-2005 (thus for the 2003 and 2005 survey rounds). We do so because our proxy for fraud revelation is backward looking and considers fraud cases revealed over the previous four years. The identification strategy based on *AA Shock* is valid if the instrument has enough variation to explain changes in fraud revelation across states and no independent effect on household stock market participation. Column (1) in Panel A of Table 4 shows that the

instrument is relevant. *AA Shock* is positively and significantly related to *Fraud in State* between 2001 and 2007, after controlling for state and year fixed effects and state economic conditions. The estimate implies that the extent of fraud revelation in states with 27% AA clients (75% of the distribution) increases by about 1.3 percentage points (=0.048*0.27) relative to states with no AA clients in 2001-2002.

Our instrument, however, may not satisfy the exclusion restriction if the proportion of AA clients in a state is correlated with changes in state economic conditions. To provide suggestive evidence that this is not the case, we exploit the fact that AA clients and the clients of the other Big 5 auditing firms had similar characteristics, including a similar probability of financial restatements, before the collapse of AA (Eisenberg and Macey, 2004; Agrawal and Chada, 2005). Thus, if the effect of *AA Shock* on *Fraud in State* is indeed due to the fact that only AA clients were forced to change auditors, we should not observe an analogous increase in fraud revelation in states with a high proportion of other Big 5 clients. We compute pseudo-instruments using the fraction of firms in a state that were clients of the other Big 5 auditing firms during 2001-2002, excluding firms that switched from AA in this period. Columns (2) to (5) in Panel A of Table 4 show that the fraction of firms that were clients of the other Big 5 auditing firms does not positively predict changes in fraud revelation after 2001, indicating that the clients of the Big 5 firms are not special along some unobserved dimension and that *AA Shock* may indeed be a valid instrument.

Panel B of Table 4 reports the instrumental variable estimates considering measures of stock market participation in levels and in differences. Columns (1) and (2) present the first stage regressions with the control variables in levels and in differences, respectively. It is evident that

AA Shock is positively and significantly related to *Fraud in State* even when we use the data at the frequency of the household survey (instead of using the annual frequency as in Panel A).

In the second stage estimates, the exogenous variation in fraud revelation due to the AA demise appears to decrease the level of stock market participation both on the extensive (column (3)) and the intensive margins (column (4)). The temporary and arguably exogenous increase in fraud revelation captured by *AA Shock* appears to have a particularly large negative effect on the purchases of new equity (column (5)), where a one-standard-deviation increase in *Fraud in State* (1.4% between 2001 and 2007) decreases the net equity purchases of an average household by almost 8%.

We also observe a large abnormal increase in exit from the stock market. In column (6), a one-standard-deviation increase in *Fraud in State* increases the exit rate by almost 7 percentage points, a nearly 25% increase considering that the average exit rate during 2001-2007 was 28%. The effect is larger than both the baseline ordinary least square estimate in column (6) of Panel A of Table 3 and the ordinary least square estimate of 2.0 obtained for the subsample 2001-2007.

It is not surprising that during this period the effect of fraud on stock market participation is larger than in the baseline specifications. Following the Enron scandal, the media coverage of corporate financial misconduct temporarily surged. When we search news regarding the fraud cases in our sample in Factiva, we find on average less than 20 articles per fraud case in the 1990s, approximately 80 in 1999 and 2006, but 160 in 2003, indicating that exposure to fraud was larger during this period. While fraudulent companies related to Arthur Andersen may have experienced even more media coverage justifying the larger effect of the instrumental variable estimate for exit and net equity purchases relative to the ordinary least square estimate, the larger

magnitude of the instrumental variable estimate also suggests that if anything omitted factors bias the estimated effect of fraud downward.

Column (8) reports the second stage estimates for the change in the equity-wealth ratio. Fraud revelation appears to have a negative effect, which is however not significant at conventional levels. Variation in fraud revelation due to the AAshock also fails to explain entry (column (7)). These results may suggest that fraud revelation causes some households to exit the stock market but leaves other households, and the intensive margin of stock market participation, unaffected. However, the insignificant results in columns (7) and (8) may also depend on the fact that the test utilizing the variation in fraud revelation due to the presence of Arthur Andersen's clients is noisy and allows us to capture only the most extreme response of households that immediately sold all their equity holdings and exited the stock market.[13]

3.4 Within-State Differences in Household Fraud Experiences

While in the previous subsection we exploit variation in fraud revelation *across states* over time, here we aim to exploit *within-state* cross-sectional differences in households' fraud experience.

In our baseline specifications, we attribute identical experiences of fraud to households living in the same state in a given year. However, Malmendier and Nagel (2011, 2013) show that economic experiences way into the past affect risk preferences and expectations. Past corporate fraud experiences can differ for households living in the same state at the same time for two reasons. First, the life cycle of households differs when they are surveyed. Older households in

[13] The noise may arise for several reasons. For instance, the prominent episodes of fraud revelation captured by the AAshock may have led also out-of-state households to reduce their equity-wealth ratio and become less likely to enter the stock market, reducing the power of our test that captures the differential effect on in-state households relative to out-of-state ones. Alternatively, the AAshock could have had a permanent (or at least long-lasting) effect on stock market entry and the equity-wealth ratio, which our specification fails to capture because we allow the effect of fraud to last for only four years.

some states may have experienced more corporate scandals than younger households. Second, as shown by the "Mover" dummy in Panel A of Table 2, about 17% of the households in our sample moved across states, which implies that these households' experiences of corporate fraud may not be the same as those of other households that currently reside in the same state.

By using past experiences, we can thus obtain within-state variation in households' experiences of fraud, which helps us to address two layers of identification issues. First, this approach allows us to include state-year fixed effects, which helps to control for any state level unobserved factors driving corporate fraud and stock market participation (Gormley and Matsa (2014)), and to demonstrate statistically that state-specific changes cannot drive the effect of fraud revelation. Second, using within-state variation in fraud experience helps us to shed light on the mechanisms driving the effect of fraud revelation on household stock market participation.

Fraud may affect households for two reasons. Fraud may affect state economic conditions and uncertainty, and consequently households' equity holdings. Alternatively, fraud revelation may undermine households' trust in the stock market and lead households to spurn equity. We consider the first mechanism less likely because there is little evidence that fraud revelation in a state has a significant effect on the state's future economic performance. However, examining the effect of within-state differences in households' fraud experience provides a more rigorous test of this mechanism because if fraud worked exclusively by affecting state economic conditions we should find no additional effect of within-state differences in households' fraud experiences on stock market participation.

We compute the fraud experience of household *i* since adulthood as the sum of past fraud intensity experienced by household *i* in the state of residence *s* at time *t-k*, $\frac{1}{M_i}\sum_{k=1}^{M_i} Fraud_{i,s,t-k}$,

where M_i is the minimum between ($age_{i,t}$-18) and (t-1980).[14] We impose this restriction because our fraud data start in 1980, which prevents us from capturing the early part of the adult-age experience of the oldest households in our sample.[15]

We evaluate the effect of the lifetime experience of fraud only on the level of household stock market participation because the lifetime experience of corporate fraud varies little for a given household and, most importantly, its within-state effects are identified by cross-sectional differences between households.[16]

Table 5 shows that within-state variation in households' past fraud experience due to age and mobility negatively and significantly predicts their stock market participation on both the extensive (Panel A) and the intensive (Panel B) margins. Since we include interactions of state and year fixed effects, this test demonstrates that the effect of fraud is not driven by state level economic conditions or by the fact that fraud affects the state's future economic prospects. The year fixed effects also absorb any macroeconomic experiences that may affect household stock market participation.

Given the different definition of the variable, the magnitude of the effect of exposure to local fraud is not directly comparable with the earlier estimates. However, also in this case, the effect of being exposed to local fraud is economically relevant. A one-standard-deviation increase in the household's lifetime exposure to (local) fraud decreases the household's probability of holding equity by 1.3 percentage points (a 4% decrease relative to the sample mean) in column (1) of Panel A and the household's equity-wealth ratio by about 0.6 percentage points (an almost 10% decrease relative to the sample mean) in column (1) of Panel B.

[14] Estimates are similar to the ones we report if we consider the lifetime fraud experience of the household head by setting M_i equal to (t-1980).
[15] The lifetime experience of fraud does *not* depend on when a household first entered the survey as in that case we use the household head's age and the current state to construct a measure of the lifetime fraud experience.
[16] For the same reason, we are unable to control for lagged stock market participation or household fixed effects.

In evaluating these results, one may wonder whether households with more past fraud experience differ from other households. They may, for instance, have moved because of poor economic prospects following fraud revelation in their state. For this reason, in column (2) of each panel, we include prior state fixed effects; in column (3), we control for the household's lifetime experience of local stock returns and local GDP growth, computed in the same way as the lifetime experience of local fraud. The estimated effect of the lifetime experience of fraud remains negative and significant. It is equally unchanged if we include a dummy that takes the value of one for individuals who moved between the current and the previous survey rounds (column (4)). These tests indicate that the effect of the lifetime experience of fraud is unlikely to be driven by the characteristics of households that moved across states.

The other source of variation in fraud experience is the age of the household heads. While we control for age throughout the analysis, one may wonder whether older household heads, who have naturally accumulated more fraud experience, are more risk averse than younger individuals and for this reason more sensitive to fraud. To address this concern, in column (5) of each panel, we consider only households with heads younger than 40. We continue to find a negative effect of the lifetime experience of fraud indicating that the longer experience of fraud accumulated by older households is unlikely to drive our findings.

Our findings are also not driven by the fact that the fraud sample starts in 1980 and induces a truncation in the fraud experience of older households. The estimated effect of the lifetime experience of fraud is invariant in column (6), when we drop any observations before 2005, dramatically reducing the effect of the truncation, although in Panel A the coefficient estimate is not significant at conventional levels (the p-value is 0.12).

4. How does fraud affect stock market participation?

So far we have shown that fraud revelation is followed by a drop in stock market participation. An interpretation of this evidence is that fraud has a negative effect on trust and, more specifically, on confidence in the stock market. In this section, we aim to evaluate alternative channels through which fraud revelation may affect stock market participation. In the next section, we provide positive evidence on the relevance of trust.

4.1. Is the effect of fraud due to a direct negative wealth effect?

Fraud could negatively affect households' equity holdings because of a direct (negative) wealth effect. The drop in the fraudulent firms' valuations following fraud revelation may mechanically decrease the value of equity holdings for households who hold those stocks.

To evaluate the merit of this explanation, we need to examine whether the effect is mostly due to households that held the stocks of fraudulent firms or whether other households are affected as well. Since PSID does not provide information on which stocks households actually hold, we use the brokerage data of Barber and Odean (2000).[17]

In column (1) of Table 6, we explore the changes in equity holdings of households that did *not* hold stocks of firms involved in fraud during the year and therefore were not directly affected by the fraud episodes. Differently from what we do with the PSID sample, here we are unable to control for changes in household characteristics, because these are reported only at the beginning of the sample. Thus, we include controls for households' demographic characteristics, such as marital status and age, similarly to Barber and Odean (2001). We also control for the state GDP growth and the household's average portfolio return during the year.[18]

[17] In Table IA.2 of the Internet Appendix, we show that households in this sample on average decrease their equity holdings following fraud revelation in the state.

[18] We do not control for the households' initial income and wealth, because these variables are missing for many households. If anything, our results would be stronger if we included these controls.

We find that households that did not hold the stocks of fraudulent firms also reduce their equity holdings following fraud revelation in their state. Thus, the decrease in equity holdings is not driven by financial losses due to fraud revelation.

In column (2), we explore the effect of fraud revelation on (all) households' equity holdings in firms that have *not* been revealed having committed fraud. It appears that households reduce their equity holdings in these firms as well. These results indicate that exposure to fraud negatively affects households' general propensity to hold equity. Thus, fraud revelation affects *all* firms, even the ones that did not commit fraud, indicating that current literature may have understated the negative effects of corporate financial malfeasance.

4.2 Fraud and Information Spillovers

Another possible explanation for our findings is that fraud communicates relevant negative information on other stocks. This could be the case if there are local spillover effects in fraud commission (e.g., Parsons, Sulaeman, and Titman (2015)). These spillovers or other negative information conveyed by fraud revelation could prompt households' sales.

To evaluate the merit of this explanation, we note that firms in the same industry as the fraudulent firms are often considered to be more likely to have committed fraud (Goldman, Peyer and Stefanescu, 2012 and Gleason, Jenkins, and Johnson, 2008). Thus, in column (3) of Table 6, we test whether households reduce their equity holdings in firms that are not in the same 2-digit SIC industries as the firms that have been revealed as fraudulent during the year. Fraud revelation is less likely to provide information about fraud and future expected returns in these firms. Nevertheless, fraud revelation appears to reduce the households' equity holdings in these stocks.

In the same spirit, column (4) considers the effect of fraud revelation on households' change in equity holdings in firms with headquarters in states in which no firm has been revealed having committed fraud during the year. These firms are unlikely to have been affected by state economic shocks leading to or following fraud revelation. The sample is reduced because not all households have holdings in these firms, but we continue to find that households that have been exposed to fraud in their states reduce their holdings in these firms. A one-standard-deviation increase in the proxy for local fraud revelation translates into a 2% drop in equity holdings for an average household. These results suggest that households reduce their stock holdings across the board and therefore their reaction is unlikely to be driven by an informational spillover leading to rational updating on the future returns of their stock investments.

Table 7 provides further support for the notion that the effect of fraud revelation is unrelated to knowledge spillovers. Households exposed to fraud appear to decrease their holdings of out-of-state stocks more than those of in-state stocks. Households appear to decrease their demand for out-of-state stocks more than for in-state stocks not only following the revelation of fraud in their own state but also following fraud revelation in other states (columns (4) to (6)), further confirming that local fraud revelation does not capture local knowledge spillovers or local shocks. Table 7 rather suggests that fraud revelation tends to increase familiarity biases and market segmentations and may thus increase firms' cost of capital.[19]

Importantly, in columns (4) to (6), households appear to rebalance their stock portfolio to a larger extent following fraud revelation in their own state, rather than fraud revelation in other

[19] Since households are sometimes considered to have better information on local stocks (Ivković and Weisbenner, 2005), following fraud revelation, households could increase their local bias because they demand more information on the stocks they hold. However, the evidence on whether households' investment in local stocks is driven by information is inconclusive. Seasholes and Zhu (2010) argue that there is no evidence of an informational advantage on local stocks. Jointly interpreted with the findings in the Internet Appendix that households sell more transparent firms as well as mutual funds (Table IA.5), the increase in local bias is more consistent with the interpretation that fraud increases familiarity biases.

states. The magnitude of the difference in the coefficients is much larger for the change in out-of-state stocks in column (4), where the coefficients are statistically different at 1 percent level. Although the effect of fraud in other states can be estimated only at the cost of omitting year fixed effects and may therefore be biased by other nationwide concurrent shocks, these estimates fully support our research design that aims to capture the differential effect of local fraud.

5. Does fraud affect trust in the stock market?

5.1 Evidence from the Gallup Surveys

To provide some evidence that fraud undermines trust in the stock market, we rely on Gallup Analytics surveys on "Confidence in Institutions". Gallup surveys a random sample of about 1,000 individuals across US states about the degree of confidence that they have in different institutions. The distribution of respondents across U.S. states reflects the geographical distribution of population.[20]

We obtain yearly surveys, generally carried out in the first few months of a year, from 1981 to 2009. Individuals are asked whether they have a great deal, quite a lot, some, or very little confidence in a range of institutions, including big businesses and banks. The surveys also provide information on the respondents' income, age, gender, education, race, political orientation, religion (in selected years), and state of residence. The number of respondents in a state is roughly proportional to the state population.

[20] The 1000~ish respondents are drawn from seven regions in a way that is proportional to the region's weight in the total US population. Then in each region, Gallup randomly selects phone numbers (including both land lines and cell phones) to call until the desired number of responses is reached. Panel A of Table IA.3 in the Internet Appendix reports the distribution of respondents across US states.

We define a respondent to have high trust in a given institution if she reports a great deal or quite a lot of confidence in the institution.[21] Unfortunately, we are unable to determine whether the same individual respond to the survey in different years because Gallup does not provide individual identifiers. Thus, we are unable to study how the trust reported by a given individual in a state varies following fraud revelation. Therefore, we concentrate on state level variation and explore how the fraction of respondents in a state that reports high confidence in different institutions between survey rounds changes following fraud revelation in that state.

We use confidence in big businesses as our main proxy of trust in the stock market. While we do not expect an individual's confidence in big businesses to be affected only by corporate financial misconduct, revelation of corporate fraud by large listed companies could certainly change confidence in big businesses. Therefore, we ask whether the fraction of respondents that reports high confidence in big businesses decreases to a larger extent in states with more fraud revelation between survey rounds.

Column (1) of Table 8 shows that fraud revelation in a state is associated with a decrease in trust in big businesses for households in that state. A one-standard-deviation increase in fraud revelation in a state leads to a 7-percentage-point decrease in the fraction of respondents in that state reporting high confidence in big businesses.

One may wonder whether changes in confidence in big businesses simply reflect changes in confidence in the state economy or in respondent characteristics. In columns (2) and (3), we include a host of controls including changes in characteristics of the survey respondents, state

[21] Individuals' reported attitudes towards specific institutions are unlikely to be affected in a systematic way by whether the word confidence or trust is used in the questionnaire. Consistently with this conjecture, the Chicago Booth/Kellogg School Financial Trust Index, which we cannot use because it only starts in January 2009 and does not overlap with our fraud sample, is defined to capture as "a measure of confidence Americans have in the private institutions in which they can invest their money." Thus, the "Confidence in Institutions" survey presumably captures trust in institutions.

economic conditions, year fixed effects, and even a proxy for the change in the respondents' general trust in other institutions ("*Δ(Trust in Other Institutions)*"), computed as the change in the proportion of state respondents that report high confidence in institutions unrelated to financial markets, such as church, military, police, public schools, media, president, etc. The negative effect of fraud revelation on households' trust in big businesses becomes even stronger. This indicates that the correlation between fraud revelation and changes in trust in big businesses is unlikely to reflect state economic conditions. This is also supported by the fact that the correlation between the change in trust in big businesses and the change in trust in the economy is only 0.001.[22]

Column (4) shows that fraud revelation appears to have a long-lasting negative effect on trust in big businesses as the effect of lagged fraud revelation is not statistically significant at conventional levels. This is consistent with our earlier finding that stock market participation does not recover to previous levels in the years following fraud revelation.

In column (5), we find that fraud revelation decreases to an even larger extent the proportion of individuals that report having high trust in banks, an alternative measure of trust in financial markets. A one-standard-deviation increase in fraud revelation in a state leads to a 22-percentage-point decrease in the fraction of local respondents reporting high confidence in banks.

In the Internet Appendix, we show that fraud revelation in a state is strongly positively correlated to an increase in the fraction of respondents in the state that report high trust in the media (Table IA.3). This is particularly interesting because media cover and even help detecting episodes of financial fraud (Dyck, Morse and Zingales, 2010).[23]

[22] Gallup provides information on the respondents' confidence in the economy only in selected years, which are unfortunately too few to consider in the multivariate analysis.

[23] Table IA.3 in the Internet Appendix shows that fraud revelation is not correlated with changes in trust in institutions that are unrelated to financial markets such as unions, medical system, church, and public schools.

5.2 Mechanisms through which trust affects stock market participation

Table 8 suggests that fraud affects trust in financial markets. But what are the mechanisms through which trust may affect stock market participation? Existing literature highlights three channels through which trust may affect individual decision-making.

First, as Guiso, Sapienza and Zingales (2008) argue, differences in general trust may capture differences in the subjective probability of being cheated. Individuals with high trust believe that they are less likely to be cheated and have higher perceived benefits from holding stocks. Even if fraud revelation does not provide information about the probability that other firms have committed fraud (as we argue in Subsection 4.2), following fraud revelation, households could update upward their subjective probabilities of being cheated and decrease their stock market participation.

Second, experimental evidence shows that trust decisions involve costs of trust betrayal (Bohnet and Zeckhauser, 2004 and Bohnet, Greig, Herrmann, and Zeckhauser, 2008). Individuals with high ex ante costs of betrayal would exhibit less trusting behaviors. This effect could increase the cost of stock market participation for less trusting individuals. In this context, even small increments in the probability of being cheated due to exposure to fraud may lead individuals with high costs of betrayal to sell their stockholdings.

Finally, trust may increase risk tolerance. Negative shocks to trust increasing risk aversion could thus decrease household stock market participation.

Below, we show that there is little evidence that changes in trust are related to changes in risk tolerance, similarly to Guiso, Sapienza and Zingales (2008). We also provide evidence that betrayal costs may matter.

Table 9 explores cross-sectional differences in the effect of fraud on household stock market participation. To test the relevance of betrayal costs in explaining households' reaction to fraud, we follow Hong and Bohnet (2007) who provide experimental evidence that individuals that are considered to have high status, such as men, Caucasians, Protestants, and middle-aged people, exhibit higher betrayal costs and less trusting behaviors. The betrayal aversion channel thus suggests that these high-status individuals should respond more negatively to fraud revelation in their own states. In column (1) of Table 9, we define a PSID household head as having high status if he is a Protestant Caucasian man. The stock market participation of these high-status households is more negatively affected by fraud than for other households. This effect does not depend on the high-status household heads' higher propensity to hold stocks. While it is indeed true that 35% of the high-status households hold stocks and only 26% of the remaining do, the estimated conditional effect of fraud is -2.5 (=0.87/0.35) for high-status households and only -1.4 (=-0.36/0.26) for the remaining households.

Similarly, following Hong and Bohnet (2007), in column (2), we define middle-aged households as those with households' heads aged between 31 and 60. As is consistent with the betrayal cost channel, the effect of fraud on equity participation appears to be driven by middle-aged individuals.[24]

Status may also be associated with education and especially a college degree. Consistent with the earlier results, in column (3), the effect of fraud on stock market participation is entirely

[24] This is the case even if the stock market participation of middle-aged households is higher: 30% of middle-aged households hold equity in comparison to 27% of the remaining households. However, the estimated coefficient of 0.11 for non-middle-aged households implies a statistically insignificant conditional effect of fraud revelation of 0.4 (=0.11/0.27). The parameter estimates imply a much larger conditional effect of fraud for middle-aged households of 2.53 (=0.76/0.30).

driven by individuals with a college degree.[25] This result also suggests that fraud does not affect predominantly unsophisticated households that are less able to rationally update their beliefs.

We also explore to what extent the effect of fraud is related to risk aversion. We exploit that in 1996 PSID respondents were surveyed about their risk tolerance. The survey included a question asking the extent of willingness to take jobs with different prospects. All choices were 50-50 chances to double income or to cut income in different proportions. The risk tolerance was then estimated from a CRRA utility function. We define a household to have low risk tolerance if the household head reported a risk aversion below the median in 1996.[26] In column (4), as we would expect, risk tolerance increases a household's propensity to hold stocks, but it does not affect how the household reacts to fraud revelation. This suggests that the effect of fraud on household stock market participation is not driven by a decrease in risk tolerance as in this case we would expect the effect of fraud revelation to be larger for households that were initially less risk tolerant.

This result is consistent with the finding in column (5) that the effect of fraud on household stock market participation does not depend on wealth, as the interaction term between Fraud in State and a dummy that takes the value of one for households in the top tercile of the wealth distribution is not significantly different from zero. Since absolute risk aversion is often found to be decreasing in wealth (Guiso and Paiella, 2008), this finding suggests that the effect of fraud is unlikely to be related to a household's level of risk aversion.[27]

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[25] The conditional effect of Fraud in State appears stronger for households with college-educated heads, even if we take into consideration the fact that their stock market participation is 51%, much larger than the 21% stock market participation of the remaining households. The parameter estimates we report imply a conditional effect of Fraud in State for households without a college-educated head of 0.8. For households with a college-educated head, the conditional effect is 2.63.

[26] In these tests, we neglect the surveys up to 1996 and focus on how the effect of fraud differs across households with different "beginning-of-the-period" risk tolerance. In this way, we make sure that the measure of risk tolerance does not reflect fraud revelation during the sample period.

[27] The Internet Appendix provides further evidence that fraud revelation does not affect a household's risk aversion.

Overall, the evidence does not support the interpretation that fraud increases households' risk aversion. Instead, the cross-sectional differences in the effect of fraud we uncover support the notion that the effects of fraud on trust depends on betrayal costs rather than merely on changes in the subjective probability of being cheated.

6. Implications for Corporate Finance and Conclusions

Corporate securities fraud appears to decrease household stock market participation, presumably because of its negative effects on trust in the stock market. Importantly, by estimating a differential effect of households' exposure to local fraud, we only estimate a lower bound for the negative effect of corporate fraud on the demand for equity. Fraud is likely to have an even larger impact on household stock market participation. The reduced demand for equity may thus create a negative externality for non-fraudulent firms by increasing their cost of capital and impairing their ability to raise equity.

Even though providing direct evidence on changes in firms' cost of capital is beyond the scope of this paper, Table 10 provides suggestive evidence that firms' investor base changes in a way that is consistent with an increase in cost of capital. We surmise that firms headquartered in the same states as the firms revealed having committed fraud experience larger changes in investor base because their stocks are held to a larger extent by households that are more exposed to fraud. They may thus experience higher selling pressure from retail investors notwithstanding the increase in local bias documented in Table 7. This conjecture appears to be confirmed in column (1) of Table 10, as these firms are the ones that experience a larger decrease in ownership from retail investors in the brokerage sample.

While retail investors sell, firms increase the repurchases of their shares outstanding (column (2)). The number of institutional investors holding the stocks does not change (column (3)), but the shares held by the top institutional investor (column (4)), the top 5 institutional investors (column (5)), and institutional blockholders (column (6)) all increase. This implies an increase in the concentration of institutional ownership. As follows from Merton (1987), such an increase in ownership concentration is expected to be associated with an increase in firm cost of capital. We believe that exploring the effects of changes in household stock market participation due to fraud on firms' corporate policies and cost of capital would be an exciting area for future research.

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Appendix: Variable Definitions

PSID Sample

Stock Market Participation variables

Equity Participation	An indicator variable that equals one if the household holds any shares in publicly held corporations, mutual funds, or investment trusts in a given year.
Equity Participation (IRA)	An indicator variable that equals one if the household holds any shares in publicly held corporations, mutual funds, or investment trusts in a given year, including holdings in pensions or individual retirement accounts.
Equity-Wealth Ratio	The ratio of a household's net equity value relative to the household's total wealth.
Entry	An indicator variable that equals one if a household did not participate in the stock market in the last survey year but does in the current survey year. This variable is defined only for households that did not participated in the stock market in the last survey year.
Exit	An indicator variable that equals one if a household participated in the stock market in the last survey year but not in the current survey year. This variable is defined only for households that participated in the stock market in the last survey year.
Net Equity Purchases	The net dollar value of new equity investment in a year.

Other Financial Market Participation Variables

Bonds & Fixed Income Securities	A dummy that equals one if a household holds bonds, treasuries, insurance policies, banks' certificates of deposits and other fixed income securities in a given year.

Income, Wealth and Other Demographic Controls

Age	The age of the household head in years.
College Education	An indicator variable that equals one if the household head has at least 16 years of schooling.
Experienced State GDP Growth	The average state GDP growth experienced by a household head since he was 18 years old.
Experienced State Stock Return	The average state value-weighted stock return experienced by a household head since he was 18 years old.
Family Size	The number of family members in a given year.
Family Income	The total dollar value of family income.
High Status	An indicator variable that equals one if the household head is a Caucasian Protestant male.
Low Risk Tolerance	In 1996, the PSID survey included a question asking the extent of willingness to take jobs with different prospects. All choices were 50-50 chances to double income or to cut income in different proportions. The

	risk tolerance was then estimated from a CRRA utility function. We define a household to have low risk tolerance if the household head reported a risk aversion below the median in 1996. This variable is defined only for the survey rounds following 1996.
Married	An indicator variable that equals one if the household head is married.
Middle Aged	An indicator variable that equals one if the household head is between 31 and 60.
Moved	An indicator variable that equals one if the household moves across states between survey rounds.
Mover	An indicator variable that equals one if the household moved across states at least once during the sample period.
Wealth	The total dollar value of family net wealth, excluding the value of equity investments.
Fraud Proxies and the Instrument	
AA Shock	It equals the average fraction of public firms in a state that were Arthur Andersen's clients in 2001-2002 for the 2003 and 2005 PSID surveys, and equals zero for the 2001 and 2007 surveys. It is not defined for the remaining surveys.
Experienced Fraud	The number of frauds revealed in the last state of residence of the household during the past year divided by the number of listed companies in the state at the end of the year and averaged across all years since when the household head turned 18.
Fraud in State	The sum of the yearly fraud revelation intensity in the past four years in a state. The yearly fraud revelation intensity is the number of frauds revealed in a state during the past year divided by the number of listed companies in the state at the end of the year.
Fraud in State (dummy)	An indicator variable that equals one if any fraud was revealed in a state during the past four years.
Fraud in State—Local Firms	Computed as "Fraud in State", with the exception that each fraud case is given weight (1+local), where "Local" is an indicator variable capturing whether the fraudulent firm operates in no more than two states. The # of operating states is the number of states mentioned in the firms' 10K, as collected by Garcia and Norli (2012).
Fraud in State—Local Firms & High Media Coverage	Computed as Fraud in State, with the exception that each fraud case is given weight (1+local*(1+totalnews/10)), where "Local" is defined as in "Fraud in State—Local Firms" and "Totalnews" is the number of non-duplicated news in Factiva associated with the case between the date of initial revelation and the date of Wells Notice or settlement agreement.
Yearly Fraud in State	The number of frauds revealed in a state during the past year divided by the number of listed companies in the state at the end of the year.

Brokerage Sample

Stock Market Participation variables

Change in Equity Holdings (portfolio *i*)	The sum of the value of the yearly changes in the number of shares of stocks belonging to portfolio *i*, divided by the value of the equity holdings of stocks in portfolio *i* of a household at the beginning of the year. All values are computed using beginning of period prices.

Household and Other Demographic Controls

Household Portfolio Return	The average monthly value-weighted portfolio return of the household during the year.

Fraud Proxies

Yearly Fraud in State	Defined like the analogous variable in the PSID sample.
Yearly Fraud in Other States	The number of frauds revealed outside a state during the past year divided by the number of listed companies outside the state at the end of the year.

Gallup Sample

Change in Trust

ΔTrust in *j*	The change in the fraction of Gallup survey respondents in a state that reports high confidence in institution *j* between survey rounds. The Gallup Confidence in Institutions surveys ask respondents to rate the degree of confidence in a given institution from 1 (very little), 2 (some), 3 (a lot), to 4 (a great deal). We define an individual to have high confidence in institution *j* if the individual reports a level of confidence at least equal to 3.
ΔTrust in Other Institutions	The change in the fraction of Gallup survey respondents in a state that have high confidence in all institutions surveyed by Gallup but big businesses and banks (these institutions include Church, Public School, Presidency, Congress, Military, Supreme Court, Criminal Justice System, Police, Media, Union, and Medical System). High confidence is defined as in "ΔTrust in *j*".

Fraud Proxies

Yearly Fraud in State	Defined like the analogous variable in the PSID sample.

Controls

Δ(College Education)	The change in the fraction of Gallup survey respondents in a state that have at least college education between survey rounds.
ΔHigh Income	The change in the fraction of Gallup survey respondents in a state with household income above the US median household income in that year between survey rounds.
ΔMale	The change in the fraction of Gallup survey respondents in a state that are male between survey rounds.

ΔProtestant/Jewish	The change in the fraction of Gallup survey respondents in a state that declare to be Protestant/Jewish between survey rounds.
ΔRepublican	The change in the fraction of Gallup survey respondents in a state that declare to be Republicans between survey rounds.
ΔWhite/Black/Hispanic	The change in the fraction of Gallup survey respondents in a state that declare to be white/black/Hispanic between survey rounds.

State Level Controls – Common across Samples

State GDP Growth	The annual GDP growth rate in a state. It is averaged over the past four years in the PSID sample.
State Stock Return	The buy-and-hold value-weighted stock market return in a state. It is cumulated over the past four years in the PSID sample.

Sample of Non-Fraudulent Firms

Change in the Ownership of Institutional Blockholders	The percentage change in the shares of a firm held by institutional blockholders (institutional investors with at least 5% of the firm's shares) during one year, divided by the firm's shares outstanding at the beginning of the year.
Change in the Number of Institutional Owners	The percentage change in the number of institutional owners.
Change in the Ownership of Retail Investors	The percentage change in the total number of shares of a firm held by retail investors in the brokerage sample over a year, divided by the firm's shares outstanding at the beginning of the year.
Change in the Ownership of Top Institutional Owner	The percentage change in the shares of a firm held by the largest institutional owner over one year, divided by the firm's shares outstanding at the beginning of the year.
Change in the Ownership of Top 5 Institutional Owners	The percentage change in the total shares of a firm held by the top 5 institutional owners over one year, divided by the firm's shares outstanding at the beginning of the year.
Firm Past Return	The buy-and-hold stock return in the past year.
Firm MktCap	The market value of equity.
Repurchases	The value of stock repurchases of a firm during a year relative to the firm's market capitalization at the beginning of the year.

Table 1
Corporate Financial Fraud by State and Year

This table reports the number of corporate security frauds revealed between 1980 and 2009 by state and by year, respectively. The year is the year in which a fraud case is first revealed. Detected corporate securities frauds are from the Federal Securities Regulation (FSR) database, compiled by Jonathan Karpoff, Scott Lee, and Gerald Martin (2012).

Panel A: Fraud Cases by State

State	# of Frauds	State	# of Frauds	State	# of Frauds	State	# of Frauds	State	# of Frauds	State	# of Frauds
AL	5	FL	67	LA	2	NC	8	OK	5	UT	12
AR	1	GA	22	MA	29	NE	3	OR	3	VA	14
AZ	10	IA	1	MD	8	NH	2	PA	24	WA	6
CA	127	ID	1	MI	12	NJ	29	RI	1	WI	3
CO	16	IL	19	MN	12	NM	2	SC	5	WV	1
CT	18	IN	8	MO	8	NV	12	SD	3	WY	1
DC	2	KS	10	MS	2	NY	84	TN	6		
DE	2	KY	1	MT	1	OH	25	TX	71		

Panel B: Fraud Cases by Year

Year	# of Frauds	Year	# of Frauds	Year	# of Frauds	Year	# of Frauds	Year	# of Frauds
1980	4	1986	12	1992	24	1998	29	2004	27
1981	6	1987	23	1993	27	1999	29	2005	37
1982	11	1988	14	1994	40	2000	51	2006	42
1983	12	1989	12	1995	26	2001	38	2007	17
1984	17	1990	16	1996	31	2002	59	2008	9
1985	11	1991	21	1997	23	2003	25	2009	11

Table 2
Summary Statistics

Panel A: PSID Sample

This panel reports summary statistics for the household-level and the state-level variables of the PSID sample. The survey years are 1984, 1989, 1994, 1999, 2001, 2003, 2005, 2007, and 2009. All variable definitions are provided in the Appendix. The summary statistics on the PSID sample and all the estimation thereafter involving the PSID sample are reported using sample population weights to be representative of the underlying population.

Variable	N	Mean	S.D.
Household-level Data (by household and survey year)			
Equity Participation	66429	0.313	0.464
Equity Participation (IRA)	66429	0.432	0.495
Equity-Wealth Ratio	66370	0.066	0.161
Entry	40528	0.133	0.340
Exit	12062	0.283	0.451
Net Equity Purchases	65354	11291	105569
Bonds & Fixed Income Securities	17031	0.167	0.373
Age (household head)	66615	50.25	16.60
College Education	64540	0.277	0.448
Experienced Fraud	65253	0.008	0.006
Experienced State GDP Growth	65253	0.093	0.035
Experienced State Stock Return	65253	0.066	0.015
Family Size	66429	2.468	1.394
Family Income (in thousands)	65929	62.62	93.67
High Status	66429	0.278	0.448
Low Risk Tolerance	26106	0.645	0.478
Married	66429	0.585	0.493
Middle Aged (household head)	66429	0.614	0.487
Moved	66359	0.046	0.211
Wealth (excl. equity, in thousands)	66408	215.1	1368.8
Household-level data (by household)			
Mover	13839	0.169	0.375
State-level Data (by state and survey year)			
AA Shock	204	0.105	0.128
Fraud in State	459	0.011	0.022
Fraud in State (dummy)	459	0.546	0.498
Fraud in State –Local Firms	459	0.013	0.024
Fraud in State –Local Firms & High Media Coverage	459	0.019	0.039
Yearly Fraud in State	459	0.002	0.006
Yearly Fraud in Other States	459	0.012	0.004
State GDP Growth	459	0.058	0.024
State Stock Return	459	0.390	0.628

Panel B: Brokerage Sample

This panel reports summary statistics for the household-level and the state-level variables of the brokerage sample. The sample period is 1991-1996. All variable definitions are provided in the Appendix.

Variable	N	Mean	S.D.
Household-level Data (by household and year)			
Change in Equity Holdings (all stocks)	127176	0.090	0.338
Change in Holdings (excl. fraudulent stocks)	126878	0.091	0.338
Change in Holdings (only stocks of firms in industries with no fraud revelation)	125528	0.088	0.336
Change in Holdings (only stocks of firms in states with no fraud revelation)	80611	0.090	0.334
Change in Holdings (only out-of-state stocks)	63727	0.127	0.379
Change in Holdings (only in-state stocks)	63727	0.018	0.125
Household Portfolio Return	127176	0.160	0.420
Age	127176	42	23
Married	127176	0.508	0.500
Family Size	127176	2.264	1.119
State-level Data (by state and year)			
Yearly Fraud in State	255	0.002	0.005
Yearly Fraud in State (dummy)	255	0.290	0.455
Yearly Fraud in Other States	255	0.112	0.043
State GDP Growth	255	0.057	0.030

Panel C: Gallup Survey Sample

This panel reports the state-level data for the Gallup Survey sample. The survey years include 1981, 1983, 1984, 1985, 1986, 1990, 1991, and 1993-2010. All variable definitions are provided in the Appendix.

Variable	N	Mean	S.D.
State-level Data (by state and survey year)			
Δ(Trust in Big Business)	1126	0.000	0.195
Δ(Trust in Banks)	1126	-0.012	0.243
Δ(Trust in Other Institutions)	1126	-0.004	0.193
ΔLog(Age)	1126	0.011	0.181
Δ(College Education)	1126	0.009	0.217
Δ(High Income)	956	0.010	0.218
ΔMale	1126	-0.000	0.205
Δ(Protestant)	577	-0.005	0.221
Δ(Jewish)	577	0.002	0.052
Δ(Republican)	1126	0.001	0.215
Δ(White)	1126	-0.001	0.195
Δ(Black)	1126	-0.000	0.089
Δ(Hispanic)	795	-0.000	0.089
Yearly Fraud in State	1126	0.003	0.009
State GDP Growth	1126	0.054	0.035
State Stock Return	1126	0.085	0.232

Table 3
Fraud Revelation and Household Stock Market Participation
Panel A: Stock Market Participation on the Extensive Margin

This table relies on the PSID sample. We relate the proxy for fraud revelation intensity, cumulated over a four year period, to household stock market participation at the end of the period and changes in stock market participation during that period. The dependent variable is indicated on top of each column. In column (4), we exclude observations from the 1984 and 1989 surveys, for which we are unable to separate any equity held in IRAs from the remaining equity holdings. In column (5), lagged equity participation includes equity in IRAs. In columns (6)-(7), all household characteristics are expressed in first differences, as the dependent variable is a change. Parameter estimates are obtained by ordinary least squares. All variables are defined in the Appendix. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1) Equity Participation	(2) Equity Participation	(3) Equity Participation	(4) Equity Participation (excl. 1984 & 1989)	(5) Equity Participation (with IRA)	(6) Exit	(7) Entry
Fraud in State	-0.528***	-0.502**	-0.559***	-0.602***	-0.304**	1.168***	-0.384*
	(0.191)	(0.215)	(0.200)	(0.201)	(0.145)	(0.405)	(0.219)
Log(Age)	0.052***	0.369***	-0.014*	-0.011	0.005	1.327***	-0.187***
	(0.011)	(0.064)	(0.008)	(0.008)	(0.007)	(0.181)	(0.065)
Married	0.059***	0.027**	0.028***	0.027***	0.020***	-0.026	0.020*
	(0.010)	(0.012)	(0.007)	(0.007)	(0.006)	(0.024)	(0.010)
Log(Family Size)	-0.058***	0.005	-0.037***	-0.036***	-0.027***	-0.033	0.010
	(0.007)	(0.009)	(0.005)	(0.005)	(0.005)	(0.021)	(0.008)
Log(Family Income)	0.048***	0.014***	0.034***	0.031***	0.020***	-0.018***	0.003*
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.006)	(0.001)
Log(Wealth)	0.029***	0.014***	0.019***	0.019***	0.012***	-0.030***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
State GDP Growth	0.266	0.399**	0.177	-0.139	-0.138	-0.259	-0.036
	(0.169)	(0.191)	(0.189)	(0.206)	(0.181)	(0.430)	(0.240)
State Stock Return	0.002	0.001	0.008	0.007	0.005	-0.004	0.016*
	(0.008)	(0.009)	(0.007)	(0.007)	(0.006)	(0.017)	(0.008)
College Education	0.207***						
	(0.011)						
Equity Participation (lagged)			0.484***	0.489***	0.281***		
			(0.008)	(0.008)	(0.007)		
Household F.E.		Yes					
Year F.E., State F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	64,191	66,084	52,257	47,121	52,257	11,989	40,157
R-squared	0.239	0.581	0.398	0.403	0.719	0.062	0.040

Panel B: Alternative Measure of Local Exposure to Fraud

This table relies on the PSID sample and explores to what extent alternative proxies for a household's exposure to local fraud are related to household stock market participation. "Fraud in State–Local Firms" gives larger weights to frauds committed by local firms (defined as firms that operate in no more than two states), and "Fraud in State–Local Firms & High News Coverage" gives larger weights to frauds that received higher news coverage, committed by local firms (defined as above). The numbers in square brackets in columns (2) and (3) are the impact of a one-standard-deviation change in "Fraud in State –Local Firms" and "Fraud in State 3 –Local Firms & High News Coverage", respectively. In columns (4) and (5), we exclude all survey rounds carried out before 1999 and relate equity participation to fraud revelation intensity during the past year; in column (5) we also include one lag. Parameter estimates are obtained by ordinary least squares. All variables are defined in the Appendix. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1) Equity Participation	(2) Equity Participation	(3) Equity Participation	(4) Equity Participation (after 1999)	(5) Equity Participation (after 1999)
Fraud in State (dummy)	-0.031***				
	(0.007)				
Fraud in State –Local Firms		-0.558***			
		(0.191)			
		[-0.015]			
Fraud in State –Local Firms & High Media Coverage			-0.311***		
			(0.088)		
			[-0.033]		
Yearly Fraud in State				-0.545**	-0.886***
				(0.270)	(0.219)
Lagged Yearly Fraud in State					0.195
					(0.206)
Log(Age)	-0.030***	-0.014*	-0.014**	0.005	0.005
	(0.007)	(0.008)	(0.006)	(0.007)	(0.007)
Married	0.034***	0.028***	0.028***	0.025***	0.025***
	(0.006)	(0.007)	(0.005)	(0.007)	(0.007)
Log(Family Size)	-0.034***	-0.037***	-0.037***	-0.037***	-0.037***
	(0.005)	(0.005)	(0.004)	(0.005)	(0.005)
Log(Family Income)	0.028***	0.034***	0.034***	0.028***	0.028***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Log(Wealth)	0.020***	0.019***	0.019***	0.016***	0.016***
	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
State GDP Growth	1.052***	0.174	0.146	0.055	0.057
	(0.167)	(0.189)	(0.145)	(0.242)	(0.242)
State Stock Return	0.001	0.008	0.008	0.008	0.007
	(0.005)	(0.007)	(0.006)	(0.013)	(0.013)
Lagged Equity Participation	0.488***	0.484***	0.484***	0.527***	0.527***
	(0.006)	(0.008)	(0.004)	(0.009)	(0.009)
Year F.E., State F.E.	Yes	Yes	Yes	Yes	Yes
Observations	52,257	52,257	52,257	36,441	36,441
R-squared	0.393	0.398	0.398	0.412	0.412

Panel C: Participation on the Intensive Margin

This table relies on the PSID sample. We relate the proxy for fraud revelation intensity, cumulated over a four year period, to household stock market participation on the intensive margin at the end of the period and changes in the continuous proxies for stock market participation during that period. The dependent variable is indicated on top of each column. In column (4), we exclude observations from the 1984 and 1989 surveys, for which we are unable to separate any equity held in IRAs from the remaining equity holdings. In column (5), the lagged equity-wealth ratio includes equity in IRAs. In column (6), all household characteristics are expressed in first differences, as the dependent variable is a change. All variables are defined in the Appendix. Parameter estimates are obtained by ordinary least squares. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1) Log(Net Equity Purchases)	(2) Equity-Wealth Ratio	(3) Equity-Wealth Ratio	(4) Equity-Wealth Ratio (excl. 1984, 1989)	(5) Equity-Wealth Ratio (with IRA)	(6) Δ(Equity-Wealth Ratio)	(7) Bonds & Fixed Income Securities
Fraud in State	-2.527*	-0.191**	-0.196***	-0.190**	-0.210***	-0.269**	-0.202
	(1.531)	(0.087)	(0.072)	(0.075)	(0.071)	(0.109)	(0.541)
Fraud in State * Lagged Equity Participation							0.997***
							(0.567)
Log(Age)	1.349	0.006	0.012***	0.013***	0.010***	0.032*	0.073
	(0.963)	(0.026)	(0.003)	(0.003)	(0.003)	(0.018)	(0.205)
Married	-0.143	0.001	0.003	0.003	-0.002	-0.003	0.061**
	(0.125)	(0.005)	(0.003)	(0.003)	(0.003)	(0.005)	(0.025)
Log(Family Size)	0.161*	0.000	-0.012***	-0.011***	-0.006***	0.002	-0.026
	(0.095)	(0.003)	(0.002)	(0.002)	(0.002)	(0.004)	(0.017)
Log(Family Income)	0.046*	0.002***	0.009***	0.008***	0.006***	0.001	-0.005
	(0.024)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.006)
Log(Wealth)	0.033***	0.004***	0.006***	0.006***	0.004***	0.004***	0.012***
	(0.006)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
State GDP Growth	0.057	-0.126*	-0.206***	-0.176**	-0.094*	-0.250***	0.079
	(2.630)	(0.069)	(0.069)	(0.081)	(0.055)	(0.082)	(0.401)
State Stock Return	0.052	0.005	0.005	0.005*	0.002	0.002	0.005
	(0.085)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.018)
Equity-Wealth Ratio (lagged)			0.380***	0.386***	0.356***		
			(0.013)	(0.014)	(0.014)		
Bonds (lagged)							-0.050***
							(0.017)
Household F.E.	Yes	Yes					
Year F.E., State F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	65,012	66,047	52,205	47,092	52,249	52,102	13,827
R-squared	0.325	0.471	0.216	0.221	0.282	0.011	0.435

Table 4
Identification Through an Exogenous Shock to Fraud Revelation

Panel A: Validity of the Instrument

The dependent variable is "Fraud in State", the measure of fraud revelation intensity in the past four years in a state. The unit of observation is state-year. The sample period is 2001-2007. Since fraud in state is backward looking, we set the value of AA Shock equal to the fraction of public firms in a state that were AA clients and had to change auditors during 2001-2002 for the years between 2003 and 2005, and to zero for remaining years. The pseudo instrument (XX) is created in the same way except that we use the fraction of public firms that were clients of the auditing firm XX during 2001-2002. Parameter estimates are obtained by ordinary least squares. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the year level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
			Fraud in State		
AA Shock	0.048**				
	(0.019)				
Pseudo Instrument		-0.003			
(Deloitte & Touche)		(0.003)			
Pseudo Instrument			-0.007		
(Ernst & Young)			(0.004)		
Pseudo Instrument				-0.025	
(KPMG)				(0.019)	
Pseudo Instrument					0.000
(PWC)					(0.013)
State GDP Growth	0.024	0.035	0.036	0.034	0.036
	(0.182)	(0.200)	(0.200)	(0.198)	(0.201)
State Stock Return	-0.003	-0.003	-0.003	-0.004	-0.003
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Year F.E.	Yes	Yes	Yes	Yes	Yes
Observations	255	255	255	255	255
R-squared	0.098	0.069	0.069	0.070	0.071

Panel B: IV Estimates

This table relies on the PSID sample for the period 2001-2007. We present two stage least squares estimates for the effect of fraud revelation on alternative measures of stock market participation in levels and first differences. In particular, column (1) presents the first stage estimates of the effect of the instrument on Fraud in State for the equations in levels. The second stage estimates are presented in columns (3) to (5) and the dependent variable is indicated on top of each column. Column (2) presents the first stage estimates for the equations in first differences; second stage estimates are presented in columns (6) to (8); when we consider the equations in first differences all control variables are expressed in first differences. All variables are defined in the Appendix. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Fraud in State		Equity Participation	Equity-Wealth Ratio	Log(Net Equity Purchases)	Exit	Entry	Δ(Equity-Wealth Ratio)
	First Stage							
Instrumental Variable								
AAshock	0.026***	0.025***						
	(0.002)	(0.002)						
Endogenous Variable								
Fraud in State			-1.073*	-0.600***	-14.533**	4.905**	2.302	-0.522
			(0.624)	(0.232)	(6.530)	(2.191)	(1.837)	(0.508)
Control Variables								
Log(Age)	0.000	-0.015***	0.052***	0.026***	0.082**	1.846***	-0.070	-0.004
	(0.000)	(0.001)	(0.007)	(0.003)	(0.038)	(0.265)	(0.049)	(0.032)
Married	0.000	0.000	0.056***	0.006***	0.146***	-0.073**	0.007	-0.009
	(0.000)	(0.000)	(0.006)	(0.002)	(0.035)	(0.035)	(0.007)	(0.006)
Log(Family Size)	-0.000*	0.000	-0.061***	-0.014***	-0.137***	0.025	0.004	0.003
	(0.000)	(0.000)	(0.005)	(0.002)	(0.027)	(0.034)	(0.005)	(0.004)
Log(Family Income)	0.000***	0.000**	0.036***	0.007***	0.126***	-0.005	0.002**	0.001
	(0.000)	(0.000)	(0.002)	(0.001)	(0.013)	(0.009)	(0.001)	(0.001)
Log(Wealth)	-0.000	0.000	0.022***	0.006***	0.060***	-0.026***	0.004***	0.003***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.003)	(0.003)	(0.000)	(0.000)
State GDP Growth	0.128***	0.135***	0.688***	0.108**	2.418*	-1.582***	0.011	0.081
	(0.010)	(0.011)	(0.152)	(0.054)	(1.435)	(0.461)	(0.243)	(0.102)
State Stock Return	-0.003***	-0.002***	-0.031***	-0.006**	-0.042	0.041*	0.045*	0.005
	(0.000)	(0.000)	(0.006)	(0.002)	(0.065)	(0.023)	(0.024)	(0.005)
College Education	0.000		0.153***	0.033***	0.359***			
	(0.000)		(0.007)	(0.002)	(0.035)			
State F.E., Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	38,841	33,603	38,841	38,841	38,841	6,401	22,075	28,389
R-squared	0.045	0.047	0.214	0.109	0.034	0.019	0.012	0.005

Table 5
Within-State Households' Differences in Fraud Experience

This table relies on the PSID sample. We relate household stock market participation to the household's lifetime experience of fraud. The main variable of interest, "Experienced Fraud", is the average fraud intensity experienced by a household in the state of residence since the head of the household was 18. In Panel A, the dependent variable is "Equity Participation", an indicator variable that equals one if the household holds equity in a given survey year. In Panel B, the dependent variable is "Equity-Wealth Ratio". "Prior State" is the state of residence of the household reported in the previous survey year. "Experienced State Stock Returns" and "Experienced State GDP Growth" are the average state stock returns and state GDP growth experienced by a household in the state of residence since the head of the household was 18. "Moved" is a dummy variable that equals one if a household moved across states between the previous and the current survey years. All variables are defined in the Appendix. Parameter estimates are obtained by ordinary least squares. All regressions include a constant term and interactions of state and year fixed effects, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Panel A. Extensive Margin

	(1) Equity Participation	(2) Equity Participation	(3) Equity Participation	(4) Equity Participation	(5) Equity Participation (Age<40)	(6) Equity Participation (Year>=2005)
Experienced Fraud	-2.138**	-2.640**	-1.664**	-2.089**	-1.752**	-1.385
	(0.834)	(1.221)	(0.828)	(0.833)	(0.696)	(0.894)
Log(Age)	0.064***	0.050***	0.055***	0.066***	0.168***	0.100***
	(0.006)	(0.008)	(0.007)	(0.006)	(0.012)	(0.007)
Married	0.094***	0.105***	0.095***	0.094***	0.077***	0.099***
	(0.006)	(0.007)	(0.006)	(0.006)	(0.005)	(0.006)
Log(Family Size)	-0.084***	-0.088***	-0.085***	-0.083***	-0.061***	-0.082***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.005)
Log(Family Income)	0.057***	0.056***	0.057***	0.057***	0.036***	0.046***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)
Log(Wealth)	0.036***	0.038***	0.036***	0.036***	0.019***	0.030***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)
College Education	0.211***	0.210***	0.211***	0.209***	0.246***	0.223***
	(0.005)	(0.006)	(0.005)	(0.005)	(0.007)	(0.007)
Experienced State Stock Return			0.067			
			(0.084)			
Experienced State GDP Growth			1.261***			
			(0.436)			
Moved				0.046***		
				(0.010)		
Prior State F.E.		Yes				

Current State*Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	62,876	50,093	62,876	62,876	26,640	23,547
R-squared	0.241	0.248	0.241	0.241	0.223	0.219

Panel B. Intensive Margin

	(1) Equity-Wealth Ratio	(2) Equity-Wealth Ratio	(3) Equity-Wealth Ratio	(4) Equity-Wealth Ratio	(5) Equity-Wealth Ratio (Age<40)	(6) Equity-Wealth Ratio (Year>=2005)
Experienced Fraud	-0.934***	-1.197***	-0.710***	-0.920***	-0.431**	-0.971***
	(0.269)	(0.395)	(0.261)	(0.268)	(0.181)	(0.297)
Log(Age)	0.022***	0.025***	0.017***	0.022***	0.022***	0.030***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)
Married	0.005**	0.007***	0.005**	0.005**	0.004***	0.012***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)
Log(Family Size)	-0.013***	-0.014***	-0.014***	-0.013***	-0.009***	-0.014***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Log(Family Income)	0.008***	0.009***	0.008***	0.008***	0.004***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)
Log(Wealth)	0.007***	0.008***	0.007***	0.007***	0.003***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
College Education	0.053***	0.058***	0.053***	0.053***	0.034***	0.063***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Experienced State Stock Return			-0.001			
			(0.027)			
Experienced State GDP Growth			0.667***			
			(0.162)			
Moved				0.013***		
				(0.004)		
Prior State F.E.		Yes				
Current State*Year F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Observations	62,876	50,093	62,876	62,876	26,640	23,547
R-squared	0.169	0.170	0.169	0.169	0.108	0.142

Table 6
Households' Changes in Equity Holdings across Different Stock Portfolios

This table relates the effect of fraud revelation to changes in households' equity holdings (net purchases) in different portfolios of stocks using the brokerage data from Barber and Odean (2000). The change in equity holdings is computed as the ratio of the sum of the changes in all equity holdings during a year scaled by the value of the households' equity holdings at the beginning of the year. The value of all positions is computed using share prices at the beginning of the year. "Yearly Fraud in State" is the fraud revelation intensity in the past year in a state. In column 1, we exclude households that held fraudulent stocks. In column 2, we compute the change in equity holdings excluding stocks of firms that were revealed having committed fraud during the past year from the computation. In column 3, we compute the change in equity holdings excluding stocks of firms in the same 2-digit SIC industry as the firms revealed having committed fraud during the past year from the computation. In column 4, we compute the change in equity holdings excluding stocks of firms headquartered in the same states as the firms revealed having committed fraud during the past year from the computation. All variables are defined in the Appendix. Parameter estimates are obtained by ordinary least squares. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Dependent Var.: Change in Equity Holdings	(1) Excluding investors with fraudulent stocks	(2) Excluding fraudulent stocks	(3) Stocks of firms in industries with no fraud revelation	(4) Stocks of firms in states with no fraud revelation
Yearly Fraud in State	-1.065***	-1.054***	-1.154***	-0.839**
	(0.282)	(0.278)	(0.278)	(0.366)
Portfolio Return	0.000	0.000	0.000	0.001
	(0.000)	(0.000)	(0.000)	(0.001)
State GDP Growth	0.174***	0.178***	0.168***	0.149**
	(0.049)	(0.049)	(0.049)	(0.059)
Log(Age)	-0.008***	-0.008***	-0.008***	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)
Married	0.006***	0.006***	0.007***	0.006**
	(0.002)	(0.002)	(0.002)	(0.003)
Log(Family Size)	0.001	0.001	0.001	0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Year F.E.	Yes	Yes	Yes	Yes
Observations	104,932	106,256	105,143	67,407
R-squared	0.005	0.010	0.010	0.006

Table 7
Fraud Revelation and Changes in Holdings of In-State and Out-of-State Stocks

The analysis is based on the brokerage sample. We consider only households with holdings of both in-state and out-of-state stocks. "Change in Holdings of Out-of-State Stocks" is the change in equity holdings in stocks of firms headquartered in a state other than the one in which the household resides computed as the ratio of the sum of the changes in the holdings of out-of-state stocks during a year scaled by the value of the households' out-of-state equity holdings The value of all positions is computed using share prices at the beginning of the year. "Change in Holdings of In-State Stocks" is computed as "Change in Holdings of Out-of-State Stocks", but considering only the household's in-state stocks. The dependent variable "Difference" is the difference between "Change in Holdings of Out-of-State Stocks" and "Change in Holdings of In-State Stocks". All remaining variables are defined in the Appendix. Parameter estimates are obtained by ordinary least squares. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1) Change in Holdings of Out-of-State Stocks	(2) Change in Holdings of In-State Stocks	(3) Difference	(4) Change in Holdings of Out-of-State Stocks	(5) Change in Holdings of In-State Stocks	(6) Difference
Yearly Fraud in State	-1.208***	-0.206**	-1.002**	-2.088***	-0.518***	-1.852***
	(0.431)	(0.105)	(0.446)	(0.433)	(0.188)	(0.448)
Yearly Fraud in Other States				-0.609***	-0.312**	-0.559***
				(0.034)	(0.145)	(0.036)
Portfolio Return	-0.001*	0.000**	-0.001**	-0.000	0.000**	-0.001
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
State GDP Growth	0.148**	-0.046*	0.194**	-0.346***	-0.046*	-0.288***
	(0.074)	(0.027)	(0.081)	(0.068)	(0.027)	(0.073)
Log(Age)	-0.017***	0.003***	-0.020***	-0.016***	0.003***	-0.019***
	(0.004)	(0.001)	(0.004)	(0.004)	(0.001)	(0.004)
Married	-0.000	0.007***	-0.007*	0.001	0.007***	-0.006
	(0.003)	(0.001)	(0.003)	(0.003)	(0.001)	(0.003)
Log(Family Size)	0.001	-0.003***	0.004	0.000	-0.003***	0.003
	(0.003)	(0.001)	(0.003)	(0.003)	(0.001)	(0.003)
Year FE	Yes	Yes	Yes	No	No	No
Observations	53,214	53,214	53,214	53,214	53,214	53,214
R-squared	0.012	0.001	0.010	0.007	0.001	0.005

Table 8
Changes in Trust and Fraud Revelation

We relate changes in trust in various institutions in a given state between survey rounds to the intensity of fraud revelation in that state during the past year. Changes in trust are computed from the Gallup Confidence in Institutions Surveys. Respondent are asked to rate the degree of confidence in a given institution from 1 (very little), 2 (some), 3 (a lot), to 4 (a great deal). We define an individual to have high confidence in an institution if the individual reports a level of confidence equal or larger than 3. We them compute the dependent variable as the change in the proportion of individuals that report high level of confidence in that institution between survey rounds. The sample period is 1981-2009. The number of observations varies across specifications because not all questions were repeated in each survey round. We compute "Δ(Trust in Other Institutions)" as an average of the change in trust across all institutions, but big businesses and banks, between survey rounds. All the respondent related control variables are the changes in the average logarithms of respondent age, and the change in the fraction of respondents with that characteristic for all others demographic characteristics between survey rounds. All variables are defined in the Appendix. Parameter estimates are obtained by ordinary least squares. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the state level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

			Δ(Trust in Big Business)		Δ(Trust in Banks)
	(1)	(2)	(3)	(4)	(5)
Yearly Fraud in State (t-1)	-0.722**	-1.395**	-1.292**	-1.922**	-2.207***
	(0.367)	(0.542)	(0.511)	(0.832)	(0.807)
Lagged Yearly Fraud in State (t-2)				1.050	
				(0.710)	
Δ(Trust in Other Institutions)			0.283***	0.272***	0.313***
			(0.070)	(0.068)	(0.099)
ΔLog(Age)		-0.025	-0.040	-0.041	-0.186*
		(0.076)	(0.066)	(0.070)	(0.110)
ΔMale		0.109	0.126	0.157	-0.128
		(0.104)	(0.102)	(0.100)	(0.137)
Δ(College Education)		-0.017	-0.007	-0.021	0.137
		(0.051)	(0.051)	(0.052)	(0.108)
Δ(High Income)		-0.085	-0.118	-0.133	-0.010
		(0.090)	(0.090)	(0.084)	(0.077)
Δ(White)		-0.266***	-0.222***	-0.222***	-0.029
		(0.089)	(0.079)	(0.077)	(0.147)
Δ(Black)		0.125	0.091	0.094	-0.209
		(0.127)	(0.125)	(0.122)	(0.169)
Δ(Hispanic)		-0.189	-0.168	-0.172	-0.020
		(0.127)	(0.108)	(0.107)	(0.280)
Δ(Republican)		0.248***	0.242***	0.273***	0.159*
		(0.050)	(0.052)	(0.068)	(0.094)
Δ(Protestant)		0.045	0.022	0.010	0.102
		(0.062)	(0.063)	(0.064)	(0.095)
Δ(Jewish)		0.214	0.179	0.216	-0.002
		(0.167)	(0.159)	(0.162)	(0.246)
State GDP Growth (yearly)		0.189	0.180	0.294	1.070***
		(0.276)	(0.275)	(0.272)	(0.388)
State Stock Return (yearly)		0.003	0.004	0.001	-0.073**
		(0.025)	(0.025)	(0.024)	(0.033)
Year FE	No	Yes	Yes	Yes	Yes
Observations	1,126	435	435	435	435
R-squared	0.018	0.167	0.230	0.230	0.199

Table 9
Cross-Sectional Differences in the Effect of Fraud on Stock Market Participation

This table relies on the PSID sample. We explore cross-sectional differences in the effect of exposure to local fraud on stock market participation. "High Status" is a dummy variable that equals one if the household head is a Caucasian Protestant male. "Middle Aged" is a dummy variable that equals one if the household head is between 31 and 60. "College Education" is a dummy variable that equals one if the household head has at least 16 years of education. "High Wealth" indicates that the household's net worth is in the top tercile of the sample distribution in a year. "Low Risk Tolerance" indicates that the household head's risk tolerance score is below the sample median. As in Column 3 of Panel A of Table 3, the set of controls includes Log(Age) (except in column 2, where we include the Middle Aged dummy), Married, Log(Family Size), Log(Family Income), Log(Family Wealth), Lagged Equity Participation, State GDP Growth, State Stock Return, whose coefficients are not reported for brevity. All variables are defined in the Appendix. Parameter estimates are obtained by ordinary least squares. All regressions include the above-mentioned controls, a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1) Equity Participation	(2) Equity Participation	(3) Equity Participation	(4) Equity Participation	(5) Equity Participation
Fraud in State	-0.356	-0.111	-0.167	-0.537**	-0.698**
	(0.225)	(0.328)	(0.191)	(0.228)	(0.287)
Fraud in State*High Status	-0.513*				
	(0.311)				
High Status	0.011*				
	(0.007)				
Fraud in State*Middle Aged		-0.652*			
		(0.341)			
Middle Aged		0.005			
		(0.006)			
Fraud in State*College Education			-1.174***		
			(0.370)		
College Education			0.125***		
			(0.008)		
Fraud in State*Low Risk Tolerance				0.115	
				(0.307)	
Low Risk Tolerance				0.178***	
				(0.007)	
Fraud in State*High Wealth					-0.093
					(0.338)
High Wealth					-0.027***
					(0.008)
Controls, State FE, Year FE	Yes	Yes	Yes	Yes	Yes
Observations	51,572	51,572	50,097	51,572	23,886
R-squared	0.397	0.397	0.406	0.400	0.394

Table 10
Fraud Revelation and Changes in Non-Fraudulent Firms' Investor Base

This table relies on a COMPUSTAT sample of firms that have not revealed to be fraudulent during the sample period. The sample period is 1984-2009, with the exception of column (1), which relies on the brokerage sample (1991-1996). Data on institutional ownership are from Thomson Financial 13F. The unit of observation is firm-year. Panel A reports the summary statistics. Panel B reports the estimated impact of fraud revelation on local non-fraudulent firms' investor base. In column (1), the dependent variable is the percentage change in the total number of shares of a firm held by retail investors in the brokerage sample over a year, divided by the firm's shares outstanding at the beginning of the year (Change in the ownership of retail investors). In column (2), the dependent variable is the value of stock repurchases of a firm during a year relative to the firm's market capitalization at the beginning of the year. In columns (3), the dependent variable is the percentage change in the number of institutional owners. In column (4), the dependent variable is the percentage change in the shares of a firm held by the largest institutional owner over one year, divided by the firm's shares outstanding at the beginning of the year. In column (5), the dependent variable is the percentage change in the total shares of a firm held by the top 5 institutional owners over one year, divided by the firm's shares outstanding at the beginning of the year. In column (6), the dependent variable is the percentage change in the shares of a firm held by institutional blockholders (institutional investors with at least 5% of the firm shares) during one year, divided by the firm's shares outstanding at the beginning of the year. Fraud in State is the number of fraud cases revealed in a state during one year, divided by the number of listed companies headquartered in the state. We control for firm market capitalization at the beginning of the year (Firm MktCap) and firm past return (Firm Past Return). All variables are defined in the Appendix. Parameter estimates are obtained by ordinary least squares. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the firm level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Panel A: Summary Statistics

Variable	N	Mean	S.D.
Change in the ownership of retail investors	14,439	-0.0001	0.0006
Repurchases	91,485	0.012	0.038
Change in the number of institutional owners	78,363	0.159	0.769
Change in the ownership of the top institutional owner	78,130	0.009	0.046
Change in the ownership of the top 5 institutional owners	78,130	0.025	0.091
Change in the ownership of institutional blockholders	45,665	0.023	0.112
Firm MktCap	91,485	5.237	1.980
Firm Past Return	91,485	0.155	0.777
Fraud in State	91,485	0.003	0.004

Panel B: Changes in Non-Fraudulent Firms' Ownership

	(1) Change in the ownership of retail investors	(2) Repurchases	(3) Change in the number of institutional owners	(4) Change in the ownership of the top institutional owner	(5) Change in the ownership of the top 5 institutional owners	(6) Change in the ownership of institutional blockholders
Fraud in State	-0.002*	0.058*	0.573	0.088*	0.219**	0.318**
	(0.001)	(0.033)	(0.501)	(0.050)	(0.093)	(0.147)
Firm MktCap	0.000***	0.002***	-0.039***	0.0004***	0.002***	0.001**
	(0.000)	(0.000)	(0.001)	(0.0001)	(0.0002)	(0.0002)
Firm Past Return	0.000	-0.001***	0.031***	0.002***	0.006***	0.009***
	(0.000)	(0.000)	(0.010)	(0.0002)	(0.001)	(0.001)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14,439	91,485	78,363	78,130	78,130	45,665
R-squared	0.010	0.014	0.023	0.007	0.017	0.015

Internet Appendix for "Corporate Scandals and Household Stock Market Participation"

Mariassunta Giannetti
Stockholm School of Economics, CEPR and ECGI

Tracy Yue Wang
University of Minnesota

Abstract

This Internet Appendix provides supplementary materials to the paper *Corporate Scandals and Household Stock Market Participation*. The document reports and discusses five tables that we mention in the paper but do not report for brevity and is organized as follows. Section A explores the robustness to our baseline results (Table IA.1). Section B shows how fraud affect changes in equity holdings in the brokerage data (Table IA.2). Section C discusses how fraud revelation in a state is related to changes in households' trust in major institutions other than big businesses and banks (Table IA.3). Section D reports and discusses further evidence on the mechanisms through which fraud may affect trust in the stock market (Tables IA.4, IA.5).

A. Robustness of the Baseline Results

We explore to what extent the geography of fraud revelation may be driving our findings. The results are reported in Table IA.1. First, we exclude the largest three states, which have most fraud cases and listed companies (column 1). If anything, fraud has a larger effect on stock market participation when we exclude the largest states. This is intuitive because California and Texas are highly geographically dispersed and fraud revelation in these states is expected to produce weaker exposure to fraud for local households. Column 2 shows that our estimates are equally robust if we exclude 12 states with fewer than 26 listed companies (the bottom quartile of the distribution of the number of listed firms across states and years in our sample).

B. Fraud Revelation and Household Equity Participation: Evidence from Brokerage Data

In this section we show, using the brokerage data of Barber and Odean (2000), that households decrease their equity holdings in years in which there has been more fraud revelation in their own state.

Since all households with a brokerage account own some equity, we explore the effects of fraud revelation in a state on changes in the households' equity holdings (or net purchases) during the year. Differently from what we do with the PSID sample, here we are unable to control for changes in household characteristics, such as family size or income and wealth, because these are only surveyed by the brokerage company at the beginning of the sample. Thus, we include controls for households' demographic characteristics, such as marital status and age, similarly to Barber and Odean (2001). We also control for the state GDP growth and the household's average

portfolio return during the year, which could be correlated with fraud revelation in the state.[1]

Table IA.2 shows that fraud revelation has pervasive negative effects on households' equity holdings in this sample as well. The effect of fraud revelation becomes even stronger after we include household fixed effects (column (2)). A one-standard-deviation increase in fraud revelation intensity in a state during a year leads to a 4.2-percentage-point decrease in the household's equity holdings. Although this effect may appear small, it is equivalent to a 5% drop in net purchases for an average household.[2] Moreover, if we do not standardize the measure of fraud revelation by the number of listed companies in the state and we simply use a dummy for whether the household has been exposed to fraud in the state during the year, the household's equity holdings appear to decrease by over 1 percentage point, which represents an over 10% drop in the net purchases for the average household.

We continue to find a negative effect of local exposure to fraud when we exploit the availability of information on households' zip codes to create a dummy for whether a household has been exposed to frauds committed by firms headquartered within 200 miles from the household residence in a year (even if they are outside the state). In column (4), the point estimate of the coefficient is very similar to the one for fraud in the state, validating our strategy (dictated by data constraints in the PSID sample) of relying on state exposure to fraud.

We also compute the number of frauds affecting firms more than 200 miles away from the household's residence. In column (5), it appears that exposure to local fraud (within 200 miles) has a much larger impact on households' equity holdings

[1] We do not control for the households' initial income and wealth, because these variables are missing for many households. As the fixed effect estimates below indicate, if anything, our results would be stronger if we included these controls.

[2] This effect is obtained by scaling 4.2 percentage points using the average of the changes in equity holdings in the sample.

than exposure to distant fraud (further than 200 miles). This result supports our empirical design of identifying the effect of fraud from variation in households' exposure to local fraud.

C. Fraud Revelation and Changes in Trust of Other Institutions

Table IA.3 Panel A reports the distribution of respondents across the U.S. states. Panel B reports the summary statistics of the change in trust in other institutions.

Table 8 in the paper shows that the fraud revelation in a state is associated with a decrease in trust in big businesses and banks for households in that state. Table IA.3 Panel C shows how fraud revelation in a state is correlated with trust in other institutions.

First, fraud revelation in a state is strongly positively correlated to an increase in the fraction of respondents that report high trust in the media in the state. This is particularly interesting because media cover episodes of financial fraud and in certain cases even help to discover fraud (Dyck, Morse and Zingales, 2010).

Second, fraud revelation appears to be negatively related to trust in political institutions that may be seen related to big businesses, corporate laws and regulations, and their enforcement, such as the Presidency, the Congress, and the Supreme Court. We want to stress, however, that the effect of fraud revelation on changes in trust in big business or banks is not mediated by the change in trust in political institutions as the effect is –if anything– stronger in columns (3) and (4) of Table 8, when we control for the changes in trust in other institutions (which include the Presidency, the Congress, and the Supreme Court).

Finally, fraud revelation appears not to be related to changes in trust in institutions that are otherwise unrelated to financial markets such as unions, medical system, church, and public schools.

D. Mechanisms through which trust affects stock market participation: Further Evidence

In columns (4) and (5) of Table 9, we show that the effect of fraud on household equity participation does not depend on the household's risk tolerance or wealth. This suggests that the effect of fraud is not driven by a decrease in risk tolerance.

To further explore whether changes in trust due to fraud and risk aversion are related, we follow Guiso, Sapienza and Zingales (2008) who argue that a household's general trust is unrelated to risk aversion because it is not correlated with the probability of having health insurance. In Table IA.4, we relate fraud revelation in a state to changes in, respectively, health insurance, car insurance and house insurance premia for households in that state. We also include a host of household level controls capturing changes in the demand for insurance driven by reason other than fraud. Fraud revelation appears unrelated to changes in the households' demand for insurance and therefore risk aversion.

We also explore whether fraud is related to changes in portfolio composition that may be related to changes in risk aversion. If the effect of fraud on trust were mediated by an effect on risk tolerance, we should observe that individuals increase their portfolio diversification. Households could sell their direct equity holdings and increase their holdings in equity mutual funds to diversify their portfolios. From the brokerage data, we are able to obtain the value of holdings of equity mutual funds for

a subsample of households and we compute their changes. Column (1) in Table IA.5 shows that households appear to sell also their indirect equity holdings through mutual funds following fraud revelation. The effect is also economically large as a one-standard-deviation increase in the proxy for fraud revelation implies a 2 percentage-point drop in mutual funds holdings, which is equivalent to a 10% decrease in the net purchases of mutual funds.[3] This indicates that households do not increase the diversification of their equity portfolios after fraud revelation.

The decrease in equity mutual fund holdings after fraud revelation also suggests that household behavior is not entirely driven by an increase in the propensity to collect information about firms because this function is delegated to mutual funds' managers for indirect equity holdings. Consistently with this conjecture, column (2) of Table IA.5 shows that households appear to also sell stocks with analyst coverage.[4] Since information should be more widely available for these stocks, this also indicates that the desire to collect more information following fraud revelation is unlikely to be the unique driver of the decrease in stock market participation.

[3] This is obtained by multiplying the coefficient (-0.748) by the standard deviation of Yearly Fraud Revelation (which is 0.0028 in this sample) and dividing by the average change in mutual funds holdings (0.02).

[4] The sample is reduced as is consistent with empirical evidence that households, differently from institutional investors (Kang and Stulz, 1997), tend to hold the stocks of smaller firms. Also, average net purchases in stocks with analyst coverage are smaller than for the average portfolio of stocks, and a one-standard-deviation increase in average net purchases is associated with a 10% decrease in the net purchases of these stocks.

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Table IA.1
Robustness of the Baseline Results

This table relies on the PSID sample and explores to what extent the geography of fraud revelation may be driving our findings. In column (1), we exclude all households in California, Texas and New York, the largest states per number of listed companies and fraud cases. In column (2) we exclude households in 12 states that have fewer than 26 public companies (the bottom quartile). All variables are defined in the Appendix. Parameter estimates are obtained by ordinary least squares. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1) Equity Participation (excl. CA/TX/NY)	(2) Equity Participation (excl. states w/ fewer than 26 firms)
Fraud in State	-0.575***	-0.444*
	(0.205)	(0.269)
Log(Age)	-0.015*	-0.014*
	(0.008)	(0.008)
Married	0.028***	0.029***
	(0.007)	(0.007)
Log(Family Size)	-0.034***	-0.037***
	(0.006)	(0.005)
Log(Family Income)	0.033***	0.033***
	(0.002)	(0.002)
Log(Wealth)	0.020***	0.019***
	(0.001)	(0.001)
State GDP Growth	0.039	0.261
	(0.205)	(0.203)
State Stock Return	0.007	0.008
	(0.008)	(0.008)
Lagged Equity Participation	0.479***	0.485***
	(0.008)	(0.008)
Year F.E., State F.E.	Yes	Yes
Observations	42,722	51,250
R-squared	0.394	0.399

Table IA.2
Fraud Revelation and Changes in Equity Holdings in the Brokerage Data

This table examines the effect of fraud revelation in a state on the change in households' equity holdings (net purchases) using the brokerage data from Barber and Odean (2000). The change in equity holdings is computed as the ratio of the sum of the changes in all equity holdings during a year scaled by the value of the households' equity holdings at the beginning of the year. The value of all positions is computed using share prices at the beginning of the year. "Yearly Fraud in State" is the fraud revelation intensity in the past year in a state. "Yearly Fraud in State (dummy)" indicates whether any episode of fraud occurred in the state during the past year. "Yearly Fraud Dummy (within 200 miles)" indicates whether firms located within 200 miles from a household's zip code were revealed having committed fraud during the past year, and "Yearly Fraud Dummy (further than 200 miles)" indicates whether firms located more than 200 miles away from a household's zip code were revealed having committed fraud during the past year. All variables are defined in the Appendix. Parameter estimates are obtained by ordinary least squares. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Dependent Var.: Change in Equity Holdings	(1)	(2)	(3)	(4)	(5)
Yearly Fraud in State	-1.061***	-1.204***			
	(0.277)	(0.407)			
Yearly Fraud in State (dummy)			-0.011***		
			(0.002)		
Yearly Fraud Dummy (within 200 miles)				-0.009***	-0.016***
				(0.002)	(0.002)
Yearly Fraud Dummy (further than 200 miles)					-0.006**
					(0.003)
Portfolio Return	0.000	0.001	0.000	0.000	0.000
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
State GDP Growth	0.179***	0.138	0.106**	0.127**	-0.136***
	(0.048)	(0.093)	(0.050)	(0.050)	(0.045)
Log(Age)	-0.008***		-0.008***	-0.009***	-0.008***
	(0.003)		(0.003)	(0.003)	(0.003)
Married	0.007***		0.007***	0.006***	0.007***
	(0.002)		(0.002)	(0.002)	(0.002)
Log(Family Size)	0.001		0.001	0.002	0.001
	(0.002)		(0.002)	(0.002)	(0.002)
Year F.E.	Yes	Yes	Yes	Yes	No
Household F.E.		Yes			
Observations	106,495	127,176	106,495	106,495	106,495
R-squared	0.010	0.280	0.010	0.010	0.010

Table IA.3
Fraud Revelation and Changes in Trust in Other Institutions

Panel A: Average Number of Gallup Survey Respondents by State

This table reports the average number of respondents surveyed by Gallup in each state across the years. The average number of total respondents in a year is 1124.

State	Average # of Respondents	State	Average # of Respondents	State	Average # of Respondents	State	Average # of Respondents
AL	20	IL	53	NC	36	SC	18
AR	12	IN	29	ND	6	SD	7
AZ	22	KS	15	NE	12	TN	27
CA	118	KY	20	NH	8	TX	71
CO	23	LA	18	NJ	36	UT	12
CT	17	MA	32	NM	10	VA	31
DC	4	MD	27	NV	8	VT	4
DE	6	ME	9	NY	88	WA	29
FL	60	MI	47	OH	59	WI	30
GA	33	MN	22	OK	16	WV	12
HI	9	MO	27	OR	18	WY	7
IA	17	MS	14	PA	67		
ID	8	MT	8	RI	7		

Panel B: Summary Statistics of Changes in Trust in Other Institutions

This panel reports state-level data for the Gallup Survey sample. The survey years include 1981, 1983, 1984, 1985, 1986, 1990, 1991, and 1993-2010. All change in trust in a given institution and state-year are computed in the same way as the change in trust in big businesses and banks in Table 8.

Variable	N	Mean	S.D.
State-level Data (by state and survey year)			
Δ(Trust in Church)	1126	-0.009	0.245
Δ(Trust in Congress)	1126	-0.008	0.209
Δ(Trust in Criminal Justice System)	1126	0.011	0.172
Δ(Trust in Media)	1126	-0.006	0.228
Δ(Trust in Medical System)	1126	0.016	0.219
Δ(Trust in Military)	1126	0.012	0.217
Δ(Trust in Police)	1126	0.026	0.233
Δ(Trust in Presidency)	1126	0.014	0.265
Δ(Trust in Public Schools)	1126	-0.007	0.226
Δ(Trust in Supreme Court)	1126	-0.005	0.231
Δ(Trust in Union)	1126	-0.004	0.198

Panel C: Effect of Fraud Revelation on Trust in Other Institutions

The dependent variable in each row is the change in trust in that institution in a state-year, computed in the same way as the change in trust in big businesses and banks in Table 8. The regression specification is the same as in column 1 of Table 8, and the number of observations is 1,126 in all the regressions. Standard errors are clustered at the state level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

Institution	Coefficient on Yearly Fraud in State
Church	0.430 (0.501)
Public School	0.056 (0.973)

Presidency	-2.181 (0.524) ***
Congress	-1.217 (0.447) ***
Military	1.195 (0.715)
Supreme Court	-1.885 (0.603) ***
Criminal Justice System	-0.693 (0.398)
Police	-1.031 (0.903)
Media	1.647 (0.508) ***
Union	0.058 (0.418)
Medical System	0.958 (1.033)

Table IA.4
Fraud Revelation and Insurance Expenses

This table relies on the PSID sample. We explore the effect of exposure to local fraud on changes in the households' self-reported insurance premia between survey years. All variables are defined in the Appendix. Parameter estimates are obtained by ordinary least squares. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1) ΔLog(Car Insurance)	(2) ΔLog(Home Insurance)	(3) ΔLog(Health Insurance)
Fraud in State	0.433	0.419	1.284
	(0.622)	(0.367)	(1.390)
ΔLog(Age)	-1.904***	0.859***	2.070*
	(0.323)	(0.215)	(1.135)
ΔMarried	0.075**	0.060***	-0.047
	(0.036)	(0.022)	(0.111)
ΔLog(Family Size)	0.279***	0.014	0.149*
	(0.031)	(0.017)	(0.082)
ΔLog(Family Income)	0.006	-0.001	-0.004
	(0.009)	(0.004)	(0.019)
ΔLog(Wealth)	0.012***	0.001	0.000
	(0.002)	(0.001)	(0.005)
State GDP Growth	1.104	1.921***	1.714
	(0.741)	(0.357)	(1.702)
State Stock Return	0.011	-0.015	0.075
	(0.028)	(0.014)	(0.081)
Year FE, State FE	Yes	Yes	Yes
Observations	26,705	20,264	16,250
R-squared	0.050	0.017	0.848

Table IA.5
Fraud Revelation and Changes in Portfolio Composition

The analysis is based on the brokerage sample from Barber and Odean (2000). In column 1, the dependent variable is the yearly changes in the value of equity mutual funds holdings of a household divided by the household's wealth invested in equity mutual funds at the beginning of the period. In column 2, the dependent variable is the change in equity holdings in stocks with analyst coverage computed as the ratio of the sum of the changes in the holdings of stocks with analyst coverage, scaled by the value of the households' equity holdings in stocks with analyst coverage at the beginning of the year. The value of all positions is computed using share prices at the beginning of the year. All regressions include a constant term and fixed effects, which we do not report. All variables are defined in the Appendix. Parameter estimates are obtained by ordinary least squares. All regressions include a constant term and fixed effects as indicated in the table, whose coefficients we do not report. Standard errors are clustered at the household level and corrected for heteroskedasticity. ***, **, * denote significance at 1%, 5%, and 10% levels, respectively.

	(1) Change in Mutual Fund Holdings	(2) Change in Holdings of Stocks with Analyst Coverage
Yearly Fraud in State	-0.602**	-0.748*
	(0.249)	(0.422)
Portfolio Return	-0.002**	0.000*
	(0.001)	(0.000)
State GDP Growth	-0.054	0.103
	(0.081)	(0.079)
Log(Age)	-0.002	-0.010**
	(0.003)	(0.004)
Married	0.007**	0.002
	(0.003)	(0.003)
Log(Family Size)	-0.001	0.002
	(0.003)	(0.003)
Year FE	Yes	Yes
Observations	7,928	24,094
R-squared	0.036	0.051