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Using micro-level panel data and a difference-in-differences identification strategy, we study the effect of political uncertainty on household stock market participation. We find that households significantly reduce their participation and reallocate funds to safer assets during periods of increased political uncertainty. The decline in participation is related to households' response to elevated asset risk and their incentive to hedge increased labor income risk. In situations where uncertainty remains high after elections, pre-election reduction in participation is only partially reversed, reflecting a prolonged distortion in household stock investments, which can have implications for households, firms, and the economy in general.

Keywords: Political uncertainty, Stock market participation, Portfolio choice, Labor income risk, Asset risk

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Introduction

Political uncertainty is related to the range, likelihood, and impact of future government actions. The magnitude of uncertainty depends on what policy actions will be undertaken, who will make these decisions, and to what extent the policies will be implemented. Despite recent research showing that political uncertainty has adverse real effects on corporate decision making (Julio and Yook 2012; Gulen and Ion 2016; Bonaime, Gulen, and Ion 2017; Çolak, Durnev, and Qian 2017; Jens 2017), surprisingly little is known about its influence on households. We seek to fill this gap in the nascent literature by investigating whether and how political uncertainty affects households' participation in the stock market.

The motivation for households' response to political uncertainty is different from that for firms. Unlike corporate investments that are costly and irreversible, households' stock investments are easily reversible. Therefore, the real option value behind the reduction in corporate investments during periods of greater political uncertainty does not apply to households. We develop a simple theoretical model to illustrate that political uncertainty affects household stock market participation through two channels that are distinct from the real option channel for corporate investments. First, an increase in political uncertainty results in greater asset risk (Pástor and Veronesi 2013; Brogaard and Detzel 2015) and hence induces a *speculative demand*, leading households to reduce their stock investment. Second, an increase in political uncertainty raises labor income risk (Baker, Bloom, and Davis 2016), thereby inducing a *hedging demand* for households to sell stocks.[1] The simultaneous effect of political uncertainty on households' speculative and hedging demands reduces households' willingness to participate in the stock market in periods of elevated political risk. Consistent with the theoretical

[1] Politicians and regulatory institutions frequently make decisions that influence employment, wages, taxation, government spending, business environment, and economic prospects (e.g., Peltzman 1987; Alesina and Roubini 1992; Besley and Case 1995), all of which affect households' labor income.

predictions, we find strong empirical evidence that higher levels of political uncertainty cause households to reduce their participation in the stock market.

To quantify the impact of political uncertainty on household participation in the stock market, we use the micro-level longitudinal Survey of Income and Program Participation (SIPP), a collection of panel data that tracks households for up to four years. There are between 30,233 and 44,347 respondents in each panel. An advantage of using panel data is that they allow us to control for household fixed effects, and thereby to eliminate compositional problems caused by unobserved household characteristics that are constant over time. Utilizing SIPP data spanning the period from 1996 to 2011, we construct two related measures of stock market participation. The first one, *Participation*, is an indicator variable that equals one if a household holds any stocks in a publicly held corporation or a mutual fund at the beginning of the interview month. The second measure, *% Stock share,* reflects the monetary value of stock investment as a fraction of a household's total liquid wealth (defined as the sum of stockholdings and safe assets, such as bonds, checking accounts, and savings accounts).

The SIPP data include each household's state of residence. We take advantage of this information and exploit the quasi-natural experiment created by U.S. gubernatorial elections, which provide an exogenous source of political uncertainty (e.g., Bird, Karolyi, and Ruchti 2017; Çolak, Durnev, and Qian 2017). State governments have substantial power in shaping the state's economic environment through policies on taxes, subsidies, state budget, wages, and labor policies. The economic environment shaped by these policies, in turn, affects businesses and households.[2]

Compared with presidential elections, gubernatorial elections have several advantages. First, while presidential elections create nationwide political uncertainty, gubernatorial elections lead to

[2] In particular, governors serve as the chief executive officers of their states and have powers that generally include appointing officials and judges, drafting budgets, making legislative proposals, and vetoing state legislature bills. These powers result in governors having significant influence over the direction of the state budget and policy environment. It is also important to note that these powers could allow governors to circumvent the state legislature.

statewide political uncertainty that have stronger localized effects. Second, unlike presidential elections, which are held every four years nationwide, gubernatorial elections in different states are staggered and held in different years. Third, unlike presidents, state governors have various term lengths and term limits. These advantages create important cross-sectional and time-series variations that can help us better identify the effect of political uncertainty on household stock market participation.

Using gubernatorial elections as a laboratory, we take a *difference-in-differences* (DD) approach to isolate the effect of political uncertainty on household stock market participation. Because gubernatorial elections are prescheduled and not controlled or affected by households, they can be viewed as mostly exogenous events. Therefore, using gubernatorial election cycles as a source of political uncertainty alleviates endogeneity concerns; that is, changes in stock market participation could be caused by changes in business cycles or in state economic conditions. In addition, the DD approach helps ease concerns that omitted variables could lead to a spurious association between stock market participation and political uncertainty, because households located in different states share the same national political and business cycles and therefore face similar macroeconomic risk and uncertainty at the national level.

Although the DD setting alleviates the aforementioned endogeneity concerns, it might not fully control for state-level economic conditions affecting the participation decision. Therefore, following Korniotis and Kumar (2013), we control for several state-level business cycle variables (income growth, relative unemployment, and the housing collateral ratio) as well as year and state fixed effects. It is important to note that the year fixed effects control for time-series variations in nationwide stock market participation. Therefore, our DD estimate captures the *marginal* effect of a state's gubernatorial election on households in that state. Since households can be exposed to elections in other states, our estimates are to be interpreted as a lower bound of the negative effects of political uncertainty on the demand for stocks. Finally, when examining the interaction effects between elections and exposures

to asset risk and labor income risk, we utilize joint *state–year* fixed effects in a *triple difference* setting. This framework controls for the impact of latent state-level shocks or trends and helps us understand the mechanisms driving the effect of political uncertainty on household stock market participation.

We find a significant 2.7% decrease in the participation rate and a 3.8% decrease in the percentage of liquid wealth invested in the stock market for households in states with upcoming gubernatorial elections, relative to households in states without upcoming elections. In terms of the economic significance of our findings, these figures are comparable to the results in Giannetti and Wang (2016), which is perhaps the most related paper in that it also investigates the effect of exogenous statewide shocks on households' stock market participation. They show that a one standard deviation increase in lifetime exposure to local fraud is associated with a 4% decrease in participation. In addition, the effects that we document are robust to controlling for a rich set of other factors at the household and state levels that can influence stock market participation. We also find that the dampening effect of political uncertainty on household participation becomes stronger for close elections measured by both victory margin and pre-election poll data (i.e., ex-post and ex-ante measures, respectively), as well as for elections with outgoing incumbent governors due to term limits. Finally, we find that, in the face of increased political uncertainty, households move their capital from the stock market to safer assets, such as savings accounts and bonds.

Our theoretical model predicts that aversion to asset risk and the need to hedge labor income risk can cause households to reduce stock investments when they face greater political uncertainty prior to gubernatorial elections. This prediction is premised on the assumption that elections are associated with elevated asset risk and labor income risk. Therefore, we carry on our empirical investigation by testing this premise and show that both asset risk (proxied by historical stock return volatility and implied volatility) and labor income risk (proxied by volatility of labor income and volatility of labor hours) increase before elections and subside afterwards. As gubernatorial elections are staggered across states and time, exposures to labor income risk and asset risk will vary

exogenously depending on the states where households and firms are located. Because the SIPP data do not contain stock-level investment information, we use data on households' stockholdings from a large discount brokerage firm to determine the locations of portfolio firms. This, in turn, allows us to classify households and their stock investments into in-state and out-of-state categories, depending on whether elections are held in the states where households reside and where portfolio firms are headquartered. Analyzing the different combinations of in-state and out-of-state households and firms enables us to test the effects of asset risk and labor income risk separately, and, thereby, identify the channels through which gubernatorial elections affect stock market participation. We find that both channels are instrumental in explaining the variation in households' participation in the stock market. Although the locations of households and firms capture *indirect* risk exposures, they do not account for within-state variations across different households and different firms located in the same state. To address this limitation, we conduct analysis with more *direct* measures of risk exposures (volatility of labor income and volatility of labor hours for labor income risk; historical return volatility and implied volatility for asset risk). The results corroborate our findings with indirect measures: greater exposures to labor income risk and asset risk are associated with more pronounced reductions in households' stock market participation prior to elections.

If elections are associated with increased levels of political uncertainty, we would expect at least some of the uncertainty to be resolved after the elections and, consequently, a reversal in stock market participation. We find results consistent with this prediction. For the overall sample of elections, the post-election increase in stock market participation is almost the same as the pre-election decrease, suggesting a complete reversal in participation. However, for the subsample of elections in which the elected governor is from a different political party than the party of outgoing governor, we observe a less than complete reversal. This evidence is again consistent with uncertainty affecting participation since, in this subsample, the increased uncertainty is more likely to linger longer after the elections.

This, in turn, implies that political uncertainty can have a long-lasting disruptive impact on household stock market participation.

By focusing on if and how political uncertainty impacts households' stock market participation, we contribute to a wide range of studies that emphasize how firms respond to political uncertainty (e.g., Julio and Yook 2012; Bonaime, Gulen, and Ion 2017; Çolak, Durnev, and Qian 2017; Jens 2017). Although we do not provide an explanation for the overall low participation of households (e.g., Campbell 2006), we show that political uncertainty can exacerbate this phenomenon by inducing households to reduce their stock investments prior to elections. We further identify political uncertainty as an important source of asset risk and labor income risk, and exploit variations in exposures to these risks to illustrate their effect on household stock investment decisions. To this end, we also contribute to earlier studies documenting the effect of labor income risk on households' portfolio choice (e.g., Guiso, Jappelli, and Terlizzese 1996; Angerer and Lam 2009; Betermier et al. 2012; Bonaparte, Korniotis, and Kumar 2014). Our contribution is relevant in that we reveal meaningful time-series variations in households' stock market participation due to the recurring effect of gubernatorial elections. Finally, our investigation demonstrates that, in certain situations, the pre-election decline in participation does not fully reverse, which may have broader implications for wealth distribution across households and cost of financing for firms.

The remainder of the paper proceeds as follows. Section 1 briefly summarizes the theoretical model and discusses the empirical implications. Section 2 describes the data and construction of the key variables. Section 3 presents the effects of political uncertainty on household stock market participation. Section 4 investigates whether the resulting effects are through the asset risk and labor income risk channels. Section 5 examines the post-election dynamics of stock market participation. Section 6 provides robustness tests. Section 7 discusses the implications and concludes the paper. The Appendix presents the theoretical model that illustrates the effect of political uncertainty on household stock market participation decisions.

1. Theoretical motivation

To motivate our empirical analysis, we consider a stock trading model with political uncertainty that incorporates participation costs and a demand to hedge labor income risk. Although there is a vast literature on the interaction between labor income and stock investment, most of the papers use dynamic partial equilibrium models that take the stock return process as exogenously given (e.g., Merton 1971; Bertaut and Haliassos 1997; Heaton and Lucas 1997; Koo 1998; Viceira 2001; and Cocco, Gomes, and Maenhout 2005). In contrast, recent theoretical studies on political uncertainty and asset prices, such as Pástor and Veronesi (2012, 2013), endogenize asset prices in the absence of participation decisions and labor income risk.

We endogenize the participation decision and stock returns by analyzing an ad hoc one-period model à la Grossman and Stiglitz (1980). The main purpose of the model is to provide theoretical guidance for the development of empirical hypotheses regarding the effect of political uncertainty on household stock market participation. We briefly explain the model's key results, leaving the detailed analysis to the Appendix. Specifically, we show that, when the stock return is correlated with labor income, households' demand for the stock consists of two components: a speculative demand that depends on the stock's risk and a hedging demand that depends on labor income risk and its correlation with the stock return. When events such as gubernatorial elections increase political uncertainty, they simultaneously raise the risk of the stock return and the risk of households' labor income. Therefore, two forces reduce household investment in the stock. First, an increase in asset risk makes the stock less attractive. Second, an increase in labor income risk provides households with a stronger hedging incentive to sell the stock. A reduced investment in the stock implies a smaller benefit of participating in the stock market; consequently, households whose participation cost is high enough decide to leave the market. Therefore, an increase in political uncertainty leads to a reduction in stock market participation.

Overall, our model sheds light on how political uncertainty affects stock market participation. Related to our empirical setting of gubernatorial elections, it has several implications. First, elections increase political uncertainty and reduce households' stock market participation. Second, by exploiting the across-state and within-state variations in households' exposures to labor income risk and asset risk, we can identify and separate these two channels through which political uncertainty affects households' stock investments. We now proceed to empirical tests of these implications.

2. Data and variable construction

2.1. SIPP panel data

Our sample of households is drawn from the 1996, 2001, 2004, and 2008 panels of the micro-level longitudinal SIPP.[3] The SIPP panels track between 30,233 and 44,347 households over a period of up to four years. The SIPP surveys are built around a core set of questions on demographic attributes, employment and income, and business ownership. Moreover, each panel includes topical modules that include detailed questions on assets and liabilities—such as the ownership and market value of different types of assets, including real estate, vehicles, and financial assets. We conduct our analysis at the household level. Our final sample of households includes 359,260 household–year observations for 152,095 unique households.

[3] Each SIPP panel is a multistage stratified sample of U.S. civilian, non-institutionalized population and a new set of households is introduced at the start of each panel. The longitudinal design of the SIPP data dictates that all persons 15 years old and over present as household members at the time of the first interview be part of the survey throughout the entire panel period. To meet this goal, the survey collects information on people who move. In addition, field procedures were established that allow for the transfer of sample cases between regional offices. Persons moving within a 100-mile radius of an original sampling area (a county or a group of counties) are followed and continued with the normal personal interviews. Those moving to a new residence that falls outside the 100-mile radius of any SIPP sampling area are interviewed by telephone. The geographic areas defined by these rules contain more than 95% of the U.S. population. The survey uses three different approaches to deal with missing data to correct for non-responses (see https://www.census.gov/programs-surveys/sipp/methodology/data-editing-and-imputation.html).

As is common in the literature (e.g., Grinblatt, Keloharju, and Linnainmaa 2011), we use two proxies for stock market participation. Our first proxy, *Participation*, is an indicator variable that equals one if a household holds any stocks in publicly held corporations or mutual funds in a given period, and zero otherwise (i.e., propensity to participate). It tells us whether a household owns any stocks or mutual funds, regardless of the invested amount. On an aggregated basis, this proxy reflects the percentage of households that own stocks or mutual funds. Our second proxy, *% Stock share*, is a continuous variable defined as the value of stocks and mutual funds as a fraction of the household's total liquid wealth (i.e., intensity of participation). We define *Liquid wealth* as the sum of assets held in stocks (including mutual funds), bonds, and checking and savings accounts, exclusive of retirement accounts.

Following prior literature (Hong, Kubik, and Stein 2004), we exclude stock investments in households' pension accounts or individual retirement accounts (IRAs) for three reasons. First, prior literature shows that households do not actively rebalance or trade in their retirement accounts (Agnew, Balduzzi, and Sunden 2003; Mitchell et al. 2006; Benartzi and Thaler 2007). Second, withdrawals of money from retirement accounts often incur significant penalties. Third, default investment choices have been shown to largely determine investments in retirement accounts (Beshears et al. 2009).

The structure of the SIPP panels is such that, in each panel, all individuals in a sampled household are interviewed every four months. The SIPP divides each panel into four subsamples and each subsample is referred to as a rotation group. These four rotation groups enter the SIPP survey at different points in time (i.e., interviews are staggered across rotation groups). Each rotation group is interviewed in one of the months (called interview months) during the year and reports asset holdings for the months (called reference months) that vary between August and February (see details in Table A1). It is important to ensure that we capture a household's stock market participation before the gubernatorial elections. Since gubernatorial elections are typically held in November (except for six cases in our sample in which the elections were held in October), our data allow us to measure stock market participation (both propensity and intensity) during the pre- and post-election periods.

Finally, our empirical specification recognizes additional household characteristics that could impact stock market participation. We consider a wide set of variables that are available in our survey, such as total wealth, total income, age, education, financial literacy, race, gender, and marital status (Haliassos and Bertaut 1995; Campbell 2006). We compute *Total wealth* as the sum of financial assets, home equity (including second homes), vehicles, and private business equity. For human capital, we identify various levels of formal education *(High school or less*; *Some college*, and *College or more*). To measure financial literacy, we use an indicator variable that is equal to one if the household head is in a finance-related occupation (*Financial occupation*) and zero otherwise. The variables are defined in Table A2.

Table 1 reports the summary statistics of the household variables. During our sample period, an average of 22.3% of households own stocks or mutual funds and their stock market investment averages 10.4% of their liquid wealth. If we include stocks held in IRA/401K/Keogh accounts, the percentage of households owning stocks or mutual funds rises to 38.7%. The mean total wealth of all respondents is about $139,000 and significantly exceeds the median total wealth (about $66,000), indicating a significant right skewness in the distribution. The mean liquid wealth is about $32,000 and is also significantly right skewed. Respondents' principal source of nonfinancial wealth is home equity, with nontrivial equity in other real estate assets. As for education, 39% of the respondents did not go beyond high school and about 70% did not complete college. In terms of demographics, 51% are female, 53% are married, and the average age is 46.9 years.

2.2. Election data

Gubernatorial elections are prescheduled and thus exogenous to household investment decisions. Unlike presidential elections, gubernatorial elections in different states occur in different years, creating substantial variations across states. Currently, the majority of states hold gubernatorial elections every four years, with the exception of Vermont and New Hampshire, which run their

gubernatorial elections every two years. Five states, including Louisiana, Kentucky, Mississippi, New Jersey, and Virginia, elect their state governors in odd-numbered years, whereas the other states run their gubernatorial elections in even-numbered years. A total of 36 states have term limits for governors, while the remaining 14 states do not. The variations in election times, term lengths, and term limits across different states make gubernatorial elections a better setting than presidential elections to study the effect of political uncertainty on stock market participation.

Our main source of data on gubernatorial elections is from the Correlates of State Policy Project (CSPP) initiated by the Institute for Public Policy and Social Research (IPPSR). The data set includes more than 900 variables, with observations across the 50 U.S. states from 1990 to 2016. These variables cover a broad range of political, social, and economic factors that could influence policy differences across the states (Jordan and Grossmann 2016). We augment the CSPP data with hand-collected vote margin and political party affiliation data.

The SIPP data mask the identification of four small states to help protect the confidentiality of respondents, leaving us 190 gubernatorial elections in our IPPSR sample between 1996 and 2011. Following the identification method of Julio and Yook (2012), we classify an election as being more uncertain if it is a close election, where the victory margin—defined as the difference between the percentages of votes obtained by the first- and second-place candidates—is in the lowest sample tercile. We also distinguish elections in which incumbents are eligible for re-election from those where incumbents face term limits (*Lame duck last term*). As expected from our bottom tercile cutoff, Table 2 indicates that 63 of 190 gubernatorial elections are defined as close and, in those elections, the average vote differential between the first- and second-place candidates is 3.84%. In 27.8% of elections, incumbent governors do not seek re-election due to term limits. In these cases, although households do not know who their next governor will be, they know with certainty that it will not be their current governor. Therefore, this situation represents a high level of uncertainty regarding future policy.

2.3. State macro data

Following Korniotis and Kumar (2013), we capture local business cycles using three state-level economic indicators, including the growth rate of labor income (*State income growth*), the relative unemployment rate (*State relative unemployment*), and the housing collateral ratio (*State housing collateral ratio*). We obtain state-level labor income data from the U.S. Bureau of Economic Analysis and state-level unemployment data from the U.S. Bureau of Labor Statistics. The state-level income growth is calculated as the difference between the logarithm of state income in a given year and that in the prior year. The relative state unemployment rate is calculated as the ratio of the current state unemployment rate to the moving average of the state unemployment rates over the previous four years. Following Lustig and van Nieuwerburgh (2005, 2010), the state-level housing collateral ratio is calculated as the log ratio of housing equity to labor income.

3. Political uncertainty and stock market participation

In this section, we examine the relation between household stock market participation and political uncertainty generated by gubernatorial elections. We start with the baseline model in Section 3.1, followed by investigations in Section 3.2 of close elections and elections in which incumbent governors cannot run for re-elections. In Section 3.3, we explore households' reallocation of capital during election cycles.

3.1. Baseline model and results

We employ a standard DD approach, using households in states without upcoming elections as the control group and households in states with upcoming elections in the same year as the treatment group. Such a setting allows us to separate out the effect of political uncertainty associated with gubernatorial elections from the effect of nationwide economic influences (which will be the same for the treatment and control states at any given point in time) and to net out any pre-existing differences

between states and between households. Furthermore, the DD approach helps address the potential omitted variable problem (i.e., some variables that affect both stock market participation and political uncertainty are omitted from the model specification). To the extent that the omitted variables affect the treatment and control groups similarly, we can still separate out the effect of political uncertainty in a DD estimation. Specifically, we estimate the following empirical model:

$$StockMktPart_{i,s,t} = \beta_0 + \beta_1 Election + \mathbf{X}'_{i,s,t}\,\beta_2 + \mathbf{Z}'_{s,t}\,\beta_3 + \alpha_i + \delta_s + \mu_t + \varepsilon_{i,s,t} \quad (1)$$

Our dependent variable, $StockMktPart_{i,s,t}$, measures the stock market participation of household *i* in state *s* and year *t*. We use two different dependent variables. The first one, $Participation_{i,s,t}$, is an indicator variable that takes the value of one if household *i* in state *s* invests in the stock market in year *t* and zero otherwise. This variable captures the propensity of a household to participate in the stock market. The second dependent variable, $\%Stock\ Share_{i,s,t}$, captures the intensity of investment in the stock market and is defined as the percentage of liquid wealth invested in stocks and mutual funds by household *i* in state *s* and year *t*.[4] Our key variable of interest is *Election*, which takes the value of one if a state holds a gubernatorial election, and zero otherwise.

Following the literature, the vector of control variables, $\boldsymbol{X}_{i,s,t}$, includes a rich set of time-varying household-level variables that have been shown to impact both the propensity and intensity of household stock market participation. The household variables are total wealth, age, education level, marital status, total income, financial occupation, race, and gender.[5] The state-level variables, $\boldsymbol{Z}_{s,t}$, are income growth, the relative unemployment rate, and the housing collateral ratio. The control variables

[4] Since households are interviewed in different months, when we merge the SIPP data with the IPPSR election data in a given year and state, we verify that the period over which the questionnaires are answered precedes the election month.

[5] The last three variables are subsumed by household fixed effects as they do not vary over time in our sample.

also include state fixed effects (δ_s) to control for time-invariant state characteristics, year fixed effects (μ_t) to control for macroeconomic conditions, and household fixed effects (α_i) to control for time-invariant household traits, such as IQ, which is documented to have an impact on stock market participation (Grinblatt, Keloharju, and Linnainmaa 2011). We estimate regression (1) using ordinary least squares, even when the dependent variable is an indicator variable, since our specifications include a large number of fixed effects (Giannetti and Wang 2016). Standard errors are clustered at the household level to account for the time-series correlation in households' decisions to participate in the stock market.

Table 3 presents the results for the DD estimation in equation (1). The first two columns report the results for the regressions with *Participation* as the dependent variable (i.e., whether a household participates at all in the stock market). Column (1) controls for presidential elections using an indicator variable, *Presidential*, which takes a value of one if a presidential election is held in a year, and zero otherwise. Column (2) replaces the *Presidential* indicator with year fixed effects. The estimated slope coefficients on *Election* are all negative and significant at the five percent level (with the coefficients –0.006 and –0.005 in Columns (1) and (2), respectively). This suggests that households in a given state are less likely to participate in the stock market in the period leading up to that state's gubernatorial election. These findings are also economically significant. Conditional on an election in a state, the percentage of households participating to any degree in the stock market goes down by 50–60 basis points (bps), which implies a decrease of 2.2–2.7% in the mean unconditional stock market participation rate (22.3%).

We draw similar inferences based on the findings for the intensity of a household's investments in the stock market, reported in the last two columns, Columns (3) and (4), of Table 3. The estimated slope coefficients on *Election* continue to be negative and significant at the five percent or ten percent level (with coefficients equal to –0.004 in both Columns (3) and (4)). These results imply that the

percentage of a household's liquid wealth invested in the stock market (*% Stock share*) also decreases during periods close to gubernatorial elections. Again, these results are economically meaningful. Compared to a non-election year, there is a decrease of 40 bps in an election year, which corresponds to a 3.8% decrease in the level of investments in stocks and mutual funds, the mean level of such investments being 10.4%. The signs for the estimated coefficients on the control variables are broadly consistent with the prior studies. Household heads who are better educated, wealthier, and with higher earnings tend to have higher stock market participation (Grinblatt, Keloharju, and Linnainmaa 2011; Giannetti and Wang 2016). The relation between stock market participation and age is nonlinear, indicating that participation increases with age initially, peaks at a certain age, and declines afterwards.

Among state-level economic variables, income growth and housing collateral ratio are positively related to stock market participation and the sign of relative unemployment rate is negative. This finding is intuitive, since better economic conditions should enhance participation in equity markets. Furthermore, as expected, the presidential election, a nationwide source of political uncertainty, has a negative relation with stock market participation.

A separate potential concern with our results is that stock market participation is correlated with general economic uncertainty. For identification purposes, it is therefore important to explicitly control for any other sources of uncertainty that could affect households' stock investment decisions at the same time as political uncertainty. To mitigate this concern, we control for several macroeconomic measures of uncertainty as proposed by Bloom (2014) and Gulen and Ion (2016). These macroeconomic factors include the Volatility Index (VIX) provided by the Chicago Board Options Exchange, the macroeconomic uncertainty index of Jurado, Ludvigson, and Ng (2015), investor sentiment using the index of Baker and Wurgler (2007), and equity market performance using the Standard & Poor's 500 index return. We include all these proxies in our baseline specification from equation (1). In untabulated results, we continue to find a significantly negative relation between stock market participation and political uncertainty.

Overall, our baseline results show that increased political uncertainty associated with gubernatorial elections leads to reduced participation in the stock market, reflected by both a lower participation rate and a smaller percentage of liquid wealth invested in stocks and mutual funds.

3.2. Further evidence from close elections and term limits

Following Atanassov, Julio, and Leng (2016), Bird, Karolyi, and Ruchti (2017), and Falk and Shelton (2018), we identify two scenarios that are likely to be associated with greater political uncertainty. These include close elections and elections in which incumbents are not standing for re-election due to term limits. In such cases, there is likely to be greater uncertainty as to which candidate will win the election and which policies will be affected than in the cases of non-close elections or elections in which the incumbent, presumably well-known at this point to both the voters and the state legislature (with which the governor has to work), is on the ballot. Therefore, we should expect greater uncertainty and a stronger reduction in household stock market participation in both cases.

Close elections are less predictable and indicate a greater dispersion of opinions among households. They therefore represent a higher level of political uncertainty ex ante. We define a close election as one in which the vote difference between the first- and second-place candidates is in the lowest tercile. Our variable *Close election* takes a value of one in such cases, and zero otherwise. For brevity, we present only the estimated coefficients on *Election* and *Close election* from the DD estimation in Columns (1) and (2) of Table 4.[6] As in Table 3, the estimated coefficients on *Election* remain negative and significant. The coefficient on *Close election* should capture the incremental effect of a close election over and above the effect of a non-close election on stock market participation. The negative and significant coefficient of −0.007 in Column (1) indicates an additional decrease of 70 bps (over and above the 40 bps for non-close elections) in the percentage of households with any

[6] Note that the variable *Close Election* is conditional on having an election. Therefore, we do not need to interact it with the variable *Election.*

investment in stocks. Therefore, the total effect of a close election is a decrease of 110 bps in the propensity for household stock market participation. These figures correspond to a 5% relative decrease in the mean unconditional stock market participation rate (22.3%). We observe a similar negative relation between *Close election* and the percentage of households' liquid wealth invested in the stock market in Column (2), *% Stock share*. The total effect adds up to a decrease of 90 bps (after adding the 40-bp effect for non-close elections), which represents an 8.7% relative decrease in the mean percentage of liquid wealth invested in the stock market.

Moving on to our second case associated with greater political uncertainty, we investigate term limits that prevent incumbent governors from seeking re-election. With the well-documented incumbency advantage (Erikson 1971; Gelman and King 1990), incumbents overwhelmingly win re-elections. Consistent with this prior research, we find that, in our sample, incumbent governors win re-elections 83% of the time. Hence, political uncertainty can increase when the incumbent governor is in his or her term and soon to be replaced by a new governor. Term limits are also plausibly exogenous because they are specified in state constitutions and are therefore not amendable by individual households to further their own interests.

We define *Lame duck last term* as an indicator variable that is equal to one if the incumbent governor is in his or her last term due to term limits and zero otherwise. Columns (3) and (4) of Table 4 present the results. As in earlier specifications, the coefficient on *Election* continues to be negative. The interaction term between *Election* and *Lame duck last term* has negative coefficients of −0.005 in Column (3) and −0.003 in Column (4), both of which are significant at the five percent level. This shows the incremental effect of political uncertainty on stock market participation in election years in which incumbent governors are serving their last terms. Moreover, the variable *Lame duck last term,* by itself, does not have a significant relation with household stock market participation. This suggests that a governor being in his or her lame duck term does not affect stock market participation, except

during gubernatorial election years when the uncertainty of change is looming. Overall, prior to an election that determines a lame duck's successor, a household's stock market participation decreases by 90 bps and the percentage of liquid wealth invested in the stock market (after adding the coefficients on *Election* and on the interaction of *Election* and *Lame duck last term*) decreases by 60 bps. These results imply a 4% relative decrease in the unconditional participation rate and a 5.8% relative decrease in the unconditional percentage of liquid wealth invested in the stock market.

Taken together, the results in this section show that it is not the elections themselves but rather the uncertainty about election outcomes that drives household stock market participation, further strengthening the causal interpretation of our findings.

3.3. How do households reallocate their assets?

The key insight from our empirical analysis so far is that households reduce their stock investments during times of elevated political uncertainty. A natural follow-up question is how households facing such uncertainty reallocate their assets. Does political uncertainty trigger flight-to-safety behavior? Does political uncertainty instigate households to switch their stock investments into nonfinancial assets such as real estate and vehicles?

To address these questions, we define three new variables: 1) *% Safe asset*^{W}, the percentage of total wealth invested by households in safer assets, such as government securities, municipal bonds, corporate bonds, money market deposit accounts, checking accounts, and savings accounts; 2) *% Stock share*^{W}, the percentage of total wealth invested by households in stocks and mutual funds; and 3) *% Illiquid*^{W}, the percentage of total wealth invested by households in illiquid assets, such as real estate, vehicles, and private businesses. Note that, in defining these variables, we use the household's total wealth in the denominator rather than its liquid wealth (e.g., Giannetti and Wang 2016) to control for any shocks to other parts of the household's portfolio that could be correlated with state-level political uncertainty. Furthermore, normalizing by total wealth rather than liquid wealth avoids the mechanical

relation that a decrease in the percentage of liquid wealth invested in stocks always indicates an increase in the percentage of liquid wealth invested in safer assets, because these two fractions no longer add up to one in the presence of illiquid assets.

To investigate asset reallocation, we modify the regression specified in Equation (1) by keeping the same independent variables but replacing the dependent variables with *% Safe asset*^{W}, *% Stock share*^{W}, or *% Illiquid*^{W}. Table 5 shows that households facing upcoming elections reduce their stock investments and reallocate their capital to safer assets. For example, Columns (1) and (2) show that the estimated coefficients on the *Election* indicator are –0.001 and –0.002, respectively. These amount to a reduction in stock investments by 4.1% and 8.2% relative to the average of 2.4% of total wealth invested in stocks. Columns (3) and (4) report the estimated coefficients on the *Election* indicator as 0.010 and 0.009, respectively, suggesting an increase in safer assets by 5.2% of the average investments in safer assets (19.1% of total wealth). Columns (5) and (6) show that political uncertainty also causes a decrease in households' investments in illiquid assets, but the coefficient estimates are statistically insignificant. These results suggest that households in states with upcoming gubernatorial elections are more likely to shift from stocks to safer liquid assets during the period leading up to an election.

4. Political uncertainty, labor income risk, and asset risk

Our results so far show that political uncertainty dampens household stock market participation. In this section, we test the prediction from our theoretical model that households alter their participation to hedge exposures to greater asset risk and labor income risk due to heightened political uncertainty. To verify the premise for the theoretical insight, we first examine whether there is an increase in both labor income risk and asset risk prior to gubernatorial elections and report the results in Section 4.1. We then conduct a battery of tests to isolate the effects of labor income risk and asset risk on household stock market participation. In Section 4.2, we use the locations of households and firms as *indirect* measures of risk exposures and, thereby, test the channels through which gubernatorial elections affect

stock market participation. However, the indirect measures do not account for variations in risk exposures across different households and different firms located in the same state. Therefore, in Section 4.3, we also use more *direct* measures of asset risk and labor income risk to further investigate how the *within-state* variations in these risk exposures affect households' responses to elections.

4.1 Effect of gubernatorial elections on labor income risk and asset risk

4.1.1 Labor income risk

The SIPP provides detailed information on employment activity and labor earnings. We use monthly wage to measure labor income. For individuals who are not paid monthly, we calculate the wage in a particular month by multiplying hourly wage rate by the weekly hours worked and by the number of weeks in that month. Considering wage rigidity, in addition to labor income, we also use labor hours worked to capture changes in employment activity. Specifically, we construct two different proxies for labor income risk: (i) volatility of labor income; (ii) volatility of labor hours worked, where volatility is the standard deviation in respondents' monthly labor income or hours worked between May and October and then between November and April. The six-month window from May to October (from November to April) captures the pre-election (post-election) period in election years and the "pseudo" pre-election (post-election) period in non-election years. Table 6 reports the descriptive statistics for these two measures of labor income risk. We estimate the following regression to test if labor income risk varies prior to elections:

$$\begin{aligned} Labor\ income\ risk_{i,s,t} = {} & \phi_0 + \phi_1 Pre \times Election + \phi_2 Post \times Election + \phi_3 Pre \\ & + \boldsymbol{Z}'_{s,t}\,\phi_4 + \alpha_i + \delta_s + \mu_t + \xi_{i,s,t} \end{aligned} \tag{2}$$

$Labor\ income\ risk_{i,s,t}$ is either the volatility in monthly income or the volatility in labor hours worked for household *i* in state *s* and year *t*. We define two indicator variables, *Pre* and *Post*, for the pre-election (pseudo pre-election) and post-election (pseudo post-election) periods, respectively.

Election is an indicator variable that takes a value of one if a gubernatorial election takes place in the state *s* where the household resides in year *t*, and zero otherwise. Time-varying state-level macro control variables, $\boldsymbol{Z}_{s,t}$, and fixed effects, $(\alpha_i, \delta_s, \mu_t)$, are same as those in Equation (1). Our coefficient of interest is ϕ_1, which captures the effect of upcoming gubernatorial elections on labor income risk.

Table 7 reports the findings where standard errors are clustered at the household level. Column (1) displays the results for labor income volatility as the dependent variable. It shows that the OLS estimate for ϕ_1 is 54.16, significant at the one percent level. This indicates that, compared to non-election years, labor income risk during the pre-election period (May through October) increases by about 6.9% (the mean labor income volatility is 789.08; see Table 6). Column (2) is analogous to Column (1) but uses the volatility in labor hours worked as our dependent variable. The estimate of ϕ_1 is 2.78, which implies that compared to non-election years, the volatility in labor hours during the pre-election period increases by 22.3% (the mean volatility is 12.46). In addition, the estimated coefficient ϕ_2 is positive in both specifications (although insignificant in Column (1)), corroborating that post-election labor income risk is higher in election years compared to non-election years. Moreover, the difference between coefficients ϕ_1 and ϕ_2 is also positive and significant in both cases, implying that the pre-election effect of political uncertainty on labor income risk is stronger than the post-election effect. Finally, the sum of coefficients ϕ_1 and ϕ_3 is greater than ϕ_2, indicating that there is a decline in labor income risk from the pre-election to post-election period.

4.1.2 Asset risk

We next examine whether and how political uncertainty affects asset risk by using both historical stock return volatility and implied volatility from option prices. For the former, we estimate

monthly stock return volatility using daily stock returns from the CRSP stock database and, for the latter, we use the end-of-month implied volatility from the OptionMetrics database. While historical volatility is backward looking, implied volatility is a forward-looking measure. To be consistent with the estimation period of labor income risk, both volatility measures are calculated twice a year as the average of monthly observations between May and October and that between November and April.[7] We estimate the following regression to test if asset risk changes prior to elections:

$$\begin{aligned} Asset\ risk_{f,s,t} = {} & \varsigma_0 + \varsigma_1 Pre \times Election + \varsigma_2 Post \times Election + \varsigma_3 Pre \\ & + \boldsymbol{Z}'_{s,t}\varsigma_4 + \delta_s + \vartheta_f + \mu_t + \omega_{f,s,t} \end{aligned} \tag{3}$$

$Asset\ risk_{f,s,t}$ is either the historical volatility or implied volatility for firm *f* headquartered in state *s* and year *t*. As in the case of labor income risk in Equation (2), we define two indicator variables, *Pre* and *Post*, for the pre-election (pseudo pre-election) and post-election (pseudo post-election) periods, respectively. *Election* is an indicator variable that takes a value of one if a gubernatorial election takes place in the state where the firm is headquartered, and zero otherwise. Compustat provides information about the current location of firms' headquarters. However, firms' headquarters can change over time. Therefore, we follow Heider and Ljungqvist (2015) and Ljungqvist, Zhang, and Zuo (2017) to supplement the Compustat data with firms' historical headquarters information listed in their regulatory filings.[8] As before, we control for time-varying state-level macro control variables, $\boldsymbol{Z}_{s,t}$, as well as state, firm, and time fixed effects, $(\delta_s, \vartheta_f, \mu_t)$.

Table 8 reports the coefficient estimates. Columns (1) and (2) report the results for implied volatility and historical return volatility, respectively, using the 1996-2011 period to coincide with

[7] Using the standardized option tables in OptionMetrics, for each stock, we first take the average of the 30-day implied volatility for both call and put options as of the last trading day of each month. We then calculate *IVol* as the average over the pre-election and post-election periods each year. For robustness, we also use the 30-day and 50-delta options from OptionMetrics' volatility surface tables. These two implied volatility measures are highly correlated (0.99). Results using the alternative measure are quantitatively and qualitatively similar.

[8] We thank Alexander Ljungqvist for sharing firms' historical headquarters information.

the SIPP data coverage. Both columns show positive and significant coefficient estimates for ς_1 (3.89 and 0.43), indicating that asset risk amplifies prior to gubernatorial elections. These estimates are economically large. Compared to non-election years, asset risk during the pre-election period increases by about 7.5% and 11.3% relative to the mean implied volatility and return volatility, respectively.[9] The last column presents the findings for return volatility for the 1991-2011 period, which corresponds to the combined sample periods for the SIPP and brokerage data.[10] We continue to observe a positive and significant estimate for ς_1 (coefficient = 0.33), which implies an 8.7% increase in return volatility relative to its average for the same period. More importantly, the difference between coefficients ς_1 and ς_2 is always positive and significant, implying that pre-election effect of political uncertainty on asset risk is greater than post-election effect. Finally, the sum of coefficients ς_1 and ς_3 is greater than ς_2, indicating that there is a decline in asset risk from the pre-election to post-election period.

4.2 In-state and out-of-state households and firms

As shown in the previous section, gubernatorial elections increase the asset risk of in-state firms (that is, firms headquartered in election states) and the labor income risk of in-state households (that is, households residing in election states). These findings allow us to examine the insights from our theoretical model and study the channels through which political uncertainty affects household stock market participation. First, the increase in asset risk reduces the appeal of in-state stocks and therefore decreases the speculative demand for these stocks relative to the demand for out-of-state stocks. Second, the increase in labor income risk provides in-state households with greater incentives to hedge the elevated risk by reducing their stock investments more than out-of-state households.

[9] We use volatility measures scaled up by a factor of 100 for a better exposition of the results in Table 8. Accordingly, we account for this adjustment while computing the economic significance. For instance, we obtain 7.5% by dividing the coefficient 3.888 in Table 8 by the scaled-up average implied volatility of 52.1 (see Table 6).

[10] Because the OptionMetrics data starts in 1996, we cannot repeat this analysis with the implied volatility for the longer sample period from 1991 to 2011.

For the empirical analysis of the channels, we isolate asset risk and labor income risk by exploiting the variations in locations of households and firms, and classifying them as in-state or out-of-state depending on whether they are located in election states. Table 9 divides the overall sample of household-firm observations into six different subsamples (S1 to S6). As we can observe from this table, to filter out the asset risk channel, we need to compare household stock market participation in S3 with that in S5 and S6 as firms in these three subsamples are not headquartered in election states. The only differentiating factor is that whether households reside in election states (S3) or not (S5 and S6); that is, whether they face different exposures to labor income risk due to elections. Therefore, the analysis using these three subsamples allows us to isolate the effect of political uncertainty on participation through the labor income risk channel. Similarly, comparing S4 with S5 and S6 enables us to suppress the labor income risk channel, and thus identify the effect of political uncertainty on participation through the asset risk channel. Finally, to capture the combined effect of both labor income risk and asset risk channels, we compare participation in S1 with that in S5, as the former subsample is associated with both higher asset risk and labor income risk prior to elections, which is not the case with the latter.[11]

We rely on data from a large discount brokerage firm to identify both in-state and out-of-state stockholdings of households, which we do not observe in the SIPP data. The brokerage data provide monthly information on common stockholdings between 1991 and 1996 for a large panel of households residing in different states. A series of papers use these data to study household investments (Barber and Odean 2000; Barber and Odean 2001; Barber and Odean 2002; Kumar 2009; Giannetti and Wang 2016). While the brokerage data have the advantage of stock-specific information, there are three

[11] It seems that we could have also compared participation in S1 and S2 with that in S5 and S6. In this alternative comparison, because the household-state and firm-state are different in S2, we would need two election indicator variables, one for the household-state and one for the firm-state. However, we cannot estimate the regression with two indicator variables because of the perfect correlation between them as one of them will not be estimated. We could include only one indicator variable but then the interpretation would be different because the household-state and firm-state are different in S2. Specifically, elections take place in both the household-state and firm-state, but they are not the same state.

limitations. First, the data are not as recent as the SIPP data. Second, the brokerage data span a shorter period of time and do not cover as large a cross section of households as the SIPP data. Finally, the data do not have information about household labor income to allow us to explore the heterogeneity in labor income for households living in the same state. In the next section, we address this limitation by using the SIPP data which facilitates analysis with micro-level information on household labor income both within and across states. Offsetting the aforementioned limitations, however, the brokerage data include the detailed information on households' investments at the firm level, which enables us to investigate how asset risk affects households' response to political uncertainty.

To examine how asset risk and labor income risk affect households' stock market participation prior to gubernatorial elections, we estimate the following regression:

$$\%\Delta holding_{i,f,t} = \kappa_0 + \kappa_1 Election + \boldsymbol{Z}'_{s,t}\kappa_2 + \alpha_i + \vartheta_f + \mu_t + \eta_{i,f,t} \quad (4)$$

where $\%\Delta holding_{i,f,t}$ is the percentage change in household *i*'s stock investment in firm *f* at the end of each month between May and October in year *t* over a 12-month horizon. Following our earlier discussion in this section, the definition of *Election* varies with the subsamples and risk channels that we analyze in our empirical tests. For the ease of exposition, we defer detailed description of *Election* to the next paragraph, where we summarize the estimation results. $\boldsymbol{Z}_{s,t}$ represents time-varying state-level macro control variables, and $(\alpha_i, \vartheta_f, \mu_t)$ denote household, firm and year fixed effects.[12] As before, the standard errors are clustered at the household level. Since we observe large outliers on the upper tail of the distribution, we winsorize our dependent variable at the 99% level to mitigate the effect of extreme values. In contrast, there is a natural lower bound for $\%\Delta holding_{i,f,t}$ as it cannot be less than –100%, which happens when a household completely liquidates its position in a specific stock.

[12] Note that a household's residence state does not change in the brokerage data. Therefore, household fixed effects subsume state fixed effects.

We exclude 33 observations that breach this lower bound.

For brevity, in Table 10, we only report the results for the coefficient of interest, κ_1, along with clustered standard errors (in parentheses). Column (1) utilizes the subsamples S1 and S5 and reports the OLS estimate of κ_1 when *both* asset risk *and* labor income risk are in place. Note that in these subsamples, the household-state is the same as the firm-state and the *Election* indicator takes a value of one when the gubernatorial election is held in that state, and zero otherwise. The coefficient estimate in Column (1) on the *Election* indicator is negative, –0.055, with a standard error of 0.014, statistically significant at the one percent level. This implies that, on average, an upcoming gubernatorial election in a state induces the resident households to reduce their stockholdings by 5.5% due to a higher exposure to both asset risk and labor income risk. Column (2) reports regression results using the subsamples S3, S5, and S6, where firms are not headquartered in election states and hence asset risk is filtered out. In this case, the *Election* indicator takes a value of one when the election is held in a household-state and serves as a proxy for the exposure to elevated labor income risk *only*. Results indicate a significant decline of 3.8% in households' stock investments prior to elections. Finally, Column (3) reports regression results using the subsamples S4, S5, and S6, where households do not reside in election states. This allows us to net out labor income risk associated with the upcoming elections and capture only the effect of asset risk prior to elections. In this case, the *Election* indicator takes a value of one when the election is held in a firm-state and serves as a proxy *only* for exposure to greater asset risk. We observe that asset risk alone contributes to a significant decrease of 3.4% in participation in response to upcoming elections.

4.3 Evidence from asset and labor income volatility

In the previous section, we rely on the locations of households and firms as indirect measures of exposures to labor income risk and asset risk, which does not allow us to capture the variations in

risk exposures across different households and different firms located in the same state. Therefore, in this section, we use more direct risk measures estimated in Section 4.1 at the individual household and firm level to investigate the *within-state* heterogeneity in labor income risk and asset risk exposures.

4.3.1 Effect of labor income volatility

We first assess the effect of labor income risk on the sensitivity of households' stock market participation to political uncertainty. To this end, we modify Equation (1) to allow for the interaction term between the *Election* indicator, and each of the two proxies of labor income risk from Section 4.1 (i.e., labor income volatility and labor hours volatility). We also include demographic measures of households and their interactions with the *Election* variable. In addition, we control for household and time-varying state fixed effects. Using time-varying state fixed effects allows us to obtain more stringent cross-sectional estimates since identification comes from the differences in stock market participation between households with higher and lower income risk within same states. Note that these fixed effects absorb all unobserved time-variant variables within a state where sample households live and share exposures to any other potentially confounding local shocks.

We report the results in Table 11. Our primary interest is in the interaction term between the *Election* indicator and each of the labor income risk measures. The estimated coefficient on this term represents the effect of the labor income risk exposure on the sensitivity of households' stock market participation to elections. In Columns (1) and (3), we use the volatility of labor income in the period prior to elections and find that the coefficients on the interaction terms are significantly negative in both cases. These results indicate that the negative effects of political uncertainty on stock market participation are stronger for households with higher exposure to labor income risk. Volatility in labor income is scaled down by a factor of 1,000 for a better exposition of estimated slope coefficients. Economically, the coefficient estimates of –0.008 in Column (1) and –0.006 in Column (3) imply that,

in response to elections, a one-standard deviation (1.429) increase in labor income risk exposure lowers the stock market participation rate by an additional 5.1%, and the percentage of liquid wealth invested in the stock market by an additional 8.2%, respectively (relative to their respective averages). Along the same lines, Columns (2) and (4) indicate that the coefficient estimates on volatility of labor hours (scaled down by a factor of 100 for a better exposition) are also negative: –0.082 and –0.044 respectively, both statistically significant at the five percent level. These numbers again indicate that higher exposure to labor income risk is associated with stronger effects of political uncertainty. That is, a one-standard-deviation (0.153) increase in the volatility of labor hours decreases the likelihood of stock market participation by an additional 5.6% and the percentage of liquid wealth invested in risky assets by an additional 6.4%.

Overall, the findings in this section provide support for the prediction that households reduce their stock market participation in response to changes in labor income risk during periods of elevated political uncertainty.

4.3.2 Effect of asset volatility

Next, using the brokerage data, we examine how within-state variations in the asset risk exposure affect households' stock investment decisions prior to elections. Since the focus of our analysis in this section is on asset risk, the *Election* indicator takes a value of one when a gubernatorial election is held in the state where the firm is headquartered, and zero otherwise. We estimate a regression similar to Equation (4) in Section 4.2 by including the interaction of *Election* with the direct measure of asset risk (historical stock return volatility, *RetVol*).[13] Our main variable of interest is the coefficient on the interaction term that captures the effect of the asset risk exposure on the sensitivity of households' changes in equity holdings prior to elections.

[13] We cannot use the implied volatility measure (*IVol*) when we analyze the brokerage data because the OptionMetrics data start in 1996 while the brokerage data end in 1996.

Table 12 reports the findings. Column (1) controls for household, firm, and time-varying state fixed effects. The *Election* indicator is subsumed by time-varying state fixed effects. We find that the estimate for the interaction term is significantly negative (coefficient = –0.480), indicating that, prior to elections, households reduce their holdings more in firms with higher asset risk. Column (2) repeats the analysis by replacing time-varying state fixed effects with state and year fixed effects, and controlling for time-varying state macroeconomic variables. The coefficient on the interaction term continues to be negative (coefficient = –0.657) and significant. We find an insignificant coefficient on the *Election* indicator, suggesting that there is little effect of elections on household's investment in assets with low risk. Overall, these findings corroborate our earlier results in Section 4.2 regarding asset risk being one of the channels that influences households' stock investment decisions in response to political uncertainty.

5. Dynamics of stock market participation during an election cycle

Our primary focus so far has been on whether households reduce stock market participation in the period before a gubernatorial election when political uncertainty is high. If uncertainty is resolved after the election, we expect the decline in stock market participation to be temporary. In this section, we test this conjecture and examine the extent and duration of any post-election reversal in participation. A complete reversal would suggest that the elevated uncertainty is only temporary and resolves quickly. In contrast, a partial reversal would indicate that the elevated uncertainty has a long-lasting and potentially disruptive effect on participation.

The magnitude of the reversal should depend on the speed and degree of resolution of political uncertainty after the election. One factor that affects the resolution is the change in the state's governing party. Different parties are likely to have different political ideologies and pander to different constituents, which can lead to differences in their stances on policy positions and political actions (Hibbs 1977; Alesina 1987; Alesina and Sachs 1988). When a new governor from the opposition party

wins the election, it takes a longer time for the new governor's policies to pass the legislature and take effect. Therefore, for elections that result in a party switch, we expect political uncertainty to remain high for a longer period than in the cases where there is no party switch (e.g., when the incumbent wins re-election).

Following the methodology of Julio and Yook (2012), we modify the baseline model in Equation (1) to examine the dynamics of stock market participation during an election cycle. Specifically, we add the binary variable *Post-election*, which takes the value of one for periods after a gubernatorial election until the year before the next election, and zero otherwise. To gauge whether a party switch has an incremental effect on post-election participation, we also interact both *Election* and *Post-election* with the binary variable *Party switch*, which takes the value of one for elections in which the state's ruling party changes, and zero otherwise.

We report the results in Table 13. As in previous analyses, Columns (1) and (2) show the findings for the propensity to invest in the stock market and Columns (3) and (4) report the results for the intensity of investments in the stock market. First, the estimated coefficients on the indicator variable *Election* are significantly negative in all specifications, confirming our previous finding that participation decreases in the election year. Second, the coefficient estimates on the indicator variable *Post-election* are significantly positive in all specifications, indicating a post-election increase in stock market participation.

Columns (1) and (3) of Table 13 estimate the average pre-election drop and post-election reversal in household stock market participation across all elections. We observe a decrease in participation during the election year (with the coefficients of –0.006 and –0.004) followed by an increase until the next election (with the coefficients of 0.004 and 0.003). In Columns (2) and (4), we separately estimate the pre-election drop and post-election reversal for elections with and without a party switch. For this purpose, we interact the *Election* and *Post-election* indicator variables with the

Party switch variable. When there is a party switch, we observe a larger decline in participation during the election year but the increase after the election is smaller. For example, based on the estimates in Column (2), there is a decline of 0.007 (i.e., (–0.005) + (–0.002)) followed by an increase of 0.002 (i.e., 0.003 + (–0.001)).

To evaluate the net effect on stock market participation during the election cycle, we conduct a test on the estimated coefficients on the election and post-election variables. The null hypothesis is that the coefficients on the election and post-election variables sum to zero, which would suggest a complete reversal in participation after the election. We fail to reject this null hypothesis for the estimates in Columns (1) and (3) of Table 13, which suggests that the decline in stock market participation completely reverses for the overall sample. In contrast, we reject the null in Columns (2) and (4), which indicates that, for elections that result in a party switch, the pre-election decline in participation is greater than the post-election increase in participation. In other words, reduction in stock market participation is only partially reversed due to the slower resolution of political uncertainty after a party switch.

Taken together, these results show a reversal in household stock market participation after the election. Moreover, the magnitude of the reversal depends on the speed and degree of resolution in uncertainty after the election. Specifically, when the governing party changes after the election, the reversal is slower, implying a long-lasting disruptive effect of political uncertainty on household stock market participation.

6. Robustness tests

In our tests so far, we have focused on stock investments outside of retirement accounts, because investments in these accounts are often affected by default choices (Beshears et al. 2009). To ensure that our results are robust to the inclusion of retirement accounts, we redefine our measure of

stock market participation. The SIPP questionnaires ask only about the type of assets held in the IRA, 401K, and Keogh but not about the dollar amount invested in risky assets in these retirement accounts. Accordingly, we modify the indicator variable *Participation* (propensity for participation) as taking the value of one if the household holds any shares in publicly held corporations or mutual funds, including holdings in their retirement accounts, and zero otherwise. In untabulated analyses, our re-estimated models deliver very similar results, both qualitatively and quantitatively, to those of earlier findings on the propensity for participation.

In a different set of tests, we refine our definition of close elections. In Table 4, we measured a close election as having a vote difference between the first- and second-place candidates in the lowest tercile of the sample. One drawback of this approach is that vote differences are captured ex post and do not capture the closeness of the race *prior* to the election. Although there is a generally high correlation between pre-election polls and actual election outcomes, for robustness, we construct an alternative *ex ante* measure of closeness by utilizing pre-election poll data from RealClearPolitics.com. We were able to hand-collect data on 1,859 polls for 104 elections conducted between 2002 and 2011. To measure closeness using poll data, we first compute the difference in the percentages of votes received by the first- and second-place candidates in each poll and then average the poll differentials for each gubernatorial election. As before, we define an election as being close if the election's average poll differential is in the lowest tercile. This leaves 34 close elections out of 104 total elections, with an average poll differential of 3.75% between the top two candidates. The correlation between the average poll margin and election results is 0.93, which, unsurprisingly, suggests that the ex post closeness measure obtained from election results is a good proxy for the ex-ante election closeness obtained from polls. We re-estimate our model as in Table 4 and find the (untabulated) results to be essentially identical.

7. Conclusions and implications

In this paper, we show that political uncertainty, proxied by gubernatorial elections, leads to a reduction in households' stock market participation. Our theoretical framework identifies two channels through which political uncertainty reduces household participation. First, an increase in political uncertainty exacerbates asset risk and makes stocks less appealing to households. Second, it increases households' labor income risk, which results in a hedging demand for households to sell stocks. Consistent with the theoretical motivation, we document three major findings. First, in the face of heightened political uncertainty, households reduce their participation in the stock market and reallocate their capital to safer assets, such as savings accounts and bonds. Second, both asset risk and labor income risk increase prior to gubernatorial elections. Moreover, variations in exposures to these risks help explain the heterogeneity in households' response to political uncertainty. Third, we find that the decline in stock market participation reverses as political uncertainty resolves after elections. For the subsample of elections in which there is a change in the ruling party, reduction in participation is only partially reversed, resulting in a prolonged distortion in stock investments of households.

Our findings have implications for households, firms, and the economy in general. There are welfare implications for households if they choose to stay out of the stock market after periods of high political uncertainty. A lack of participation in the stock market can significantly reduce wealth accumulation and can contribute to income inequality. In addition, our findings have implications for firms' ability to raise capital through equity markets. If the demand for stocks is lower during periods of high uncertainty, then it is costlier for firms to raise capital. This, in turn, can worsen or slow down recovery from economic recessions, since periods of high political uncertainty and economic downturns tend to coincide. These implications are beyond the scope of this study but offer interesting avenues for future research.

References

Agnew, J., Balduzzi, P., Sunden, A., 2003. Portfolio choice and trading in a large 401(k) plan. American Economic Review 93(1), 193–215.

Alesina, A., 1987. Macroeconomic policy in a two-party system as a repeated game. Quarterly Journal of Economics 102(3), 651–678.

Alesina, A., Roubini, N., 1992. Political cycles in OECD economies. Review of Economic Studies 59(4), 663–688.

Alesina, A., Sachs, J., 1988. Political parties and the business cycle in the United States, 1948-1984. Journal of Money, Credit and Banking 20(1), 63–82.

Angerer, X., Lam, P.K., 2009. Income risk and portfolio choice: an empirical study. Journal of Finance 64,1037–1055.

Atanassov, J., Julio, B., Leng, T., 2016. The bright side of political uncertainty: The case of R&D. Unpublished working paper, University of Nebraska, University of Oregon, and Sun Yat-sen University.

Baker, S.R., Bloom, N., Davis, S.J., 2016. Measuring economic policy uncertainty. Quarterly Journal of Economics 131(4), 1593–1636.

Baker, M., Wurgler, J., 2007. Investor sentiment in the stock market. Journal of Economic Perspectives 21(2), 129–152.

Barber, B.M., Odean, T., 2000. Trading is hazardous to your wealth: the common stock investment performance of individual investors. Journal of Finance 55(2), 773–806.

Barber, B.M., Odean, T., 2001. Boys will be boys: Gender, overconfidence, and common stock investment. Quarterly Journal of Economics 116(1), 261–292.

Barber, B.M., Odean, T., 2002. Online investors: Do the slow die first? Review of Financial Studies 15(2), 455–488.

Benartzi, S., Thaler, R.H., 2007. Heuristics and biases in retirement savings behavior. Journal of Economic Perspectives 21(3), 81–104.

Bertaut, C. C., Haliassos, M., 1997. Precautionary portfolio behavior from a life-cycle perspective. Journal of Economic Dynamics and Control 21(8), 1511–1542.

Beshears, J., Choi, J.J., Laibson, D., Madrian, B.C., 2009. The importance of default options for retirement saving outcomes: evidence from the United States, in Jeffrey Brown, Jeffrey Liebman, and David A. Wise, eds.: Social Security Policy in a Changing Environment (NBER, Cambridge, MA).

Besley, T., Case, A., 1995. Does electoral accountability affect economic policy choices? Evidence from gubernatorial term limits. Quarterly Journal of Economics 110(3), 769–798.

Betermier, S., Jansson, T., Parlour, C., Walden, J., 2012. Hedging labor income risk. Journal of Financial Economics 105(3), 622–639.

Bird, A., Karolyi, S.A., Ruchti, T.G., 2017. Political uncertainty and corporate transparency. Unpublished working paper, Carnegie Mellon University.

Bloom, N., 2014. Fluctuations in uncertainty. Journal of Economic Perspectives 28(2), 153–176.

Bonaime, A.A., Gulen, H., Ion, M., 2017. Does policy uncertainty affect mergers and acquisitions? Journal of Financial Economics 129(3), 531–558.

Bonaparte, Y., Korniotis, G.M., Kumar, A., 2014. Income hedging and portfolio decisions. Journal of Financial Economics 113(2), 300–324.

Brogaard, J., Detzel, A., 2015. The asset-pricing implications of government economic policy uncertainty. Management Science 61(1), 3–18.

Campbell, J.Y., 2006. Household finance. Journal of Finance 61(4), 1553–1604.

Cocco, J. F., Gomes, F. J., Maenhout, P. J., 2005. Consumption and portfolio choice over the life cycle. Review of Financial Studies 18(2), 491–533.

Çolak, G., Durnev, A., Qian, Y., 2017. Political uncertainty and IPO activity: Evidence from U.S. gubernatorial elections. Journal of Financial and Quantitative Analysis 52(6), 2523–2564.

Diamond, D., Verrecchia, R., 1981. Information aggregation in a noisy rational expectations economy. Journal of Financial Economics 9(3), 221–235.

Erikson, R.S., 1971. The advantage of incumbency in congressional elections. Polity 3(3), 395–405.

Falk, N., Shelton, C. A., November 2018. Fleeing a lame duck: Policy uncertainty and manufacturing investment in US states. American Economic Journal: Economic Policy 10(4), 135–52.

Gelman, A., King, G., 1990, Estimating incumbency advantage without bias. American Journal of Political Science 34(4), 1142–1164.

Giannetti, M., Wang, T.Y., 2016. Corporate scandals and household stock market participation. Journal of Finance 71(6), 2591–2636.

Grinblatt, M., Keloharju, M., Linnainmaa, J., 2011. IQ and stock market participation. Journal of Finance 66(6), 2121–2164.

Grossman, S. J., Stiglitz, J. E., 1980. On the impossibility of informationally efficient markets. American Economic Review 70(3), 393–408.

Guiso, L., Jappelli, T., Terlizzese, D., 1996. Income risk, borrowing constraints, and portfolio choice. American Economic Review 86(1), 158–172.

Gulen, H., Ion, M., 2016. Policy uncertainty and corporate investment. Review of Financial Studies 29(3), 523–564.

Haliassos, M., Bertaut, C.C., 1995. Why do so few hold stocks? The Economic Journal 105(432), 1110–1129.

Heaton, J., Lucas, D., 1997. Market frictions, savings behavior, and portfolio choice. Macroeconomic Dynamics 1(1), 76–101.

Heider, F., Ljungqvist, A., 2015. As certain as debt and taxes: Estimating the tax sensitivity of leverage from state tax changes. Journal of Financial Economics 118(3), 684–712.

Hellwig, M., 1980. On the aggregation of information in competitive markets. Journal of Economic Theory 22(3), 477–498.

Hibbs, D.A., 1977. Political parties and macroeconomic policy. American Political Science Review 71(4), 1467–1487.

Hong, H., Kubik, J.D., Stein J.C., 2004. Social interaction and stock-market participation. Journal of Finance 59(1), 137–163.

Jens, C.E., 2017. Political uncertainty and investment: causal evidence from U.S. gubernatorial elections. Journal of Financial Economics 124(3), 563–579.

Jordan, M.P., Grossmann, M., 2016. The Correlates of State Policy Project v.1.0. East Lansing, MI: Institute for Public Policy and Social Research (IPPSR).

Julio, B., Yook, Y., 2012. Political uncertainty and corporate investment cycles. Journal of Finance 67(1), 45–83.

Jurado, K., Ludvigson, S.C., Ng, S., 2015. Measuring uncertainty. American Economic Review 105(3), 1177–1216.

Koo, H. K., 1998. Consumption and portfolio selection with labor income: A continuous time approach. Mathematical Finance 8(1), 49–56.

Korniotis, G.M., Kumar, A., 2013. State-level business cycles and local return predictability. Journal of Finance 68(3), 1037–1096.

Kumar, A., 2009. Dynamic style preferences of individual investors and stock returns. Journal of Financial and Quantitative Analysis 44(3), 607–640.

Ljungqvist, A., Zhang, L., Zuo, L., 2017. Sharing risk with the government: How taxes affect corporate risk taking. Journal of Accounting Research 55(3), 669–707.

Lustig, H., van Nieuwerburgh, S., 2005. Housing collateral, consumption insurance, and risk premia: An empirical perspective. Journal of Finance 60, 1167–1219.

Lustig, H., van Nieuwerburgh, S., 2010. How much does household collateral constrain regional risk sharing? Review of Economic Dynamics 13, 265–294.

Merton, R.C., 1971. Optimum consumption and portfolio rules in a continuous-time model. Journal of Economic Theory 3(4), 373–413.

Mitchell, O.S., Mottola, G.R., Utkus, S.P., Yamaguchi, T., 2006. The inattentive participant: portfolio trading behavior on 401(k) plans. Unpublished working paper, University of Pennsylvania and FINRA Foundation.

Pástor, L., Veronesi, P., 2012. Uncertainty about government policy and stock prices. Journal of Finance 67(4), 1219–1264.

Pástor, L., Veronesi, P., 2013. Political uncertainty and risk premia. Journal of Financial Economics 110(3), 520–545.

Peltzman, S., 1987. Economic conditions and gubernatorial elections. American Economic Review 77(2), 293–297.

Viceira, L. M., 2001. Optimal portfolio choice for long-horizon investors with nontradable labor income risk. Journal of Finance 56 (2), 433–470.

Table A1. Interview and reference months in the SIPP panels

The structure of the SIPP panels is such that, in each panel, all the sampled individuals included in a household are interviewed every four months. The SIPP divides each panel into four sub-samples and each sub-sample is referred to as a 'rotation group'. These four rotation groups enter the SIPP survey at different points in time (i.e., interviews are staggered across rotation groups). Each rotation group is interviewed in one of the months (called interview months) during the year and reported asset holdings for the months (called reference months). The table below displays the SIPP panels, interview months, and reference months associated with each of the four SIPP panels included in our sample period.

Panels	Asset interview months	Reference month for which asset holdings are reported
1996	December	November
	January	December
	February	January
	March	February
2001	October	September
	November	October
	December	November
	January	December
2004	October	September
	November	October
	December	November
	January	December
2008	September	August
	October	September
	November	October
	December	November

Table A2. Variable definitions

Variable	Description
Household variables	
% Stock share	Percentage of liquid wealth invested by the household in stocks and mutual funds in a given period.
% Stock share^{W}	Percentage of total wealth invested by the household in (risky assets) stocks and mutual funds.
% Safe share^{W}	Percentage of total wealth invested in safe assets, such as government securities, municipal bonds, money market deposit accounts, checking accounts, and savings accounts.
% Illiquid^{W}	Percentage of total wealth invested in illiquid assets, such as real estate, vehicles, and private businesses.
$\%\Delta Holding$	Percentage change in household's stock investment in a firm, calculated from the brokerage data.
Age	Age of household head.
College or more	A binary variable equal to 1 if the household head has at least a college degree and 0 otherwise.
Female	A binary variable equal to 1 if the household head is a female and 0 otherwise.
Financial occupation	A binary variable equal to 1 if the household head has a finance-related occupation and 0 otherwise.
High school or less	A binary variable equal to 1 if the household head finished at most high school and 0 otherwise.
Liquid wealth	Sum of safe assets, such as government securities, municipal bonds, corporate bonds, money market deposit accounts, checking accounts, savings accounts, and stockholdings.
Married	A binary variable equal to 1 if the household head is married and 0 otherwise.
Participation	A binary variable equal to 1 if the household holds any stocks in publicly held corporations or mutual funds and 0 otherwise.
Participation (with IRA/401K/Keogh)	A binary variable that equals 1 if the household holds any shares in publicly held corporations or mutual funds, including holdings in their retirement accounts, and 0 otherwise.
Race	A binary variable equal to 1 if the household head is white and 0 otherwise.
Some college	A binary variable equal to 1 if the household head is a college dropout and 0 otherwise.
Total income	Total household earned income
Total wealth	Sum of financial assets, real estates, vehicles, and private business equity.
State variables	
State housing collateral ratio	Log ratio of housing equity to labor income, using the methodology of Lustig and van Nieuwerburgh (2005, 2010).
State income growth	Difference between the logarithm of state income in a given year and that in the prior year.
State relative unemployment	Ratio of the current unemployment rate to the moving average of the state unemployment rates over the previous four years.

Labor income risk variables	
Labor earnings volatility	Standard deviation of labor earnings from May to October (from November to April) for the pre-election (post-election) period in election years and "pseudo" pre-election ("pseudo" post-election) period in non-election years.
Labor hours volatility	Standard deviation of labor hours worked from May to October (from November to April) for the pre-election (post-election) period in election years and "pseudo" pre-election ("pseudo" post-election) period in non-election years.
Asset risk variables	
RetVol	Average of monthly standard deviations of historical daily stock returns in the CRSP stock data from May to October (from November to April) for the pre-election (post-election) period in election years and "pseudo" pre-election ("pseudo" post-election) period in non-election years.
IVol	Average of the end-of-month implied volatility in the OptionMetrics data from May to October (from November to April) for the pre-election (post-election) period in election years and "pseudo" pre-election ("pseudo" post-election) period in non-election years.

Table 1. Summary statistics: SIPP data

The sample includes households covered by SIPP from 1996 to 2011. All monetary values are in real 1996 dollars. The variable *Participation* is a binary variable equal to one if a household holds any stocks in publicly held corporations or mutual funds in a given period and zero otherwise; *Participation (with IRA/401K/Keogh)* is a binary variable that equals one if the household holds any shares in publicly held corporations or mutual funds, including holdings in their retirement accounts, and zero otherwise; *% Stock share* is the percentage of liquid wealth invested by the household in stocks and mutual funds in a given period; *Female* is a binary variable that equals one if the household head is female and zero otherwise; *Married* is a binary variable that equals one if the household head is married and zero otherwise; *Age* is the age of the household head; *High school or less* is a binary variable that equals one if the household head has finished at most high school and zero otherwise; *Some college* is a binary variable that equals one if the household head is a college dropout and zero otherwise; *College or more* is a binary variable that equals one if the household head has at least a college degree and zero otherwise; *Financial occupation* is a binary variable that equals one for a household head in a finance-related occupation and zero otherwise; *Race* is a binary variable that equals one if the household head is white and zero otherwise. *Total wealth* includes financial assets as well as all real estate (including second homes), vehicles, and private business equity; *Liquid wealth* is defined as the sum of safe assets—such as bonds, checking accounts, and savings accounts—and stockholdings.

	Nobs	Mean	Median	Standard deviation
Participation	359,260	0.223	0.000	0.416
Participation (with IRA/401K/Keogh)	359,260	0.387	0.000	0.450
% Stock share (% of liquid wealth)	359,260	0.104	0.000	0.271
Female	359,260	0.510	1.000	0.499
Married	359,260	0.531	1.000	0.489
Age	359,260	46.92	45.00	17.23
Education				
High school or less	359,260	0.394	0.000	0.493
Some college	359,260	0.312	0.000	0.468
College or more	359,260	0.283	0.000	0.456
Financial occupation	359,260	0.041	0.000	0.198
Race (=white)	359,260	0.822	1.000	0.382
Total wealth	359,260	139,079	66,197	694,331
Liquid wealth	359,260	32,173	1,500	824,300

Table 2. Summary statistics: Gubernatorial elections

This table reports summary statistics for gubernatorial elections held between 1996 and 2011. The variable *Lame duck last term* is a binary variable that equals one if the incumbent governor is in his or her last term due to term limits and zero otherwise; *Party switch* is a binary variable which takes the value of one for elections in which the state's ruling party changes, and zero otherwise; and *Mid-year governor change* is a binary variable that equals one if there is a nonstandard mid-year change in governors and zero otherwise, where nonstandard means due to death, resignation, or impeachment. An election is called close if the victory margin, i.e., the difference between the percentages of votes obtained by the first- and second-place candidates in an election is in the lowest tercile.

	Nobs	Mean	Median	Standard deviation
Whole sample				
Gubernatorial elections (%)	736	25.81	0.00	43.79
Mid-year governor change (%)	736	2.445	0.00	15.46
Governor switch (%)	736	17.11	0.00	37.36
Lame duck last term (%)	736	32.03	0.00	46.69
Election subsample				
Incumbent Republican (%)	190	51.87	1.00	50.06
Incumbent Democrat (%)	190	46.13	0.00	49.91
Incumbent other (%)	190	2.000	0.00	14.80
Victory margin (%)	190	16.46	12.71	13.68
Close election victory margin (%)	63	3.84	3.90	2.22
Party switch (%)	190	37.82	0.00	28.33
Lame duck last term (%)	190	27.80	0.00	44.52

Table 3. Political uncertainty, household stock market participation, and portfolio allocation

This table relates gubernatorial elections to household stock market participation (Columns (1) and (2)) and portfolio allocation (Columns (3) and (4)). The variable *Participation* is an indicator variable that equals one if the household holds any stocks in publicly held corporations or mutual funds in a given period and zero otherwise; *% Stock share* is the percentage of liquid wealth invested by the household in stocks and mutual funds in a given period; and *Election* is an indicator variable that takes a value of one if a gubernatorial election occurred in a given state and year and zero otherwise. The omitted category for education is *High school or less. Total wealth* and *Total income* are in logarithmic units. Other variables are as defined in Table A2. Age^2 is scaled down by a factor of 100 for better exposition of the estimated slope coefficients. *Presidential* is an indicator variable equal to one if a presidential election is held in a certain year, and zero otherwise. All specifications include fixed effects as indicated in the table. Standard errors are clustered at the household level and presented in parentheses. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Participation		% Stock share	
	(1)	(2)	(3)	(4)
Election	–0.006**	–0.005**	–0.004*	–0.004**
	(0.002)	(0.002)	(0.002)	(0.002)
Total wealth	0.018***	0.021***	0.007***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)
College or more	0.215***	0.233***	0.072***	0.081***
	(0.007)	(0.005)	(0.004)	(0.003)
Some college	0.119***	0.127***	0.021***	0.026***
	(0.005)	(0.005)	(0.004)	(0.003)
Age	0.011***	0.012***	0.002**	0.002**
	(0.001)	(0.001)	(0.001)	(0.000)
Age^2	–0.009***	–0.008***	–0.001*	–0.001*
	(0.002)	(0.002)	(0.000)	(0.000)
Married	0.005	0.005	0.001	0.001
	(0.004)	(0.004)	(0.000)	(0.000)
Total income	0.015***	0.016***	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)
State income growth	0.024	0.028	0.085**	0.092***
	(0.031)	(0.032)	(0.029)	(0.021)
State unemployment rate	–1.198***	–1.435***	–0.277***	–0.352***
	(0.027)	(0.033)	(0.072)	(0.060)
State housing collateral ratio	–0.019	–0.021	0.091***	0.122***
	(0.011)	(0.013)	(0.000)	(0.007)
Presidential	–0.007**		–0.012***	
	(0.002)		(0.001)	
Nobs	306,648	306,648	306,648	306,648
R-Squared	0.788	0.788	0.668	0.668
State fixed effects	yes	yes	yes	yes
Year fixed effects	no	yes	no	yes
Household fixed effects	yes	yes	yes	yes

Table 4. Close elections, term limits, and household stock market participation

This table examines whether the degree of electoral uncertainty impacts the effect of political uncertainty on household stock market participation (Columns (1) and (3)) and portfolio allocation (Columns (2) and (4)). Columns (1) and (2) report the results for close elections and Columns (3) and (4) report the results for elections in which term limits prevent incumbent governors from seeking re-election. The variable *Participation* is an indicator variable that equals one if the household holds any stocks in publicly held corporations or mutual funds in a given period and zero otherwise; *% Stock share* is the percentage of liquid wealth invested by the household in stocks and mutual funds in a given period; *Close election* is a binary variable that equals one if the vote differential (i.e., difference between the percentages of votes obtained by the first- and second-place candidates) in an election is in the lowest tercile and zero otherwise; and *Lame duck last term* is a binary variable that equals one if the incumbent governor is in his/her last term due to term limits and zero otherwise. All specifications include fixed effects as indicated in the table. Standard errors are clustered at the household level and presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Close elections		Term limits	
	Participation	% Stock share	Participation	% Stock share
	(1)	(2)	(3)	(4)
Election	–0.004*	–0.004*	–0.004*	–0.003*
	(0.002)	(0.002)	(0.002)	(0.002)
Close election	–0.007**	–0.005**		
	(0.003)	(0.002)		
Lame duck last term			–0.001	0.001
			(0.002)	(0.000)
Election × Lame duck last term			–0.005**	–0.003**
			(0.002)	(0.001)
Nobs	306,648	306,648	306,648	306,648
R-Squared	0.797	0.668	0.797	0.668
State fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
Household fixed effects	yes	yes	yes	yes
Other controls	As in Table 3, Col. (2)	As in Table 3, Col. (4)	As in Table 3, Col. (2)	As in Table 3, Col. (4)

Table 5. Household asset reallocation

This table reports the results on how political uncertainty relates to the investment decisions of households on risky assets (stocks and mutual funds), safe assets, and illiquid assets; *% Stock share*^{W} is the percentage of total wealth invested by the household in (risky assets) stocks and mutual funds; *% Safe share*^{W} is the percentage of total wealth invested in safe assets, such as government securities, municipal bonds, money market deposit accounts, checking accounts, and savings accounts; *% Illiquid*^{W} is the percentage of total wealth invested in illiquid assets, such as real estate, vehicles, and private businesses; and *Election* is an indicator variable that takes a value of one if a gubernatorial election occurred in a given state and year and zero otherwise. All specifications include fixed effects as indicated in the table. Standard errors are clustered at the household level and presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	% Stock share^{W}		% Safe share^{W}		% Illiquid^{W}	
	(1)	(2)	(3)	(4)	(5)	(6)
Election	–0.001**	–0.002**	0.010**	0.009**	–0.008	–0.006
	(0.000)	(0.001)	(0.005)	(0.004)	(0.006)	(0.004)
Nobs	306,648	306,648	306,648	306,648	306,648	306,648
R-Squared	0.633	0.633	0.701	0.701	0.497	0.497
State fixed effects	Yes	yes	yes	yes	yes	yes
Year fixed effects	No	yes	no	yes	no	yes
Household fixed effects	Yes	yes	yes	yes	yes	yes
Other controls	As in Table 3, Col. (3)	As in Table 3, Col. (4)	As in Table 3, Col. (3)	As in Table 3, Col. (4)	As in Table 3, Col. (3)	As in Table 3, Col. (4)

Table 6. Summary statistics for the measures of labor income risk and asset risk

Volatility in monthly labor income and labor hours worked are calculated twice a year, between May and October and then between November and April, as the standard deviation in workers' monthly labor income or labor hours worked, respectively. The six-month period from May to October (from November to April) captures the pre-election (post-election) period in election years and the "pseudo" pre-election (post-election) period in non-election years. *IVol* is the average end-of-month implied volatility and *RetVol* is the average monthly standard deviations of stock returns (computed from daily stock returns) during both the pre-election and post-election periods. All variables are measured over 1996-2011 period, coinciding with the SIPP data coverage. Last row reports the statistics for *RetVol* between 1991 and 2011, combining the sample periods of the SIPP and brokerage data.

	Nobs	Mean	Median	Standard Deviation
Labor income volatility	458,214	789.08	526.19	1429.4
Labor hours volatility	697,132	12.464	9.271	15.305
IVol	68,863	0.521	0.462	0.251
RetVol	171,529	0.038	0.031	0.025
RetVol (1991-2011)	234,887	0.038	0.031	0.026

Table 7. Changes in labor income risk prior to gubernatorial elections

This table explores the changes in labor income risk prior to gubernatorial elections. We use two different proxies for labor income risk: (i) volatility in monthly labor income; (ii) volatility in monthly labor hours worked, where each proxy is calculated twice a year, between May and October and then between November and April, as the standard deviation in workers' monthly labor income or labor hours worked, respectively. The six-month period from May to October (from November to April) captures the pre-election (post-election) period in election years and the "pseudo" pre-election (post-election) period in non-election years. Accordingly, we define two indicator variables, *Pre* and *Post*, for the pre-election and post-election periods, respectively. *Election* is an indicator variable that takes a value of one if a gubernatorial election takes place in the state where the household resides, and zero otherwise. The last row of the table reports the *p*-values for the differences between the coefficients on *Pre* × *Election* and *Post* × *Election*. Household-state control variables include income growth, unemployment rate, and housing collateral ratio, as defined in Table A2. The sample period is from 1996 to 2011. All specifications include state, year, and household fixed effects and standard errors are clustered at the household level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Labor Income Volatility (1)	Labor Hours Volatility (2)
Pre × Election	54.157***	2.780***
	(7.995)	(0.156)
Post × Election	14.939	0.881***
	(8.423)	(0.078)
Pre	–3.325	–0.287***
	(4.711)	(0.028)
Nobs	455,521	693,536
R-squared	0.422	0.534
Household-state controls	yes	yes
State fixed effects	yes	yes
Year fixed effects	yes	yes
Household fixed effects	yes	yes
Test: Pre × Election = Post × Election	0.00	0.00

Table 8. Changes in asset risk prior to gubernatorial elections

This table explores the changes in asset risk prior to gubernatorial elections. We use two different proxies for asset risk: *IVol* is the end-of-month implied volatility and *RetVol* is the monthly stock return standard deviations (computed from historical daily stock returns). Both volatility measures are calculated twice a year as the average of monthly observations between May and October and that between November and April. The six-month period from May to October (from November to April) captures the pre-election (post-election) period in election years and the "pseudo" pre-election (post-election) period in non-election years. Accordingly, we define two indicator variables, *Pre* and *Post*, for the pre-election and post-election periods, respectively. *Election* is an indicator variable that takes a value of one if a gubernatorial election takes place in the state where the firm is headquartered, and zero otherwise. *IVol* and *RetVol* are multiplied by a factor of 100 for a better exposition of the results. Columns (1) and (2) report the results for 1996-2011 coinciding with the coverage of the SIPP data; Column (3) report the results for 1991-2011, combining the sample periods of the SIPP and brokerage data. The last row of the table reports the *p*-values for the differences between the coefficients on *Pre* × *Election* and *Post* × *Election*. Firm-state control variables include income growth, unemployment rate, and housing collateral ratio, as defined in Table A2. All specifications include state, firm, and year fixed effects. Standard errors are clustered at the firm level and presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	1996-2011		1991-2011
	IVol	RetVol	RetVol
	(1)	(2)	(3)
Pre × Election	3.888***	0.430***	0.332***
	(0.176)	(0.013)	(0.011)
Post × Election	0.141	–0.013	0.006
	(0.163)	(0.013)	(0.011)
Pre	–1.676***	–0.212***	–0.186***
	(0.094)	(0.008)	(0.006)
Nobs	68,695	171,211	234,675
R-squared	0.714	0.609	0.592
Firm-state controls	yes	yes	yes
State fixed effects	yes	yes	yes
Firm fixed effects	yes	yes	yes
Year fixed effects	yes	yes	yes
Test: Pre × Election = Post × Election	0.00	0.00	0.00

Table 9. Labor income risk and asset risk channels

This table illustrates how labor income risk (Channel #1) and asset risk (Channel #2) independently and together influence household stock market participation. For this purpose, the table groups the overall sample of household-firm observations into six different subsamples S1 through S6.

Subsample no.	Channel #1	Channel #2	Election in household-state?	Election in firm-state?	Household-state same as firm-state?
(S1)	Labor Income Risk	Asset Risk	yes	yes	yes
(S2)	Labor Income Risk	Asset Risk	yes	yes	no
(S3)	Labor Income Risk	No Asset Risk	yes	no	no
(S4)	No Labor Income Risk	Asset Risk	no	yes	no
(S5)	No Labor Income Risk	No Asset Risk	no	no	yes
(S6)	No Labor Income Risk	No Asset Risk	no	no	no

Table 10. Labor income risk and asset risk analysis using the brokerage data

The dependent variable is the percentage change in a household's stockholding in a firm at the end of each month between May and October over a 12-month horizon, which is winsorized at the 99% level on the upper tail of the distribution. *Election* is an indicator variable that takes a value of one when a gubernatorial election is in the household-state (same as the firm-state) to capture the *combined effects of asset risk and labor income risk* (Column 1); or it takes a value of one when the election is held in the household-state to capture *only the effect of labor income risk* (Column 2); or it takes a value of one when the election is held in the firm-state to capture *only the effect of asset risk* (Column 3). Column (1) reports the results using subsamples S1 and S5 from Table 9. Column (2) reports the results using subsamples S3, S5, and S6 from Table 9. Column (3) reports the results using subsamples S4, S5, and S6 from Table 9. Household-state and firm-state control variables include income growth, unemployment rate, and housing collateral ratio, as defined in Table A2. The sample period is from 1991 to 1996. All specifications include fixed effects as indicated in the table. Standard errors are clustered at the household level and reported in parentheses, where ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Asset risk + Labor income risk	Labor income risk	Asset risk
	(1)	(2)	(3)
Election	–0.055***	–0.038***	–0.034***
	(0.014)	(0.009)	(0.010)
Nobs	86,190	293,587	292,797
R-Squared	0.317	0.278	0.271
Household-state controls	yes	yes	yes
Firm-state controls	yes	yes	yes
Firm fixed effects	yes	yes	yes
Year fixed effects	yes	yes	yes
Household fixed effects	yes	yes	yes

Table 11. Political uncertainty, stock market participation, and labor income risk of households

This table explores the cross-sectional differences in the effect of political uncertainty on stock market participation and the portfolio decisions of households. The variable *Participation* is an indicator variable that equals one if the household holds any stocks in publicly held corporations or mutual funds in a given period, and zero otherwise; *% Stock share* is the percentage of liquid wealth invested by the household in stocks and mutual funds in a given period; *Election* is an indicator variable that takes a value of one if a gubernatorial election occurred in a given state and year, and zero otherwise. The omitted category for education is *High school or less*. *Total wealth* and *Total income* are in logarithmic units. *Labor Income Volatility* is the standard deviation of labor income from May through October each year. *Labor Hours Volatility* is the standard deviation of labor hours worked from May through October each year. Other variables are as defined in Table A2. All regressions include the same controls as in Table 3 (Columns (2) and (4)) and fixed effects are as indicated in the table. The coefficients on *State income growth*, *State relative unemployment*, and *State housing collateral ratio* are subsumed by the state × year fixed effects. Measures of labor income volatility, labor hours volatility, and Age^2 are scaled down by a factor of 1,000, 100, and 100, respectively, for better exposition of estimated slope coefficients. The sample period is from 1996 to 2011. Standard errors are clustered at the household level and presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Participation		% Stock Share	
	(1)	(2)	(3)	(4)
Labor income risk				
Labor Income Volatility × Election	–0.008**		–0.006*	
	(0.003)		(0.003)	
Labor Hours Volatility × Election		–0.082**		–0.044**
		(0.039)		(0.018)
Other demographic characteristics				
Female × Election	–0.002	–0.002	–0.002	–0.001
	(0.001)	(0.001)	(0.000)	(0.000)
Race × Election	–0.001	–0.001	–0.001	–0.001
	(0.000)	(0.000)	(0.000)	(0.000)
Financial occupation × Election	0.003*	0.003*	0.002*	0.002**
	(0.001)	(0.001)	(0.002)	(0.002)
Married × Election	0.002	0.002	0.000	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
College or more × Election	0.004***	0.004***	0.003*	0.002**
	(0.002)	(0.002)	(0.002)	(0.001)
Some college × Election	0.002	0.002	0.002	0.002
	(0.000)	(0.000)	(0.000)	(0.002)
Age × Election	0.001	0.001	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)
Age^2 × Election	–0.002*	–0.002**	–0.001*	–0.002**
	(0.000)	(0.000)	(0.000)	(0.000)
Total wealth × Election	0.009***	0.007***	0.009***	0.006***
	(0.002)	(0.002)	(0.001)	(0.000)
Total income × Election	0.002	0.002	0.001	0.001
	(0.001)	(0.001)	(0.000)	(0.000)
Nobs	194,220	194,220	292,470	292,470
R-Squared	0.682	0.724	0.595	0.655
Household fixed effects	yes	yes	yes	yes
State × year fixed effects	yes	yes	yes	yes
Other controls	As in Table 3, Col. (2) (excluding state-level time-varying controls)		As in Table 3, Col. (4) (excluding state-level time-varying controls)	

Table 12. Political uncertainty, stock market participation and asset risk using brokerage data

The dependent variable is the percentage change in a household's stockholding in a firm at the end of each month between May and October over a 12-month horizon, which is winsorized at the 99% level on the upper tail of the distribution. *Election* is an indicator variable that takes a value of one when a gubernatorial election is in the firm-state, and zero otherwise. Column (1) reports the results with state × year fixed effects where state corresponds to firm-state. Household-state fixed effects are not included because they are subsumed by household fixed effects as households do not change their residence states in our sample. Column (2) shows the results with both firm-state and household-state control variables instead, and replacing state × year fixed effects with firm-state and year fixed effects. *Asset risk* is the monthly standard deviation of historical daily stock returns. Household-state and firm-state control variables include income growth, unemployment rate, and housing collateral ratio, as defined in Table A2. The sample period is from 1991 to 1996. All specifications include fixed effects as indicated in the table. Standard errors are clustered at the household level and presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)
Asset risk × Election	–0.480**	–0.657**
	(0.225)	(0.219)
Election		0.003
		(0.007)
Nobs	374,149	374,149
R-Squared	0.281	0.237
Firm-state controls	no	yes
Household-state controls	no	yes
Firm fixed effects	yes	yes
Household fixed effects	yes	yes
State × year fixed effects	yes	no
Firm-state fixed effects	no	yes
Year fixed effects	no	yes

Table 13. Dynamics of stock market participation during an election cycle

This table provides evidence of the evolution of stock market participation and portfolio allocation over the full gubernatorial election cycle. The dependent variables are *Participation* (Columns (1) and (2)) and *% Stock share* (Columns (3) and (4)); *Election* is a binary variable that equals one if a gubernatorial election occurred in that state in that year, and zero otherwise; *Post-election* is a binary variable that takes a value of one for years after the current election and until the year before the next gubernatorial election in a state, and zero otherwise; and *Party switch* is a binary variable that equals one for gubernatorial elections in which the elected governor is from a different political party than the party of the outgoing governor, and zero otherwise. Intercepts are omitted from all regressions and other untabulated controls are defined in Table A2. The sample period is from 1996 to 2011. All specifications include fixed effects as indicated in the table. The bottom panel provides the results of tests for the null hypothesis where the coefficients of election and post-election variables sum to zero. Standard errors are clustered at the household level and presented in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	Participation		% Stock share	
	(1)	(2)	(3)	(4)
Election	–0.006***	–0.005**	–0.004**	–0.004**
	(0.002)	(0.002)	(0.001)	(0.002)
Post-election	0.004**	0.003**	0.003**	0.003**
	(0.002)	(0.001)	(0.002)	(0.001)
Election × Party switch		–0.002*		–0.002*
		(0.001)		(0.001)
Post-election × Party switch		–0.001		–0.001
		(0.000)		(0.000)
Test for linear combinations of coefficients				
Election + Post-election variables	–0.002	–0.005**	–0.001	–0.004**
Nobs	306,648	306,648	306,648	306,648
R-Squared	0.797	0.797	0.668	0.668
State fixed effects	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
Household fixed effects	yes	yes	yes	yes
Other controls	As in Table 3, Col. (2)	As in Table 3, Col. (2)	As in Table 3, Col. (4)	As in Table 3, Col. (4)

Appendix A

1. Model setup

To motivate the empirical tests, we consider a stock market participation and trading model by incorporating participation costs and the need to hedge labor income risk. The purpose of the model is to illustrate the effect of political uncertainty on households' participation and trading decisions. Specifically, we show that an increase in political uncertainty can lead to a lower participation rate and more cautious stock trading. Below we describe the details of the model setup and derive the analytical solutions.

We assume that the state of the economy is captured by a random variable $\widetilde{M}$, which is normally distributed: $\widetilde{M} \sim N(\bar{M},\ \sigma_M^2)$. There are many sources of uncertainty affecting the state of the economy, among which political uncertainty is an important one, which has a huge impact on employment, investment, production, and consumption decisions. For the purpose of this paper, we assume that $\widetilde{M}$ captures political uncertainty, and its variance, σ_M^2, serves as a *measure* of political uncertainty. When σ_M^2 is higher, there is more uncertainty about government policies; an example is gubernatorial elections that can result in power turnover between opposing political parties. By analyzing how the magnitude of σ_M^2 affects the equilibrium outcome, we can obtain insights about the impact of political uncertainty on households' participation and trading decisions.

There is a riskless asset and a risky asset that are traded in the market. The return on the riskless asset is normalized to be equal to zero; that is, it can be viewed as cash. The risky asset can be viewed as a stock, whose value is $\tilde{V}$:

$$\tilde{V} = \beta\widetilde{M} + \tilde{s},$$

where $\beta\widetilde{M}$ represents the risk that is related to political uncertainty and $\tilde{s}$ represents the risk that is not related to political uncertainty. Hence β >0 measures the stock's exposure to political uncertainty. We assume that $\tilde{s}$ follows the normal distribution $\tilde{s} \sim N(\bar{s},\ \sigma_s^2)$. Further, we assume that the two risk

components are independent of each other, thus we have $\tilde{V} \sim N(\bar{V},\ \sigma_V^2)$, where $\bar{V} = \beta\bar{M} + \bar{s}$, and $\sigma_V^2 = \beta^2\sigma_M^2 + \sigma_s^2$.

We assume that there is a continuum of measure one of households who have the CARA utility function: $u(W) = -exp(-\gamma W)$, where $\gamma > 0$ is the risk-aversion coefficient. In order to trade the stock, households need to incur a cost that varies individually. The participation cost can result from the time and effort devoted to stock trading or from taxation for capital gains, which are not the same for all households. We assume that the participation cost follows the uniform distribution on the interval $[0,\ \bar{c}]$, where $\bar{c}$ is a constant large enough so that there are always some households who decide not to trade the stock. Households' participation decisions are endogenized in the model. In addition to the heterogeneity in the participation cost, we will extend the analysis to the case with cross-sectional variations in the exposure of labor income to political uncertainty after we fully analyze the basic case.

The supply of the stock absorbs trading by other exogenous investors, strategic or non-strategic, including noise traders, Specifically, we assume that the supply of the stock is equal to $\tilde{x} + \delta P$. The first component, $\tilde{x}$, follows the normal distribution, $\tilde{x} \sim N(\bar{x},\ \sigma_x^2)$ and is independent of all the other variables in the model. The second component is proportional to the stock price. We assume $\delta > 0$, so the second component can be interpreted as supply (demand) by arbitrageurs, which is positively (negatively) related to the stock price.[14] When households sell, other investors have to buy to clear the market; hence, the external liquidity supply is indispensable—without it, it would be impossible to generate variations in households' average stock market participation, which would have to be equal to the random supply, $\tilde{x}$, to clear the market. For this purpose, we assume $\gamma\delta > \frac{1}{\sigma_V^2}$ so that the external liquidity supply is sufficiently large to absorb households' demand shocks.

For ease of exposition, we focus our analysis on the case with no information asymmetry. The

[14] We can imagine that there exist risk-neutral arbitrageurs whose demand of the stock is $\delta(\bar{V} - P)$. Since demand is negative supply, it amounts to a supply equal to $\delta(P - \bar{V})$, where the constant part $-\delta\bar{V}$ is subsumed by $\bar{x}$.

extension to the case with information asymmetry (for example, in the fashion of Grossman and Stiglitz 1980; Hellwig 1980; and Diamond and Verrechia 1981) is straightforward and can be solved similarly, but the solutions will be notationally cumbersome.[15] When households' signals are very noisy, the case with information asymmetry converges to the one without information asymmetry. Considering that we are modelling retail investors' participation and trading decisions, it is reasonable to assume that household investors do not have accurate signals about the stock's payoff; therefore, the case without information asymmetry is a good approximation.

There are three dates: date 0, 1, and 2, and the sequence of events is as follows:

1) Date 0: Households receive their initial endowment and decide whether to participate in trading the stock. They have to incur the participation cost to trade the stock. If they decide not to trade the stock, they simply invest in the riskless asset.

2) Date 1: Households who participate in stock trading make the optimal trading decisions based on the stock price. The stock price clears the market by equating the aggregate demand with the aggregate supply.

3) Date 2: The stock's payoff is realized. Households receive the cash flow from their investment in the stock; in addition, their labor income is realized. They consume their final wealth, which determines their realized utility.

2. Households' trading strategy

We use e_i to denote household i's initial endowment at date 0. Its labor income at date 2 is denoted by $\alpha\widetilde{M}$, where $\alpha > 0$ is a constant capturing the labor income's exposure to political uncertainty. For the time being, we assume that all households have the same α— that is, the labor income exposure to political uncertainty is homogeneous. Later, we will extend the analysis to the case

[15] The detailed analysis of the case with asymmetric information yields similar results and is available upon request.

with heterogeneous exposures. If the household decides not to trade the stock, then its terminal wealth at date 2 is

$$\widetilde{W}_i = e_i + \alpha\widetilde{M}.$$

If the household decides to trade the stock and buy θ_i shares of the stock, then the terminal wealth at date 2 is

$$\widetilde{W}_i = e_i - c_i + \theta_i\left(\tilde{V} - P\right) + \alpha\widetilde{M},$$

where c_i is the participation cost and $\left(\tilde{V} - P\right)$ is gain or loss per share. It is well known that the CARA utility implies mean-variance maximization. Hence, the household's optimization problem is:

$$Max_{\theta_i}\left(e_i - c_i - \theta_i P\right) + \theta_i E[\tilde{V}\,] + \alpha E[\widetilde{M}]$$

$$-\frac{\gamma}{2}\left\{\theta_i^2 Var[\tilde{V}\,] + \alpha^2 Var\left[\widetilde{M}\right] + 2\,\theta_i\alpha Cov[\tilde{V},\widetilde{M}]\right\}.$$

The solution to the optimization problem is:

$$\theta_i = \frac{1}{\gamma}\frac{E[\tilde{V}\,] - P - \gamma\alpha Cov[\tilde{V},\widetilde{M}]}{Var[\tilde{V}\,]}$$

$$= \frac{1}{\gamma}\frac{E[\tilde{V}\,] - P}{Var[\tilde{V}\,]} - \frac{\alpha Cov\left[\tilde{V},\widetilde{M}\right]}{Var[\tilde{V}\,]}.$$

The solution shows that the household's demand consists of two parts. The first part, $\frac{1}{\gamma}\frac{E[\tilde{V}\,]-P}{Var[\tilde{V}\,]}$ is a speculative demand, which is positively related to the perceived equity premium, $E[\tilde{V}\,] - P$, and negatively related to the risk-aversion coefficient, γ, and asset risk, $Var[\tilde{V}\,]$. The second part is a hedging demand, $-\frac{\alpha Cov[\tilde{V},\widetilde{M}]}{Var[\tilde{V}\,]}$. Intuitively, households have incentives to hedge their labor income by selling or short-selling the stock. The magnitude of the hedging demand is increasing in the labor income's exposure to political uncertainty, α, and the correlation between the stock's payoff and labor income, but is decreasing in the stock's risk.

3. Equilibrium stock price

Suppose that in equilibrium households with $c_i \leq \hat{c}$ participate in trading the stock. The market clearing condition is thus:

$$\int_{c_i \leq \hat{c}} \theta_i dF(c_i) = x + \delta P.$$

We define

$$\eta = \int_{c_i \leq \hat{c}} dF(c_i)$$

as the population of households who participate in stock trading. The market clearing condition can be rewritten as:

$$\eta \frac{1}{\gamma} \left\{ \frac{\bar{V} - P}{\sigma_V^2} - \frac{\gamma \alpha \beta \sigma_M^2}{\sigma_V^2} \right\} = x + \delta P.$$

By matching the coefficients on the constant term and the value of *x*, we can derive the following proposition.

Proposition 1: Given that households with $c_i \leq \hat{c}$ participate in trading the stock, the equilibrium price is $P = a + bx$, where $a = \frac{\frac{\bar{V}}{\sigma_V^2} - \gamma \frac{\alpha \beta \sigma_M^2}{\sigma_V^2}}{\frac{1}{\sigma_V^2} + \frac{\gamma \delta}{\eta}}$, and $b = \frac{-\frac{\gamma}{\eta}}{\frac{1}{\sigma_V^2} + \frac{\gamma \delta}{\eta}}$. The unconditional expected equity premium is equal to $\frac{\frac{\gamma \delta}{\eta} \bar{V} + \frac{\gamma}{\eta} \bar{x} + \gamma \frac{\alpha \beta \sigma_M^2}{\sigma_V^2}}{\frac{1}{\sigma_V^2} + \frac{\gamma \delta}{\eta}}$.

Proof: See Appendix B.

Proposition 1 shows that the equilibrium price is linearly decreasing in the random supply of the stock, x. As can be seen, the exposure of labor income to political uncertainty increases the unconditional equity premium—even if $\bar{V} = 0$ and $\bar{x} = 0$, there is still a positive equity premium that results from households' hedging demand.

4. Participation rate

In the analysis above, we took participation as exogenously given. As the final step of the model solution, we solve the endogenous participation rate. If household *i* decides not to participate in trading the stock, its unconditional expected utility is denoted by E_i^0:

$$E_i^0 = E\left[-exp\left(-\gamma\left(e_i + \alpha\tilde{M}\right)\right)\right]$$

$$= -exp\left(-\gamma\left(e_i + \alpha\bar{M} - \frac{\gamma}{2}\alpha^2\sigma_M^2\right)\right).$$

If the household decides to participate in trading the stock, then its unconditional expected utility is denoted by E_i^P:

$$E_i^P = E\left[-exp\left(-\gamma(e_i - c_i + \theta_i\left(\tilde{V} - P\right) + \alpha\tilde{M}\right)\right)\right],$$

where $\theta_i = \frac{1}{\gamma}\left\{\frac{\bar{V}-P}{\sigma_V^2} - \frac{\gamma\alpha\beta\sigma_M^2}{\sigma_V^2}\right\}$.

We use iterated expectations to derive E_i^P. Conditional on the realized value of *x*, we have

$$E_i^P(x) = E\left[-exp\left(-\gamma\left(e_i - c_i + \theta_i\left(\tilde{V} - P\right) + \alpha\tilde{M}\right)\right)|x\right]$$

$$= E_i^0\ exp\left(-\gamma\left(-c_i + \frac{\gamma\sigma_V^2}{2}\left(\frac{1}{\gamma}\frac{\bar{V}-P}{\sigma_V^2} - \frac{\alpha\beta\sigma_M^2}{\sigma_V^2}\right)^2\right)\right)$$

$$= E_i^0 \exp(\gamma c_i)\ exp\left(-\frac{1}{2\sigma_V^2}\ (\bar{V} - (a+bx) - \gamma\alpha\beta\sigma_M^2)^2\right).$$

Because $E[bx] = b\bar{x}$ and $Var[bx] = b^2\sigma_x^2$, taking the expectation with respect to *x*, we get the unconditional expected utility:

$$E_i^P = E[E_i^P(x)]$$

$$= E_i^0\ exp(\gamma c_i)\ E\left[exp\left(-\frac{1}{2\sigma_V^2}\ (\bar{V} - (a+bx) - \gamma\alpha\beta\sigma_M^2)^2\right)\right]$$

$$= \frac{E_i^0\ exp(\gamma c_i)}{\sqrt{1 + \frac{b^2\sigma_x^2}{\sigma_V^2}}} exp\left(\frac{-\frac{1}{2\sigma_V^2}\ (\bar{V} - (a+b\bar{x}) - \gamma\alpha\beta\sigma_M^2)^2}{1 + \frac{b^2\sigma_x^2}{\sigma_V^2}}\right).$$

Hence the participation cost of the marginal household who is indifferent between whether or not to participate in trading the stock satisfies $E_i^0 = E_i^P$, or

$$c_i = \frac{1}{2\gamma}\left\{\frac{\frac{1}{\sigma_V^2}\left(\bar{V} - (a + b\bar{x}) - \gamma\alpha\beta\sigma_M^2\right)^2}{1 + \frac{b^2\sigma_x^2}{\sigma_V^2}} + ln\left(1 + \frac{b^2\sigma_x^2}{\sigma_V^2}\right)\right\}.$$

Proposition 2: There is a threshold value $c^* \in [0, \bar{c}]$ such that households with $c_i \leq c^*$ participate in trading the stock and households with $c_i > c^*$ do not participate in trading the stock.

Proof: See Appendix B.

Now that we have fully solved the model, we will conduct comparative static analysis to see how an increase in political uncertainty affects households' participation and trading decisions. Intuitively, as political uncertainty increases, the payoff of the stock is more uncertain and, at the same time, households face more risky labor income. The increased uncertainty about the stock's payoff makes it less attractive. In addition, the increased uncertainty about the labor income provides households with greater incentives to hedge the risk. Overall, an increase in political uncertainty reduces households' desire to own the stock. The following proposition characterizes this effect.

Proposition 3: When $\alpha < \frac{\delta\bar{V} + \bar{x}}{\gamma\delta\beta\sigma_M^2}$, households are on average stock buyers, and an increase in political uncertainty, σ_M^2, is going to lead to:

1) a decrease in the number of households participating in trading the stock;
2) a decrease in the sensitivity of their trading volume to the perceived risk premium, and
3) a decrease in each household's average stockholding.

Proof: See Appendix B.

Proposition 3 implies that, as political uncertainty increases, the increased uncertainty about the stock's payoff as well as households' labor income makes the stock less attractive. As a result, the benefit of participating in stock trading decreases, resulting in fewer households willing to participate in stock trading. Theoretically, a surge in political uncertainty reduces households' speculative motive,

but increases their hedging motive for selling the stock. The assumption $\alpha < \frac{\delta\bar{V}+\bar{x}}{\gamma\delta\beta\sigma_M^2}$ implies that on average, the equity premium is positive and households are net buyers, which is consistent with the empirical fact that households are net buyers in the capital market. This assumption holds when the stock's expected payoff ($\bar{V}$) is high or the supply ($\bar{x}$) is high so that the hedging demand does not result in an average demand for short selling the stock. Because many stocks are difficult to sell short and few retail investors do short selling, empirically, it is not a concern that the assumption may be violated with a large value of α. In the real world, a very large value of α does not increase the participation rate through increased short selling. Instead, households just liquidate their stockholdings and leave the market, causing a decline in the participation rate.

5. Extension and discussion

So far we have shown that an increase in political uncertainty causes a decline in households' participation in stock trading, based on the assumption that households face heterogeneous costs to participate in stock trading. In addition to the participation cost, households may vary in other dimensions, such as the exposure of labor income to political uncertainty. In this section, we briefly discuss the model's implications with regard to other cross-sectional variations and use numerical examples to illustrate these implications.

Some households have greater labor income exposures to political uncertainty than other households. In other words, these households have a higher value of α, whereas other households have a lower value of α. We can extend the above analysis to incorporate the heterogeneity in the exposure of labor income to political uncertainty. Specifically, we assume that there are two types of households: one type with α_H and the other type with α_L<α_H. Within each type, there is a continuum of measure one of households whose participation costs are uniformly distributed on $[0, \bar{c}]$. Suppose the

equilibrium participation rate for α_H-type households is η_H and that for α_L-type households is η_L. Hence, the market clearing condition becomes

$$\eta_H \frac{1}{\gamma}\left\{\frac{\bar{V}-P}{\sigma_V^2}-\frac{\gamma\alpha_H\beta\sigma_M^2}{\sigma_V^2}\right\}+\eta_L \frac{1}{\gamma}\left\{\frac{\bar{V}-P}{\sigma_V^2}-\frac{\gamma\alpha_L\beta\sigma_M^2}{\sigma_V^2}\right\}=x+\delta P.$$

As a result, the equilibrium stock price is

$$\text{P}= a+bx,$$

where $=\frac{\frac{\bar{V}}{\sigma_V^2}-\gamma\frac{\bar{\alpha}\beta\sigma_M^2}{\sigma_V^2}}{\frac{1}{\sigma_V^2}+\frac{\gamma\delta}{\eta_H+\eta_L}}$, $b=\frac{-\frac{\gamma}{\eta_H+\eta_L}}{\frac{1}{\sigma_V^2}+\frac{\gamma\delta}{\eta_H+\eta_L}}$, and $\bar{\alpha}=\frac{\eta_H\alpha_H+\eta_L\alpha_L}{\eta_H+\eta_L}$.

The equilibrium participation rates for the two groups of households are:

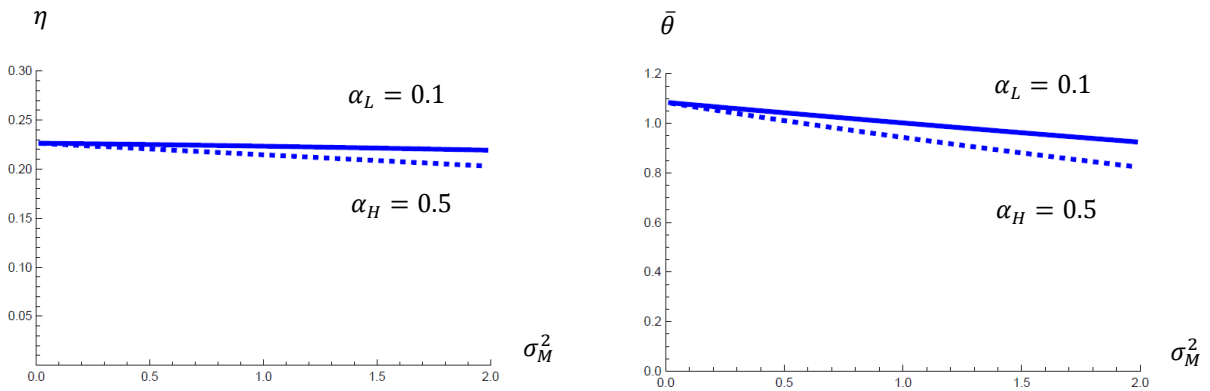
$$\eta_H\bar{c}=\frac{1}{2\gamma}\left\{\frac{\frac{1}{\sigma_V^2}(\bar{V}-\bar{P}-\gamma\alpha_H\beta\sigma_M^2)^2}{1+\frac{b^2\sigma_x^2}{\sigma_V^2}}+ln\left(1+\frac{b^2\sigma_x^2}{\sigma_V^2}\right)\right\}$$

$$\eta_L\bar{c}=\frac{1}{2\gamma}\left\{\frac{\frac{1}{\sigma_V^2}(\bar{V}-\bar{P}-\gamma\alpha_L\beta\sigma_M^2)^2}{1+\frac{b^2\sigma_x^2}{\sigma_V^2}}+ln\left(1+\frac{b^2\sigma_x^2}{\sigma_V^2}\right)\right\}.$$

Because α_H is greater than α_L, the right-hand side of the first equation above is smaller than the right hand side of the second equation, implying that η_H is smaller than η_L.

Because it is infeasible to analytically derive how an increase in political uncertainty affects η_H and η_L differently, we use numerical examples to illustrate the cross-sectional variations in households' participation sensitivity to changes in political uncertainty. We choose simple parameter values for the purpose of illustration. Figure 1 shows that, with the per-capita stock supply set to 1, as political uncertainty (σ_M^2) increases from 0.02 to 2, households with high exposure of labor income to political uncertainty ($\alpha_H = 0.5$) experience a sharper decrease in participation than households with low exposure of labor income to political uncertainty ($\alpha_L = 0.1$): for households with α_H, the participation rate decreases from 22.62% to 20.29%, and the average per-capita stockholding decreases

from 1.082 to 0.823; for households with α_L, the participation rate decreases from 22.64% to 21.93%, and the average per-capita stockholding decreases from 1.083 to 0.924.



Participation Rate

Average Stockholding

Figure 1: Labor Income Exposure to Political Uncertainty and Participation in Stock Trading

This figure illustrates how changes in political uncertainty affects the participation rates of investors with different labor income exposures. The parameter values are set as follows: the mean value of the random stock supply ($\bar{x}$) is equal to 2 (so the per-capita stock supply is equal to 1), the volatility of the random stock supply (σ_x^2) is equal to 0.01, the mean value of the stock's payoff ($\bar{V}$) is equal to 10, the volatility unrelated to political uncertainty (σ_s^2) is equal to 2, the stock's exposure to political uncertainty (β) is equal to 0.5, the coefficient of the external liquidity supply (δ) is equal to 0.4, the maximum participation cost ($\bar{c}$) is equal to 100, and the risk-aversion coefficient (γ) is equal to 1. The solid curves represent the participation rate and the average per-capita stockholding for investors with low labor income exposure to political uncertainty ($\alpha_L = 0.1$); the dashed curves represent the participation rate and the average per-capita stockholding for investors with high labor income exposure to political uncertainty ($\alpha_H = 0.5$).

Appendix B

Proof of Proposition 1: The market clearing condition is:

$$\eta \frac{1}{\gamma}\left\{\frac{\bar{V}-P}{\sigma_V^2}-\frac{\gamma\alpha\beta\sigma_M^2}{\sigma_V^2}\right\}=x+\delta P.$$

Rearranging the terms, we get

$$P=\frac{\frac{\bar{V}}{\sigma_V^2}-\gamma\frac{\alpha\beta\sigma_M^2}{\sigma_V^2}-\frac{\gamma}{\eta}x}{\frac{1}{\sigma_V^2}+\frac{\gamma\delta}{\eta}}.$$

Therefore, we have:

$$a=\frac{\frac{\bar{V}}{\sigma_V^2}-\gamma\frac{\alpha\beta\sigma_M^2}{\sigma_V^2}}{\frac{1}{\sigma_V^2}+\frac{\gamma\delta}{\eta}} \quad and \quad b=\frac{-\frac{\gamma}{\eta}}{\frac{1}{\sigma_V^2}+\frac{\gamma\delta}{\eta}}\ .$$

As for the expected risk premium, we have

$$E(V-P)=\bar{V}-a-b\bar{x}\ =\frac{\frac{\gamma\delta}{\eta}\bar{V}+\frac{\gamma}{\eta}\bar{x}+\gamma\frac{\alpha\beta\sigma_M^2}{\sigma_V^2}}{\frac{1}{\sigma_V^2}+\frac{\gamma\delta}{\eta}}. \quad \blacksquare$$

Proof of Proposition 2: The marginal investor who is indifferent between whether or not to participate in trading the stock satisfies $E_i^0=E_i^P$, or

$$c_i=\frac{1}{2\gamma}\left\{\frac{\frac{1}{\sigma_V^2}\left(\bar{V}-(a+b\bar{x})-\gamma\alpha\beta\sigma_M^2\right)^2}{1+\frac{b^2\sigma_x^2}{\sigma_V^2}}+ln\left(1+\frac{b^2\sigma_x^2}{\sigma_V^2}\right)\right\}.$$

Plugging $a=\frac{\frac{\bar{V}}{\sigma_V^2}-\gamma\frac{\alpha\beta\sigma_M^2}{\sigma_V^2}}{\frac{1}{\sigma_V^2}+\frac{\gamma\delta}{\eta}}$ and $b=\frac{-\frac{\gamma}{\eta}}{\frac{1}{\sigma_V^2}+\frac{\gamma\delta}{\eta}}$ into the equation above, we have

$$c_i=\frac{1}{2\gamma}\left\{\frac{\frac{b^2}{\sigma_V^2}\left(\delta\bar{V}+\bar{x}-\gamma\delta\alpha\beta\sigma_M^2\right)^2}{\left(1+\frac{b^2\sigma_x^2}{\sigma_V^2}\right)}+ln\left(1+\frac{b^2\sigma_x^2}{\sigma_V^2}\right)\right\}.$$

Because the cost follows the uniform distribution on the interval $[0, \bar{c}]$, if the participation rate is η, then $c_i = \eta\bar{c}$. We therefore obtain an equation with one variable, η. The left hand side is linearly increasing in η, with the slope equal to $\bar{c}$. In contrast, the right hand side is decreasing in η (it is increasing in b^2, which is decreasing in η). Further, when $\eta = 0$, the left- hand side is equal to zero, whereas the right-hand side is positive. When $\eta = 1$, the left-hand side is equal to $\bar{c}$; the assumption that $\bar{c}$ is sufficiently large guarantees that the left-hand side is greater than the right-hand side. Therefore, there is a unique $\eta^* \in [0, 1]$ that solves the equation, and the corresponding c^* is equal to $\eta^*\bar{c}$. ■

Proof of Proposition 3: Defining $G \equiv \frac{b^2}{\sigma_V^2}$, we can rewrite the marginal investor's participation condition as $F(\sigma_M^2, \eta) = 0$, where

$$F(\sigma_M^2, \eta) \equiv \eta\bar{c} - \frac{1}{2\gamma}\left\{\frac{G\,(\delta\bar{V} + \bar{x} - \gamma\delta\alpha\beta\sigma_M^2)^2}{(1 + G\sigma_x^2)} + ln(1 + G\sigma_x^2)\right\}.$$

Based on the implicit function theorem,

$$\frac{\partial\eta}{\partial\sigma_M^2} = -\frac{\frac{\partial F(\sigma_M^2,\eta)}{\partial\sigma_M^2}}{\frac{\partial F(\sigma_M^2,\eta)}{\partial\eta}} = -\frac{\frac{\partial F(\sigma_M^2,\eta)}{\partial G}\frac{\partial G}{\partial\sigma_M^2} + \frac{\delta\alpha\beta G\,(\delta\bar{V} + \bar{x} - \gamma\delta\alpha\beta\sigma_M^2)}{(1 + G\sigma_x^2)}}{\bar{c} + \frac{\partial F(\sigma_M^2,\eta)}{\partial G}\frac{\partial G}{\partial\eta}}.$$

The assumption that $\bar{c}$ is sufficiently large guarantees that the denominator is greater than zero. As for the numerator, we have

$$\frac{\partial F(\sigma_M^2,\eta)}{\partial G} = -\frac{1}{2\gamma}\left\{\frac{(\delta\bar{V} + \bar{x} - \gamma\delta\alpha\beta\sigma_M^2)^2}{(1 + G\sigma_x^2)^{\,2}} + \frac{\sigma_x^2}{1 + G\sigma_x^2}\right\} < 0.$$

Further, based on the assumption $\gamma\delta > \frac{1}{\sigma_V^2}$, we have

$$\frac{\partial G}{\partial\sigma_M^2} = \frac{G\beta^2(\frac{1}{\sigma_V^2} - \frac{\gamma\delta}{\eta})}{1 + \frac{\gamma\delta}{\eta}\sigma_V^2} < 0.$$

Hence, the assumption $\alpha < \frac{\delta\bar{V} + \bar{x}}{\gamma\delta\beta\sigma_M^2}$ is a sufficient condition to guarantee that

$$\frac{\partial F(\sigma_M^2,\eta)}{\partial G}\frac{\partial G}{\partial \sigma_M^2}+\frac{\delta\alpha\beta G\,(\delta\bar{V}+\bar{x}-\gamma\delta\alpha\beta\sigma_M^2)}{(1+G\sigma_x^2)}>0,$$

implying that the participation rate η^* is decreasing in political uncertainty captured by σ_M^2.

Because an increase in σ_M^2 leads to an increase in σ_V^2, it is trivial to see that investors' trading strategies are less sensitive with respect to the equity premium, $\bar{V}-P$. Further, the hedging demand, -$\frac{\gamma\alpha\beta\sigma_M^2}{\sigma_V^2}$, is decreasing in σ_M^2, indicating that investors want to sell more as σ_M^2 increases.

Finally, the average trading amount is:

$$E[\theta_i]=\frac{1}{\gamma\sigma_V^2}\,(E[V-P]-\gamma\alpha\beta\sigma_M^2)=\frac{1}{\eta+\gamma\delta\sigma_V^2}(\delta\bar{V}+\bar{x}-\,\alpha\beta\gamma\delta\sigma_M^2).$$

It is trivial to see that $\delta\bar{V}+\bar{x}-\,\alpha\beta\gamma\delta\sigma_M^2$ is decreasing in σ_M^2. In addition, we have $\frac{\partial(\eta+\gamma\delta\sigma_V^2)}{\partial\sigma_M^2}=\frac{\partial\eta}{\partial\sigma_M^2}+\gamma\delta\beta^2$, which is positive if $\bar{c}$ is sufficiently large. Hence, $E[\theta_i]$ is decreasing in σ_M^2. ■

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