Political Uncertainty and Household Stock Market Participation

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Using a unique micro-level panel dataset, we relate households' stock market participation to political uncertainty. We find that households significantly reduce their stock market participation during periods of increased political uncertainty preceding state gubernatorial elections. The magnitude of the decline in participation varies with labor income risk due to hedging demand. In certain situations, pre-election drops in participation are followed by a partial increase in post-election years as the uncertainty over political outcomes subsides, reflecting a real distortion. Our findings suggest that political uncertainty can create a negative externality in financial markets.

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1. Introduction

Low levels of household stock market participation are one of the major challenges of household finance and have potentially large economic and welfare effects (Campbell, 2006). Despite the diversification benefits and significant risk premium involved in stock investment, only forty to fifty percent of U.S. households participate in the stock market directly or indirectly.[1] Traditional explanations for limited stock market participation include fixed participation costs and non-standard preferences (e.g., Dow and Werlang, 1992; Haliassos and Bertaut, 1995; Vissing-Jorgensen, 2003; Ang, Bekaert, and Liu, 2005). Since limited stock market participation has a direct impact on the level of the equity premium (e.g., Mankiw and Zeldes, 1991; Campbell, 1993; Constantinides and Duffie, 1996; Vissing-Jorgensen, 1999; Heaton and Lucas, 2000), on the volatility of asset prices (Allen and Gale, 1994), and on wealth inequality (Favilukis, 2013), identification of the determinants of stock market participation is important. In this paper, we show that political uncertainty is another important factor that affects households' stock market participation.

The topic of political uncertainty has drawn increased attention from policy makers, academics, and the media. Political uncertainty is related to the range, likelihood, and impact of future government policy outcomes. The magnitude of uncertainty relates to who will make these decisions, what policy actions will be undertaken, 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; Jens, 2017; Çolak, Durnev, and Qian, 2017), surprisingly little is known about its influence on households. We seek to fill this gap in the nascent literature by investigating, both

[1] Survey of Consumer Finances (https://www.federalreserve.gov/econres/scfindex.htm), Hong, Kubik, and Stein, 2004, Giannetti and Wang, 2016.

empirically and theoretically, if and how political uncertainty affects households' stock market decisions.

Our theoretical framework predicts that an increase in political uncertainty reduces households' participation in the stock market for two reasons. First, it causes an increase in asset risk (Brogaard and Detzel 2015; Pástor and Veronesi, 2013) and hence induces a speculative demand, leading households to reduce their stock investment. Second, it increases households' labor income risk, thereby induces a hedging demand for households to sell stocks. 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; therefore, political uncertainty associated with elections cause an increase in households' labor income risk. The simultaneous impact of political uncertainty on firms' stock returns and households' labor income results in a positive correlation between the two, which incentivizes households to sell stocks to hedge their labor income risk. Consistent with the theoretical 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 households' 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 it allows us to control for household fixed effects and therefore to eliminate compositional problems caused by unobserved household characteristics that are constant over time. Utilizing the 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 equity investment as a fraction of the households' total liquid wealth (defined as the sum of stockholdings and safe assets, such as bonds, checking accounts, and savings accounts).

The SIPP data includes 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., Atanassov, Julio, and Leng, 2016; Bird, Karolyi, and Ruchti, 2017; Çolak, Durnev, and Qian, 2017; Jens, 2017). Compared with presidential elections, gubernatorial elections have several advantages. First, while presidential elections create nationwide political uncertainty, gubernatorial elections lead to statewide political uncertainty that have stronger localized effects. Second, unlike presidential elections that are held once every four years nationwide, gubernatorial elections in different states are staggered and held in different years. Third, unlike presidents, state governors have varying 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 households' 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 households' stock market participation. State governments have substantial power in shaping the state's economic environment through policies on taxes, subsidies, state budget, and wages. The economic environment shaped by these policies, in turn, impacts businesses and households.[2] Because gubernatorial election dates are pre-

[2] In particular, each state's executive branch is headed by a governor, whose powers 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 may allow the governor to circumvent the state legislature.

scheduled and not controlled or affected by households, they can therefore be viewed as mostly exogenous events; as a result, using gubernatorial election cycles as a source of political uncertainty mitigates endogeneity concerns that changes in equity participation may 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.

Our DD setting alleviates the concern that the relation between political uncertainty and households' stock market participation is affected by nationwide economic conditions. However, it may not fully control for state-level economic conditions affecting the participation decision. Therefore, we control for several state-level business cycle variables (GDP growth, unemployment rate, housing market) as well as year and state fixed effects. It is important to note that the year fixed effects also capture nationwide stock market participation, implying that our estimate captures the marginal effect of a state's gubernatorial election on households in that state. Since households may 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 households' demographics, we utilize joint *state-year* fixed effects in a *triple difference* setting (DDD). This framework controls for the impact of latent unobservable state-level shocks or trends and helps us understand the mechanisms driving the effect of political uncertainty on households' stock market participation.

We find a significant 3.5% decrease in the participation rate, and a 5.8% decrease in the percentage of liquid wealth invested in the stock market for households in states with an upcoming

gubernatorial election (treated group), relative to households in states without an upcoming election (control group). These effects 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 households' 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. Furthermore, we find that in the face of increased political uncertainty, households move their capital from the stock market to safer assets such as savings account and bonds.

Our theoretical model identifies two channels through which an increase in political uncertainty leads to a reduction in households' stock mark participation: 1) an increase in asset risk reduces the speculative demand; and 2) an increase in labor income risk increases the hedging demand to sell the stock. Our setting of gubernatorial elections (as opposed to presidential elections) enables us to classify firms into in-state and out-of-state groups, and therefore allows us to examine the differences in households' investments in these two groups of firms. In-state firms become riskier due to the political uncertainty associated with home state elections than the out-of-state firms (Bird, Karolyi, and Ruchti, 2017; Boone, Kim, and White, 2017). Hence, in-state stocks become less attractive when home state elections are upcoming. Furthermore, because of the higher correlation between the performances of in-state firms and the labor income of in-state households, home state elections should also induce a stronger hedging demand by households to sell in-state stocks. The combination of changes in both the speculative and hedging demands jointly reduce households' in-state investments more than their out-of-state investments.

Because the SIPP data does not provide information about the specific stocks in which households invest, to test the aforementioned prediction, we use data on households' equity

holdings from a large discount brokerage firm for the period from 1991 to 1996. Specifically, we examine the investments of households in their in-state and out-of-state stocks prior to gubernatorial elections. Consistent with the theoretical prediction, we find that gubernatorial elections have a significantly greater negative impact on in-state investments than on out-of-state investments.

We conduct a second test to further investigate if households reduce their stock market participation to hedge their labor income risk. For this purpose, we exploit the heterogeneity in household demographics related to the labor income risk, which are available in the SIPP data. We posit that households employed in public sectors or self-employed in politically sensitive industries are subject to greater employment or labor income risk during periods of heightened political uncertainty. Using the triple difference (DDD) design, we find that these households reduce their stock market participation more due to hedging demand in response to political uncertainty.

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 the stock market participation by households. We find results consistent with this prediction. For the overall sample of elections, the pre-election decrease in stock market participation is almost the same as the post-election increase, suggesting a complete reversal in participation. However, for the subsample of elections where the governor's party changes, we observe a less than complete reversal. This evidence is again consistent with uncertainty affecting participation since, in this subsample, there is relatively lesser resolution of uncertainty after the election. This, in turn, implies that political uncertainty can have a long-lasting disruptive effect on households' stock market participation.

To our knowledge, our paper is among the first studies to examine the extent to which political uncertainty affects households' stock market participation. We document a new stylized fact regarding household behavior, namely, a tendency to reduce stock market participation when political uncertainty increases. We identify political uncertainty with the help of exogenous and staggered nature of gubernatorial elections, which allows us to provide relatively clean evidence on the portfolio decisions of households. Furthermore, by documenting how the dampening effect of political uncertainty varies in the cross section, we reveal the mechanisms by which uncertainty affects both households and financial markets. Finally, our investigation into how this relation evolves through time demonstrates that political uncertainty can in certain situations cause long-lived distortions and thus create a negative externality in financial markets.

The rest of the paper proceeds as follows. Section 2 briefly summarizes the theoretical model and discusses the predictions that motivate the empirical tests. Section 3 describes the data and construction of the key variables. Section 4 presents the effects of political uncertainty on households' stock market participation. Section 5 investigates how our results vary cross-sectionally with asset risk and labor income risk. Section 6 examines the post-election dynamics of stock market participation. Section 7 provides some robustness tests. Section 8 discusses the implications and concludes. The appendix includes the theoretical model that illustrates the effect of political uncertainty on households' stock market participation decisions.

2. Motivation and Hypotheses

To motivate our empirical analysis, we consider a stock trading model with political risk that incorporates participation costs and a demand to hedge labor income risk. Although there is a large literature on the interaction between labor income and stock investment, most of the papers in the

literature are dynamic partial equilibrium models that take the stock return process as exogenously given (for example, see Merton, 1971; Bertaut and Haliassos, 1997; Heaton and Lucas, 1997; Koo, 1998; Viceira, 2001; and Cocco, Gomes, and Maenhout, 2005). On the other hand, recent theoretical models on political uncertainty and asset prices, such as Pástor and Veronesi (2012, 2013), endogenize asset prices in the absence of participation and labor income. We endogenize participation and the stock return by analyzing an ad hoc one-period model a 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 the propensity and intensity of households' stock market participation. Below 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. Gubernatorial elections increase political uncertainty, which, in turn, increase the risk of the stock return and the risk of households' labor income. There are two forces that reduce households' investment in the stock. First, an increase in asset risk makes stocks less attractive. Second, an increase in labor income risk provides households with stronger incentives to sell stocks to hedge their labor income. Because the average equity premium is positive, a reduced investment in the stock market means that the benefit of owning stocks becomes smaller; consequently, households whose participation cost is high enough decide to leave the market. Therefore, an increase in political uncertainty leads to a reduction in both the propensity and intensity of stock market participation.

In addition to the aggregate effect, the theoretical model also provides predictions for

households with different levels of labor income risk. When households differ in their labor income exposure to political uncertainty, those with higher labor income exposure have stronger incentives to hedge, so they demonstrate a sharper reduction in the propensity and intensity of stock market participation.

Overall, the model predictions enable us to generate two testable hypotheses related to gubernatorial elections: 1) at the aggregate level, elections increase political uncertainty and reduce households' stock market participation; and 2) across different households, those with higher labor income exposure demonstrate a greater reduction in participation as a reaction to upcoming elections. The heterogeneous effects across different households, especially those with different exposures of labor income to political risk, show that, in addition to increased asset risk, labor income hedging is also a driving force that causes fluctuations in stock market participation around gubernatorial elections.

3. Data and variable construction

3.1. SIPP panel data

Our sample of households is drawn from the 1996, 2001, 2004, and 2008 panels of the micro-level longitudinal Survey of Income and Program Participation (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

[3] Each SIPP panel is a multi-stage 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 percent of the U.S. population. The survey uses three different approaches to deal with missing data to correct for non-responses https://www.census.gov/programs-surveys/sipp/methodology/data-editing-and-imputation.html.

built around a core set of questions on demographic attributes, employment and income, and business ownership. Moreover, each panel also includes topical modules, which 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 and include only heads of households who are 18 years or older. Our final sample of households includes 359,260 household-year observations for 152,095 unique households.

As is common in the literature (e.g., Guiso, Sapienza, and Zingales, 2008; Giannetti and Wang, 2016; Chetty, Sándor, and Szeidl, 2017), 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 (i.e., propensity of participation). 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, checking and savings accounts, exclusive of retirement accounts.

Following prior literature (Hong, Kubik, and Stein, 2004; Kozak and Sosyura, 2015; Chetty, Sándor, and Szeidl, 2017), we exclude stock investments in households' pension accounts or 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).

It is important for our analysis to ensure that we capture households' stock market participation before the gubernatorial elections. Households are interviewed every year about their stock market investments in separate groups, which are called rotation groups. Each rotation group is interviewed during one of the months during the year where the months vary between May and November. Since the gubernatorial elections are typically held in November, our data allows us to measure households' stock market participation (both propensity and intensity) prior to the elections. Specifically, households report their stock investments (part of the assets and liabilities included in the topical module of the SIPP survey) ending in the month prior to the interview month. For example, if a household group is interviewed during October 2005, SIPP survey reports their investments as of September 2005. We find stronger results (not tabulated) when we confine the interview months to be between August and November of the election year. This is consistent with the uncertainty peaking as the election approaches.

Our data identify a worker's employer, the employer's 3-digit Census Industry Classification (CIC), and the Integrated Public Use Microdata Series (IPUMS) code for the worker's occupation. This data allow us to test the prediction from our theoretical model that households with higher exposure to labor income risk during periods of heightened political uncertainty will reduce their stock market participation more due to hedging demand. We use two proxies to capture heterogeneity in labor income risk: one binary variable for public sector (state or local government) employees (*Government employee)* and a second binary variable for those who are self-employed in politically sensitive industries (*Business owner in PSI*). Following Herron et al. (1999), we classify businesses operating in transportation, warehousing, utilities, public administration, educational, health and social services, and mining as politically sensitive.

Finally, our empirical specification recognizes additional individual characteristics that may

impact stock market participation. We consider a wide set of variables that are available in our survey such as total wealth, age, education, financial literacy, race, gender, and marital status (Haliassos and Bertaut, 1995; Guiso and Jappelli, 2002; Campbell, 2006). We compute *Total wealth* for each respondent in our sample, which includes financial assets as well as all real estate (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. We categorize age as *Old* (those with heads of household above 60), *Middle aged* (those with heads of household between 35 and 60), and *Young* (those with heads of household between 18 and 34). We provide variable definitions in the Data Description preceding the tables.

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.[4] If we include stocks held in IRA/401K/Keogh accounts, the percentage of households owning stocks or mutual funds rise to 39%. The mean total wealth of all respondents is about $139,000 and significantly exceeds the median total wealth (of about $66,000), indicating a significant right skew in the distribution. The mean liquid wealth is about 17% of the mean total wealth and is also significantly right skewed. Respondents' principal source of non-financial wealth is from home equity, and there is non-trivial equity in other real estate assets. As for education, 39% of the respondents have not gone beyond high school and 70% have not completed college. In terms of demographics, 18% are African-American, 51% are female,

[4] Our sample summary statistics are comparable to those in Chetty, Sándor, and Szeidl (2017) (see Appendix DI), where they find 19.18% of households hold stocks and 12.27% of households' liquid wealth invested in stock market for the 1990 to 2008 SIPP data. As in their case, we include households that do not participate at all in the stock market while computing the average stock investment as a fraction of households' liquid wealth.

53% are married, and 19% are in the 18-34 age group, while 30% belong to the above 60 age group. Finally, 4.1% of the households are employed in a finance-related job, 4% of households own businesses in politically sensitive industries, and 8.6% hold a job in state or local government.

3.2. Election data

Gubernatorial elections are pre-scheduled and thus exogenous to households' investment decisions. Unlike presidential elections, gubernatorial elections in different states occur in different years, creating substantial across-state variations. Currently, the majority of the states hold gubernatorial elections every four years, with the exception of Vermont and New Hampshire, which choose to 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 other states run their gubernatorial elections in even-numbered years. Thirty six states have term limits for governors, while the remaining fourteen states do not have term limits. 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 households' 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 dataset includes more than nine-hundred variables, with observations across the U.S. 50 states, from 1990 to 2016. These variables cover a broad range of political, social, and economic factors that may influence policy differences across the states (Jordan and Grossman, 2016). We augment the CSPP data with hand-collected vote margin and political party-affiliation data.

The SIPP data masks the identification of four small states (North Dakota, South Dakota, Maine, and Vermont) to help protect the confidentiality of respondents, leaving us 190 gubernatorial

elections in our IPPSR sample between 1996 and 2011. *Election* is a binary variable that is equal to one if a state elects a governor in a year, and zero otherwise. *Presidential* is a binary variable that is equal to one if a presidential election occurs in a year, and zero otherwise. Following the identification of Julio and Yook (2012) and Jens (2017), we classify an election as being more uncertain if it is a close election, where the victory margin — defined as the difference between the percentage of votes obtained by the first and second place candidates — is in the lowest sample tercile. We also distinguish elections where incumbents are eligible for re-elections from those where incumbents face term limits (*Lame duck last term*). As expected from our bottom tercile cut off, 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-elections 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.

3.3. State macro data

We use data on state unemployment (*Unemployment*), state GDP growth (*State GDP growth*), and appreciation in state housing prices (*State HPI appreciation*) to proxy for each state's time-varying economic conditions. We obtain the annual state unemployment data from the Bureau of Labor Statistics (BLS), annual state GDP growth data from the Bureau of Economic Analysis (BEA), and State HPI appreciation data from the Federal Housing Finance Agency. Untabulated results indicate that, during our sample period, the average state-level GDP growth, unemployment rate, and appreciation in HPI are 2.5%, 5.6%, and 3.5%, respectively.

4. Political uncertainty and stock market participation

In this section, we examine the relation between households' stock market participation and political uncertainty generated by gubernatorial elections. We start with the baseline model in Section 4.1, followed by investigations in Section 4.2 of close elections and elections where incumbent governors cannot stand for re-elections. In Section 4.3, we explore the reallocation of capital by households during election cycles.

4.1. Baseline model and results

We employ a standard difference-in-differences (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 treatment and control states at a given point in time) and to net out any pre-existing differences between states and 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 in the model specification. To the extent that the omitted variables affect the treatment group and the control group in a similar way, we can still separate out the effect of political uncertainty in a DD estimation. Specifically, we estimate the following empirical model:

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

Our dependent variable, $StockMktPart_{i,s,t}$, measures the stock market participation of household *i* in state *s* and period *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 period *t*, and zero otherwise. This variable captures the propensity of a

household to participate in the stock market. The second one, $\%Stockshare_{i,s,t}$, 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 period *t*.[5] Our key variable of interest is $Election_{s,t}$, and it takes the value of one if state *s* in period *t* holds a gubernatorial election, and zero otherwise.

Following the literature (e.g., Giannetti and Wang, 2016; Chetty, Sándor, and Szeidl, 2017), the vector of control variables, $\mathbf{X}_{i,s,t}$, includes a rich set of time-varying household- and state-level variables that have been shown to impact both the propensity and intensity of households' stock market participation. The household variables are total wealth, age, education level, marital status, business ownership, government employment, financial occupation, race, and gender. The state-level variables are state GDP growth, state unemployment rate, and state housing price index (*HPI*) growth rate. The control variables 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 double clustered by state and year to account for the time-series correlations in households' decisions to participate in the stock market

[5] 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. For example, a gubernatorial election was held on November 1998 in New Hampshire whereas a sample of SIPP households were asked questions over their assets and liabilities in October 1998. In this setting, we deem these respondents to be in an on-election year relative to this election. Similarly, those households for which the answers are provided as of November 1998, are deemed to be off-election year relative to the November 1998 election.

from the same state and the cross-sectional correlations for households across states in the same year.

Table 3 presents the results for the DD estimation in equation (1). The first two columns report results for the regressions with *Participation* as the dependent variable (i.e., whether a household participates at all in the stock market). Estimated slope coefficients on *Election* are all negative and significant at the 5% or 10% level (coefficients are –0.008 and –0.007 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 70 to 80 basis points, which implies a decrease of 3.1% to 3.5% 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, (3) and (4), of Table 3. Estimated slope coefficients on *Election* continue to be negative and significant at the 5% level or 1% level (coefficients equal to –0.005 and –0.006 in 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 50 to 60 basis points in an election year, which corresponds to a 4.8% to 5.8% 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 control variables are broadly consistent with the prior literature. Heads of households who are married, better educated, wealthier, and between 18 and 60 tend to have higher

stock market participation (Grinblatt, Keloharju, and Linnainmaa, 2011; Giannetti and Wang, 2016).

Among state-level economic variables, state GDP growth and state HPI are positively related to stock market participation, while the sign on state unemployment rate is negative. This finding is intuitive, as 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 households' stock market participation. Overall, our baseline results show that increased political uncertainty associated with gubernatorial elections leads to decreased participation in the stock market, reflected by both a lower average investment in the stock market and a decreased percentage of households owning stocks or mutual funds.

4.2. Further evidence from close elections and term limits

Following Atanassov, Julio, and Leng (2016), Bird, Karolyi, and Ruchti (2017), and Jens (2017), we identify two scenarios that are likely to be associated with greater political uncertainty. These include close elections and elections where incumbents are not standing for reelections 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 households' stock market participation in both of these cases.

Close elections are less predictable and indicate greater dispersion of opinion among households. They therefor represent a higher level of political uncertainty *ex-ante*. We define *Close election* as one where the vote difference between the first and second place candidates is in the

lowest tercile, and our variable takes a value of one in such cases, and zero otherwise. For brevity, we present only the estimated coefficients on the *Election* and the *Close election* from the DD estimation for stock market participation in Table 4. The estimated coefficients on *Election* remain, as in Table 3, negative and significant, ranging from –0.004 to –0.006 in Columns (1) through (4). The coefficient on the *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 coefficients of –0.015 and –0.017 in Columns (1) and (2) indicate an additional decrease of 150 and 170 basis points (over and above the 60 and 50 basis points for non-close elections) in the percentage of households with any investment in stocks. Therefore, the total effect of a close election is a decrease of 210 to 220 basis points in the propensity of households' stock market participation. These figures correspond to a 9.4% to 9.8% 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 a household's liquid wealth invested in the stock market in Columns (3) and (4) (*% Stock share*). Both models indicate that close elections cause an additional decrease of 90 basis points in the percentage of liquid wealth invested in the stock market. The total effect adds up to a decrease of 130 to 140 basis points (after adding the 50 and 40 basis point effect for non-close elections), which represents a 12.5% to 13.5% relative decrease in the mean percentage of liquid wealth invested in the stock market (10.4%).

Moving on to our second case associated with greater political uncertainty, we investigate term limits that prevent incumbent governors from seeking re-elections. 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 last term and soon to be replaced by a new governor and new administration. 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 in a given election year, and zero otherwise.

Table 5 presents the results. For brevity, we only report estimated coefficients on the *Election*, *Lame duck last term*, and the interaction term between *Election* and *Lame duck last term*. As in earlier specifications, the coefficient on *Election* continues to be negative. The interaction term between *Election* and *Lame duck last term* has a negative coefficient ranging from –0.008 to –0.011 in Columns (1) through (4), all of which are highly significant at 1% level. This shows the incremental effect of political uncertainty on stock market participation in election years where incumbent governors are serving their last terms. Moreover, the *Lame duck last term,* by itself, does not have a significant relation with households' stock market participation. This suggests that the fact that a governor is in his or her lame duck term does not affect households' stock market participation except during the gubernatorial election years when the uncertainty of change is looming. Overall, prior to the election that determines the lame duck's successor, a household's stock market participation decreases by 160 to 170 basis points, 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 100 to 130 basis points. These imply a 7.2% to 7.6% relative decrease in the unconditional participation rate (22.3%) and a 9.6% to 12.5% relative decrease in the unconditional percentage of liquid wealth invested in the stock market (10.4%).

Taken together, 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.

4.3. 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 do households facing such uncertainty reallocate their assets? Does political uncertainty trigger flight-to-safety activities? Does it instigate households to switch their stock investments into non-financial assets such as real estate and vehicles?

To address these questions, we define three new variables: (1) $\%\ Safe\ asset^{W}$ as the percentage of total wealth invested by the households in safer assets — such as government securities, municipal bonds, corporate bonds, money market deposit accounts, checking accounts, savings accounts; (2) $\%\ Stock\ share^{W}$ as a percentage of total wealth invested by the households in stocks and mutual funds; and (3) $\%\ Illiquid^{W}$ as the percentage of total wealth invested by households in illiquid assets — such as real estate, vehicles, private businesses, etc. We then estimate the regression in equation (1) using the independent variables and specifications in Table 3, but this time we use $\%\ Safe\ asset^{W}$, $\%\ Stock\ share^{W}$, and $\%\ Illiquid^{W}$ as our dependent variables. Note that 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 the 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 safe assets because these two fractions no longer add up to one in the presence of illiquid assets.

Columns 1 and 2 in Table 6 show that households reduce their stock investments by 4.4% (at the mean of 2.7%), while increasing their investments in safe assets by 5.7% (at the mean of 19.1%). We do not find that political uncertainty has significant impact on households' investments in illiquid assets. These results suggest that households in states with upcoming elections are more likely to shift from risky to safe liquid assets instead of to illiquid assets in the period leading up to an election.

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

Our results so far show that political uncertainty dampens the households' stock market participation. In this section, we test the prediction from our theoretical model that households alter their stock market participation to reduce exposure to asset risk and to hedge the labor income risk when they face political uncertainty. We employ two tests. The first test, reported in Section 5.1, exploits the cross-sectional variation in the in-state versus out-of-state stock investments of households that have elections in their states. The second test, reported in Section 5.2, uses the cross-sectional variation in the exposure of the households' to labor income risk.

5.1. In-state and out-of-state investments

Prior research has shown that political uncertainty can influence the real behavior of in-state firms. The theoretical model gives us two reasons to expect that gubernatorial elections in households' home state affect their "in-state" investments more than their investments in other states ("out-of-state") that do not have upcoming elections. First, gubernatorial elections are likely to increase the risk of in-state firms more than out-of-state firms (Bird, Karolyi, and Ruchti, 2017;

Boone, Kim, and White, 2017).[6] This, in turn, reduces the attractiveness of in-state stocks, and therefore reduces the speculative demand of households. Second, the correlation between households' labor income and the performance of in-state firms is higher than the correlation between households' labor income and the performance of out-of-state firms. To hedge the exposure of labor income to political uncertainty, households have greater incentives to reduce their investments in in-state firms than in out-of-state firms.

Since we need to examine the changes in households' in-state and out-of-state equity holdings, which we do not observe in the SIPP data, we use information from a large discount brokerage firm for the period 1991 to 1996.[7] These data provide monthly information on common stock holdings for a large panel of households residing in different states. A series of papers use this data to study households' investments (Barber and Odean, 2000; Barber and Odean, 2001; Barber and Odean, 2002; Kumar, 2009; Giannetti and Wang, 2016). While the brokerage data has the advantage of stock-specific information, it also has two limitations that can undermine the statistical power of our empirical tests. First, the data is not as recent as the SIPP data and there is only an overlap of one year between the two datasets. Second, the data spans over a shorter time period and does not cover as large a cross section of households as the SIPP data. Nevertheless, in absence of more recent and more comprehensive data, we attempt to provide the best possible evidence using the brokerage data.

[6] Using gubernatorial elections, Boone, Kim, and White (2017) show an increase in abnormal return volatility and implied volatility for the firms headquartered in election states compared to the firms in non-election states. In addition, their paper and Bird, Karolyi, and Ruchti (2017) document a greater decrease in stock liquidity (and therefore higher illiquidity risk) for firms in election states.

[7] We thank Brad M. Barber and Terrance Odean for sharing this data with us.

Our analysis in this section is similar to that in Giannetti and Wang (2016). We compute the percentage changes in in-state and out-of-state equity holdings for household *i* at the end of month *t* with holdings in *j* stocks as follows:

$$\Delta holding_{i,t}^{k} = \sum_{j} p_{j,t-12}\left(holding_{i,j,t} - holding_{i,j,t-12}\right) / \sum_{j} p_{j,t-12} holding_{i,j,t-12}, \qquad (2)$$

where $k = \{\text{in-state, out-of-state}\}$. Note that we fix the price of stock *j*, $p_{j,t-12}$, lagged by twelve months. We do so to capture *active* changes in households' equity holdings (i.e., changes in number of shares) as opposed to passive changes in holdings due to stock price fluctuations. To be consistent with our previous analysis using the SIPP data, we compute the changes in in-state and out-of-state equity holdings during the one-year period prior to the interview months in the SIPP data (May to November; see Section 3.1).

Next, we analyze the effect of political uncertainty on in-state and out-of-state holdings separately using $\Delta holding_{i,s,t}$ as our dependent variable and controlling for state-level time-varying macroeconomic factors —unemployment rate, GDP growth, and housing price index. We include year fixed effects in the regression and cluster the standard errors only by households due to the short time-series of the panel data.

Table 7 presents the results. We find a statistically significant decrease in in-state, but not in out-of-state investments in election years, and the difference between the two is also significant. We find that households reduce their in-state equity holdings by 7.7% relative to an average holding of 24.1%. In contrast, the decline in out-of-state equity holdings is only 1.8% relative to an average of 27.1%.

5.2. Households with different labor income exposures to political uncertainty

Households are likely to differ from each other with respect to the risk that political uncertainty presents to their labor income. This may be particularly important in our gubernatorial election

setting given that Cahan (2017), for instance, finds that governors and their party allies may have the ability to raise employment levels leading up to elections, or delay employment-reducing decisions until afterwards.[8] In the two quarters following the election, Cahan (2017) documents that state and local government employment growth is generally lower by similar magnitudes in those counties that have just experienced an election compared to those that did not, and such effects are absent in private sector employment. In a similar vein, households who are self-employed in politically sensitive industries are more susceptible to changes in political landscape than others (Kostovetsky, 2015). Because households with a greater labor income exposure to political risk have stronger incentives to hedge the exposure, we expect the reduction in stock market participation to be more pronounced for households employed by state and local government and for those operating a business in politically sensitive industries, compared to other households.

We examine the different sensitivities to political uncertainty in the cross-section of households with different labor income risk by estimating the following regression:

$$StockMktPart_{i,s,t} = \phi_0 + \phi_1 Election_{s,t} \times \mathbf{Z}_{i,s,t} + \mathbf{Z}'_{i,s,t}\,\phi_2 + \nu_{s,t} + \alpha_i + \varepsilon_{i,s,t} \quad (3)$$

where $\mathbf{Z}_{i,s,t}$ is a vector of demographic characteristics (employment, business ownership, wealth, age, gender, race, marital status, and education) for household *i* from state *s* in period *t*, $Election_{s,t} \times \mathbf{Z}_{i,s,t}$ is the interaction of $Election_{s,t}$ and $\mathbf{Z}_{i,s,t}$. Because we are now differentiating the effects of political uncertainty among households with different labor income risk, unlike equation (1), we can include joint state-year fixed effects, $\nu_{s,t}$, as well as household fixed effects, α_i.

[8] Anecdotal evidence of manipulation by governors abounds. During his re-election campaign in 2014, Connecticut governor Dannel Malloy dismissed nonpartisan reports of a growing budget deficit only to announce a statewide freeze on hiring for all positions not "essential for critical agency operations" and on state contracting only two weeks after winning the re-election. Republican lawmakers accused Malloy of misleadingly delaying the bad news until after the election (see http://www.courant.com/politics/hc-malloy-hiring-freeze-state-agencies-20141113-story.html).

Through state-year fixed effects, we can exploit within-state cross-sectional variation in households' sensitivities to political uncertainty and absorb any time-varying state-level latent shocks (including state economic conditions) that could be correlated with stock market participation and make our estimates spurious.

Table 8 presents the results for cross-sectional differences in the effect of political uncertainty on household stock market participation. For brevity, we only report the interaction terms between different demographic characteristics and *Election* in the table. We report the results for our two dependent variables, the stock market participation and the percentage of liquid wealth invested in the stock market, Columns (1) and (2), respectively. We expect greater dampening effects of political uncertainty on equity participation for households with higher labor income risk, i.e., those employed in state and local government and for those who own businesses in politically sensitive fields. Following Herron et al. (1999), we classify businesses operating in transportation, warehousing, utilities, public administration, educational, health and social services, and mining as politically sensitive. We set the *Government employee* and *Business owner in PSI* dummies to one for state and local government employees and for business owners in politically sensitive industries, respectively. We then interact these dummy variables with the election year dummy to measure the cross-sectional differences in such households' sensitivity to political uncertainty. We observe that state and local government employees and business owners in politically sensitive industries decrease their participation rate by 40 and 30 basis points on average based on Column (1) estimates. These results support the prediction that households with higher labor income risk (those employed in public sectors and business owners operating in politically sensitive industries) are particularly sensitive to changes in political uncertainty.

In addition to the two variables we discussed above, other household characteristics are also related to the exposure of labor income to political uncertainty. For example, well-educated and young households have more job mobility; wealthy households are less concerned about their labor income. As a result, younger, wealthier, and better-educated households do not need to hedge the exposure of labor income to political uncertainty as much as older, poorer, and worse-educated households, resulting in a lower sensitivity of stock market participation to elevated political uncertainty. Indeed, the estimated coefficients on the interaction terms of these variables and the *Election* dummy are by and large significantly positive. Having said that, it is possible that these variables may affect households' investment sensitivity to political uncertainty through other channels, such as different risk attitude or different information processing costs (e.g., see van Rooij, Lusardi, and Alessie, 2011; Cole, Paulson, and Shastry, 2014).

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

6. 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 is over, we expect the decline in stock market participation to be temporary. In this section, we test this expectation and examine the extent and duration of any post-election reversal in participation. A complete reversal would suggest that the uncertainty is only temporary and resolves quickly. In contrast, a partial reversal would indicate that uncertainty has a long-lasting disruptive effect on participation.

The magnitude of reversal should depend on the speed and degree of resolution in political uncertainty after the election. For elections where a new governor from a different political party is elected, we expect political uncertainty to remain high for a longer period of time than in the case of an election in which there is no change in governor or political party (i.e., when the incumbent wins re-election). With a new governor and/or party coming into power, it will take time before the new governor's policies pass the legislature and take effect, and the reversal in uncertainty should therefore be slower than in elections in which the incumbent governor wins the re-election. 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).

Following the methodology in 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 a 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 party switch has an incremental effect on the post-election participation, we also interact both *Election* and *Post-election* variables with a binary variable, *Party switch*, which takes the value of one for elections where the political party of the elected governor differs from the party of the outgoing governor, and zero otherwise.

We report the results in Table 9. As in previous analyses, Columns (1) and (2) show the findings for the propensity of investing 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 *Election* dummy are significantly negative in all specifications, confirming our previous finding that participation decreases in the election year. Second, the coefficient estimates on *Post-election*

dummy are significantly positive in all specifications, indicating a post-election increase in stock market participation.

Columns (1) and (3) estimate the average pre-election drop and post-election reversal in households' stock market participation across all elections. We observe a decrease in participation during the election year (coefficients of –0.007 and –0.005) followed by an increase till the next election (coefficients of 0.005 and 0.003). In Columns (2) and (4), we separately estimate the pre-election drop and post-election reversal for elections with and without party switch. For this purpose, we interact *Election* and *Post-election* dummies with the *Party switch* dummy. 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 0.011 (i.e., (–0.007) + (–0.004)) followed by an increase of 0.004 (i.e., 0.006 + (–0.002)).

To evaluate the net effect on stock market participation during the election cycle, we conduct a test on the estimated coefficients on 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 estimates in Columns (1) and (3), 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 where there is a party switch, the pre-election decline in participation is greater than the post-election increase in participation, i.e., a net reduction in stock market participation due to lower resolution in political uncertainty after party switches.

Taken together, these results show that there is a reversal in households' stock market participation after the election. Moreover, the magnitude of reversal depends on the speed and

degree of resolution in uncertainty after the election. Specifically, when there is a party change after the election, the reversal is slower, implying a long-lasting disruptive effect of uncertainty on households' stock market participation.

7. Robustness tests

In our tests, so far, we have focused on stock investment outside 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 *Participation* dummy (propensity of 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. In analyses not shown, our re-estimated models deliver very similar results, both qualitatively and quantitatively, to those of earlier findings on the propensity of 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 first and second place vote difference 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 over the period *prior* to the election. Although there is a generally high correlation between pre-election polls and the actual election outcomes, for robustness, we construct an alternative *ex ante* measure of closeness by utilizing the pre-election poll data from RealClearPolitics.com. We were able to hand-collect data on 1,859 polls for 104 elections that were conducted between 2002-2011. To measure closeness using poll data, we first compute the

difference in percentage vote received for the first and second candidates in each poll, and then average the poll vote differential for each gubernatorial election. As before, we define an election as close if the election's average poll differential is in the lowest sample tercile. This leaves 34 close elections out of 104 total elections with the average poll differential between the top two candidates being 3.75 percent. 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 ex-ante election closeness obtained from polls. We re-estimate our model as in Table 4 and find results (not tabulated) to be essentially identical.

8. Conclusions and implications of our findings

In this study, we exploit the cross-sectional and time-series variations among gubernatorial elections to investigate the effect of political uncertainty on households' stock market participation. We provide new evidence showing that political uncertainty reduces households' participation in the stock market. Our theoretical framework reveals two channels through which political uncertainty reduces households' participation. First, an increase in political uncertainty exacerbates asset risk and makes stocks less attractive to households. Second, it increases the households' labor income risk, which results in a hedging demand to sell stocks. Consistent with the theoretical predictions, we document three major findings. First, we observe that an increase in political uncertainty is associated with a significant decline in household stock market participation, whether measured by percentage of assets invested in the stock market or by percentage of households owning stocks or mutual funds. In the face of increased political uncertainty, households reallocate capital from the stock market to safer assets, such as savings account and bonds. Second, we show that variations in households' labor income exposure to

political uncertainty help explain the differential sensitivities of households' stock market participation 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 where there is a change in the party of the prior governor, there is only partial reversal since political uncertainty is not fully resolved, resulting in a long-lasting disruptive effect on households' stock market participation.

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. Since the equity risk premium is positive, a lack of participation in the stock market can significantly reduce households' wealth accumulation and retirement savings. In addition to the welfare implications for households, our findings also have implications for firms' ability to raise capital through equity markets in times of greater political uncertainty. If the demand for stocks is lower during periods of high uncertainty, then it is costlier for firms to raise capital, which might delay corporate investments. This in turn can worsen or slow down recovery from economic recessions as periods of high political uncertainty and economic downturns tend to coincide. Finally, our finding that wealthier households' stock investments are less sensitive to political uncertainty suggests that political uncertainty can contribute to income inequality. These implications are beyond the scope of this study but offer interesting avenues for future research.

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Variable Description

Variable Name	Description
Political uncertainty variables	
Close election	a binary variable equal to 1 if the vote differential (i.e., difference between the percentage of votes obtained by the first and second place candidates) for an election is in the lowest sample tercile of vote differential, and 0 otherwise.
Election	a binary variable equal to 1 if a state in a given year holds a gubernatorial election, and 0 otherwise.
Post-election	a binary variable equal to 1 for years after current gubernatorial election until the next gubernatorial election in a state, and 0 otherwise.
Lame duck last term	a binary variable equal to 1 if an incumbent governor is prevented from seeking re-election because of term limits, and 0 otherwise.
Party switch	a binary variable equal to 1 if the party of the new governor elected is different from the party of the outgoing one, and 0 otherwise.
Presidential	a binary variable equal to 1 for years when presidential elections are held, and 0 otherwise.
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, corporate bonds, money market deposit accounts, checking accounts, savings accounts.
% Illiquid^{W}	percentage of total wealth invested in illiquid assets — such as real estate, vehicles, private businesses etc.
Business owner in PSI	a binary variable equal to 1 if the household head owns a business in politically sensitive industries, and 0 otherwise.
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 for the household head in a finance-related occupation, and 0 otherwise.
Government employee	a binary variable equal to 1 if the household head is employed in a state or local government, and 0 otherwise.
High school or less	a binary variable equal to 1 if the household head has 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.
Middle aged	a binary variable equal to 1 if the household head's age is between 35 and 60, and 0 otherwise.

Old	a binary variable equal to 1 if the household head's age is 60 and above, 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, 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 drop-out, and 0 otherwise.
Total wealth	sum of financial assets, real estates, vehicles, and private business equity.
Young	a binary variable equal to 1 if the household head's age is between 18 and 34, and 0 otherwise.
Macro-level variables	
State HPI appreciation	percentage change in state's housing price index is the weighted index of single-family house prices obtained from Federal Housing Finance Agency.
State unemployment	state's number of unemployed as a percentage of the labor force.
State GDP growth	annual growth rate in state's GDP.

Table 1. Summary statistics: SIPP data

The sample includes households in SIPP for the 1996-2000, 2001-2003, 2004-2007, and 2008-2013 waves. All monetary values are in real 1996 dollars. 'Participation' is a binary variable equal to 1 if a household holds any stocks in publicly held corporations or mutual funds in a given period, and 0 otherwise. 'Participation (with IRA/401K/Keogh)' is a binary variable that equals 1 if the household holds any shares in publicly held corporations, mutual funds, including holdings in their retirement accounts, and 0 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 1 if the household head is a female, and 0 otherwise. 'Married' is a binary variable that equals 1 if the household head is married, and 0 otherwise. 'Young' is a binary variable that equals 1 if the household head's age is between 18 and 34 years, and 0 otherwise. 'Middle aged' is a binary variable that equals 1 if the household head's age is between 35 and 60 years, and 0 otherwise. 'Old' is a binary variable that equals 1 if the household head's age is at or over 60 years, and 0 otherwise. 'High school or less' is a binary variable that equals 1 if the household head has finished at most high school, and 0 otherwise. 'Some college' is a binary variable that equals 1 if the household head is a college drop-out, and 0 otherwise. 'College or more' is a binary variable that equals 1 if the household head has at least a college degree, and 0 otherwise. 'Financial occupation' is a binary variable that equals 1 for the household head in finance-related occupations, and 0 otherwise. 'Race' is a binary variable that equals 1 if the household head is white, and 0 otherwise. 'Government employee' is a binary variable that equals 1 if the household head is employed in a local or state government, and 0 otherwise. 'Business owner in PSI' is a binary variable if the household head is self-employed or owns a business in politically sensitive industries, and 0 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. 'Home equity' denotes the difference between the value of the household's property and the value of the household's mortgage. 'Equity in vehicles', 'Equity in other real estate', 'Business equity' are constructed as the difference between the value and total debt owed against the vehicle, other real estate (other than primary residence such as a vacation home or undeveloped lot), and business, respectively.

	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				
Young	359,260	0.189	0.000	0.391
Middle aged	359,260	0.521	1.000	0.499
Old	359,260	0.290	0.000	0.453
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
Government employee	359,260	0.086	0.000	0.281
Business owner in PSI	359,260	0.041	0.000	0.197
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 2013 in 46 U.S. states. 'Lame duck last term' is a binary variable that equals 1 if the incumbent governor is prevented from seeking re-election by term limits, and 0 otherwise. 'Party switch' is a binary variable that equals 1 if the party of the new governor elected is different from the party of the previous one, and 0 otherwise. 'Mid-year governor change' is a binary variable that equals 1 if there is a non-standard mid-year change in governors, and 0 otherwise. Non-standard means because of death, resignation, or impeachment. An election is called 'close' if the difference between the percentage of votes obtained by the first and second place candidates for an election is in the lowest sample tercile of vote differential.

	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 =1				
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 the gubernatorial elections to household stock market participation (Columns 1 and 2) and portfolio allocation (Columns 3 and 4). 'Participation' is an indicator variable that equals 1 if the household holds any stocks in publicly held corporations or mutual funds in a given period, and 0 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 0 otherwise. Omitted category in age is 'Old'. Omitted category for education is 'High school or less'. 'Total wealth' is in log-units. Other variables are as defined in the Data Description. All specifications include fixed effects as indicated in the table. Standard errors are clustered by state and year. *t*-statistics are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

	(1)	(2)	(3)	(4)
	Participation		% Stock share	
Election	–0.008**	–0.007*	–0.005***	–0.006**
	(–2.216)	(–1.875)	(–2.794)	(–1.980)
Married	0.025***	0.025***	0.021***	0.021***
	(5.192)	(5.375)	(3.719)	(3.782)
College or more	0.040***	0.040***	0.020***	0.020***
	(4.120)	(4.533)	(3.016)	(2.785)
Some college	0.012*	0.010	0.006	0.005
	(1.729)	(1.636)	(1.033)	(1.459)
Young	0.009*	0.007	0.006*	0.003
	(1.828)	(1.676)	(1.885)	(1.480)
Middle aged	0.016***	0.010**	0.008*	0.008*
	(3.525)	(2.251)	(1.677)	(1.923)
Total wealth	0.004***	0.004***	0.004***	0.004***
	(8.526)	(8.614)	(8.008)	(8.175)
Government employee	–0.005	–0.005	–0.006	–0.007
	(–1.182)	(–1.017)	(–1.392)	(–1.595)
Business owner	0.006	0.005	0.005	0.005
	(1.172)	(1.369)	(1.508)	(1.452)
State GDP growth	0.435***	0.342***	0.046**	–0.027
	(4.028)	(3.267)	(2.209)	(–1.483)
State unemployment	–0.392*	–0.137*	–0.290*	–0.155
	(–1.763)	(–1.702)	(–1.807)	(–1.266)
State HPI appreciation	0.034*	0.007	0.181**	0.121**
	(1.901)	(1.501)	(2.433)	(2.298)
Presidential	–0.003*		–0.017***	
	(–1.792)		(–2.928)	
Nobs	306,648	306,648	306,648	306,648
R-squared	0.842	0.842	0.731	0.731
State fixed effects	yes	yes	yes	yes
Year fixed effects	no	yes	no	yes
Household fixed effects	yes	yes	yes	yes

Table 4. Degree of political uncertainty, household stock market participation and portfolio allocation

This table examines whether the degree of electoral uncertainty amplifies the effect of political uncertainty on households' stock market participation (Columns 1 and 2) and portfolio allocation (Columns 3 and 4). 'Participation' is an indicator variable that equals 1 if the household holds any stocks in publicly held corporations or mutual funds in a given period, and 0 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 1 if the vote differential (i.e., difference between the percentage of votes obtained by the first and second place candidates) for an election is in the lowest sample tercile of vote differential, and 0 otherwise. Other variables are as defined in the Data Description. All specifications include fixed effects as indicated in the table. Standard errors are clustered by state and year. *t*-statistics are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

	(1)	(2)	(3)	(4)
	Participation		% Stock share	
Election	–0.006**	–0.005*	–0.005**	–0.004*
	(–1.952)	(–1.677)	(–2.018)	(–1.759)
Close election	–0.015***	–0.017***	–0.009***	–0.009***
	(–3.627)	(–2.893)	(–4.472)	(–3.008)
Nobs	306,648	306,648	306,648	306,648
R-squared	0.842	0.842	0.731	0.731
State fixed effects	yes	yes	yes	yes
Year fixed effects	no	yes	no	yes
Household fixed effects	yes	yes	yes	yes
Other controls	As in Table 3 Col. 1	As in Table 3 Col. 2	As in Table 3 Col. 3	As in Table 3 Col. 4

Table 5. Term limits, household stock market participation, and portfolio allocation

Dependent variable is households' stock market participation (Columns 1 and 2) and portfolio allocation (Columns 3 and 4). 'Participation' is an indicator variable that equals 1 if the household holds any stocks in publicly held corporations or mutual funds in a given period, and 0 otherwise. '% Stock share' is the percentage of liquid wealth invested by the household in stocks and mutual funds in a given period. 'Lame duck last term' is a binary variable that equals 1 if the incumbent governor is prevented from seeking re-election by term limits, and 0 otherwise. Other variables are as defined in Tables 1, 2, and 3. All specifications include fixed effects as indicated in the table. Standard errors are clustered by state and year. *t*-statistics are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level

	(1)	(2)	(3)	(4)
	Participation		% Stock share	
Election	–0.006*	–0.005	–0.004***	–0.002*
	(–1.754)	(–1.573)	(–2.606)	(–1.699)
Lame duck last term	–0.002	–0.003	–0.003	–0.003
	(–1.160)	(–0.918)	(–1.401)	(–1.001)
Election × Lame duck last term	–0.011***	–0.011***	–0.009***	–0.008***
	(–4.886)	(–3.705)	(–6.018)	(–5.015)
Nobs	306,648	306,648	306,648	306,648
R-squared	0.842	0.842	0.731	0.731
State fixed effects	Yes	yes	yes	yes
Year fixed effects	No	yes	no	yes
Household fixed effects	Yes	yes	yes	yes
Other controls	As in Table 3 Col. 1	As in Table 3 Col. 2	As in Table 3 Col. 3	As in Table 3 Col. 4

Table 6. How do households reallocate their assets?

This table reports the results on how political uncertainty relates to 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, corporate bonds, money market deposit accounts, checking accounts, savings accounts. '% Illiquid^{W}' is the percentage of total wealth invested in illiquid assets — such as real estate, vehicles, private businesses etc. 'Election' is an indicator variable that takes a value of one if a gubernatorial election occurred in a given state and year, and 0 otherwise. Other variables are as defined in the Data Description. All specifications include fixed effects as indicated in the table. Standard errors are clustered by state and year. *t*-statistics are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

	(1)	(2)	(3)	(4)	(5)	(6)
	% Stock share^{W}		% Safe share^{W}		% Illiquid^{W}	
Election	–0.001**	–0.001**	0.012**	0.010*	–0.009	–0.012
	(–2.078)	(–2.369)	(2.247)	(1.809)	(–0.988)	(–1.035)
Nobs	306,648	306,648	306,648	306,648	306,648	306,648
R-squared	0.706	0.706	0.775	0.775	0.544	0.544
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 7. Effects of political uncertainty on in-state and out-of-state investments using brokerage data

This table examines how political uncertainty impacts households' equity investment in in-state and out-of-state (those without upcoming gubernatorial elections) stocks using the brokerage data from Barber and Odean (2000). This table provides the estimation results of panel regressions with household and year fixed effects. Standard errors are clustered at the household level. *t*-statistics are reported in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

	(1)	(2)
	In-state investment	Out-of-state investment
Election	–0.077**	–0.018
	(–2.267)	(–0.715)
State GDP growth	0.032***	0.004
	(5.356)	(1.004)
State unemployment	0.026**	0.008
	(2.009)	(1.094)
State HPI appreciation	0.002	0.003
	(0.260)	(0.736)
Nobs	87,283	137,881
R-squared	0.009	0.009
Year fixed effects	Yes	Yes

Table 8. Political uncertainty and stock market participation of households with different labor income risk

This table explores cross-sectional differences in the effect of political uncertainty on stock market participation and portfolio decision of households. 'Participation' is an indicator variable that equals 1 if the household holds any stocks in publicly held corporations or mutual funds in a given period, and 0 otherwise. '% Stock share' is the percentage of liquid wealth invested by the household in stocks and mutual funds in a given period. Omitted category in age is 'Old'. Omitted category for education is 'High school or less'. 'Total wealth' is in log-units. Other variables are as defined in the Data Description. All regressions include the same controls as in Table 3 (Columns 2 and 4), and fixed effects as indicated in the table. The coefficients on 'State GDP growth', 'State unemployment', and 'State HPI' are subsumed by the state-year fixed effects. Standard errors clustered at the state and year level. *t*-values are presented in parentheses. ***, **, and are* denote significance at 1%, 5%, and 10% levels, respectively.

	(1) Participation	(2) % Stock share
Labor income risk		
Government employee × Election	–0.004***	–0.003***
	(–2.883)	(–3.093)
Business owner in PSI × Election	–0.003*	0.002
	(–1.810)	(0.903)
Other demographic characteristics		
Male × Election	0.003*	0.001
	(1.792)	(1.007)
Race × Election	–0.000	–0.002
	(–0.839)	(–1.366)
Financial occupation × Election	0.006**	0.004*
	(2.129)	(1.912)
Married × Election	–0.001	0.001
	(–1.335)	(1.066)
College or more × Election	0.004***	0.003***
	(3.018)	(3.100)
Some college × Election	0.003**	0.001*
	(2.119)	(1.882)
Young × Election	0.003*	0.002**
	(1.905)	(2.186)
Middle aged × Election	0.005	0.006*
	(1.536)	(1.699)
Total wealth × Election	0.002***	0.003***
	(4.527)	(4.020)
Nobs	306,648	306,648
R-squared	0.842	0.731
Household fixed effects	Yes	yes
State-year fixed effects	Yes	yes
Other controls	As in Table 3 Col. 2 (except state-level time-varying controls)	As in Table 3 Col. 4 (except state-level time-varying controls)

Table 9. Dynamics of stock market participation during an election cycle

This table provides evidence on the evolution of stock market participation and portfolio allocation over the full gubernatorial election cycle. The dependent variables are 'Participant' (Columns 1 and 2) and '% Stock share' (Columns 3 and 4). 'Election' is a binary variable that equals 1 if a gubernatorial election occurred in that state in that year, and 0 otherwise. 'Post-election' is a binary variable, which takes a value of 1 for years after current gubernatorial election until the next gubernatorial election in a state, and 0 otherwise. 'Party switch' is a binary variable that equals 1 for gubernatorial elections, where the elected governor is from a different political party compared to the party of the outgoing governor, and 0 otherwise. Other unreported controls are defined in the Data Description. All specifications include fixed effects as indicated in the table. Clustered *t*-values are presented in parentheses. Bottom panel provides tests for the null hypothesis that the coefficients of election and post-election variables sum to zero. Standard errors are clustered by state and year. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1) Participation	(2) Participation	(3) % Stock share	(4) % Stock share
Election	–0.007***	–0.007***	–0.005***	–0.004**
	(–3.626)	(–3.445)	(–2.769)	(–2.402)
Post-election	0.005**	0.006***	0.003**	0.003**
	(2.489)	(2.736)	(2.121)	(2.039)
Election × Party switch		–0.004**		–0.006***
		(–2.183)		(–2.753)
Post-election × Party switch		–0.002		–0.001
		(–1.616)		(–1.527)
Test for linear combinations of coefficients:				
Election + Post-election variables	–0.002	–0.007***	–0.002	–0.008 ***
Nobs	306,648	306,648	306,648	306,648
R-squared	0.842	0.842	0.731	0.731
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 risk can lead to a lower participation rate and more cautious stock trading. In addition, we show that households whose labor income are more exposed to political risk react more strongly to elevated political uncertainty. These results are consistent with the empirical findings reported in the paper. 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: $\widetilde{M} \sim N(\overline{M},\ \sigma_M^2)$. There are many sources of risk affecting the state of the economy, among which political risk is an important one that has a huge impact on employment, investment, production, and consumption decisions. For the purpose of this paper, we assume that $\widetilde{M}$ captures political risk that affects asset returns and households' labor income. In view of this purpose, 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 $\tilde{V}$:

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

where $\beta\tilde{M}$ 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 and 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 risk 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

that is positively (negatively) related to the stock price.[9] 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 $\gamma\delta > \frac{1}{\sigma_{\tilde{V}}^2}$ so that the external liquidity supply is sufficiently large to absorb households' demand shocks.

For ease of exposition, we focus our exposition on the case with no information asymmetry. The 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.[10] 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 individual 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. If they decide to trade the stock, they have to incur the participation cost. If they decide not to trade the stock, they simply invest in the riskless asset.

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

[9] 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 $\bar{x}$.
[10] The detailed analysis of the case with asymmetric information yields similar results, and is available upon request.

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 also 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 $\alpha\tilde{M}$, where $\alpha > 0$ is a constant capturing the labor income's exposure to political uncertainty. If the household decides not to trade the stock, then its terminal wealth at date 2 is

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

If the household decides to trade the stock and buy θ_i shares of the stock, then it incurs a cost c_i and the terminal wealth is

$$\tilde{W}_i = e_i - c_i + \theta_i(\tilde{V} - P) + \alpha\tilde{M}.$$

It is well know that the CARA utility implies mean-variance maximization. Hence the household's optimization problem is:

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

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

The solution to the optimization problem is

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

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

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, $-\frac{\alpha Cov[\tilde{V},\tilde{M}]}{Var[\tilde{V}\,]}$. 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 $c_i \le \hat{c}$ participate in trading the stock. The market clearing condition is thus:

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

We define

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

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 $c_i \le \hat{c}$ 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 lineally decreasing in the random supply of the stock, x. As can be see, the exposure of labor income to political risk increases the unconditional equity premium—even if $\bar{V} = 0$ and $\bar{x} = 0$, there is a 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, it incurs a cost c_i, and its unconditional expected utility is denoted by E_i^P:

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

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

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

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

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

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:

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

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

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

So 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

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

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 risk 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 hold 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 risk, 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 return premium; and
3) a decrease in each household's average stockholding.

Proof: See Appendix B.

Proposition 3 implies that, as political risk increases, the increased volatility in the stock's payoff and 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 risk reduces households' speculative motive, but increases their hedging motive for trading 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. 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. This assumption is consistent with the empirical fact that average households are net buyers in the capital market. 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 illustrated the effect of an increase in political risk on households' participation and trading decisions. The analysis is based on the assumption that households face heterogeneous

costs in participating in stock trading. In addition to the participation cost, household may vary in other dimensions, such as the exposure of labor income to political risk. 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.

We consider cross-sectional variations in households' exposure of labor income to political risk. Some households, such as government employees, small business owners, and employees of politically sensitive industries, have greater labor income exposure 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 difference 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

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

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:

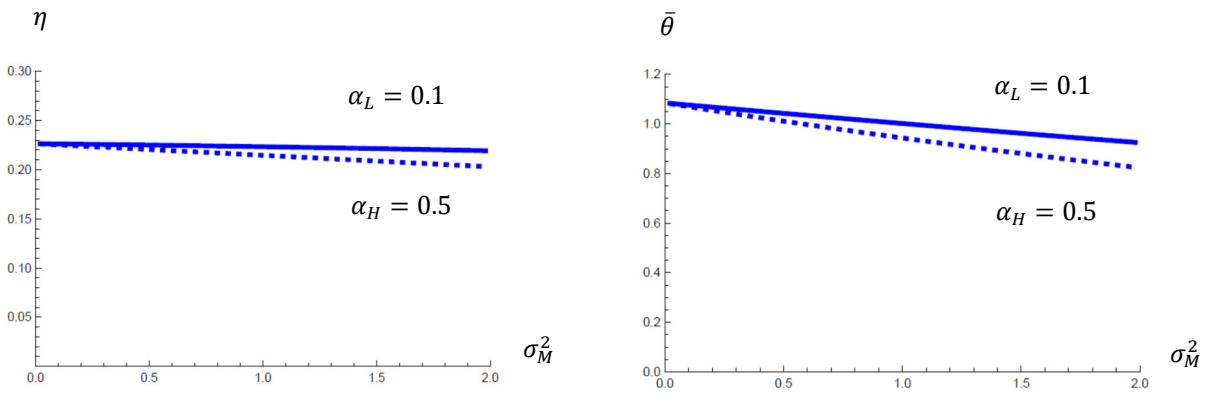
$$\eta_H\bar{c}=\frac{1}{2\gamma}\left\{\frac{\frac{1}{\sigma_V^2}\left(\bar{V}-\bar{P}-\gamma\alpha_H\beta\sigma_M^2\right)^2}{1+\frac{b^2\sigma_x^2}{\sigma_V^2}}+ln\left(1+\frac{b^2\sigma_x^2}{\sigma_V^2}\right)\right\}$$

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

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 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 labor income exposure to political risk ($\alpha_H = 0.5$) experience a sharper decrease in participation than households with low labor income exposure to political risk ($\alpha_L = 0.1$): 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.

Figure 1



Participation Rate

Average Stockholding

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

This figure illustrates how political risk 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, and the maximum participation cost ($\bar{c}$) is equal to 100, the risk-aversion coefficient (γ) is equal to 1. The solid curve represents the participation rate and the average per-capita stockholding for investors with low labor income exposure to political risk ($\alpha_L = 0.1$); the dashed curve represents the participation rate and the average per-capita stockholding for investors with high labor income exposure to political risk ($\alpha_H = 0.5$).

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

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

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

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

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 $\bar{c}$. On the other hand, 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 risk 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.

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. ■