Political Uncertainty and Housing Markets

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Abstract

This paper examines the causal effects of political uncertainty on housing markets. We used US gubernatorial elections from 1982 to 2018 as a source of exogenous variation in political uncertainty and exploited the regional variations in residential housing markets. We used neighboring states without elections and counties at the state borders without elections as control groups. We found that higher political uncertainty causes (a) a decrease in house price growth; (b) a decrease in the number of housing transactions; and (c) an increase in the number of building permits. These effects are stronger during election years when election outcomes present higher uncertainty. We further examined the impact of political uncertainty on mortgage markets and found that mortgage demand and supply decrease in election years.

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1. Introduction

Political uncertainty has increased in recent times. The US Economic Policy Uncertainty Index—normalized to 100 as of the year 2010—has been only three times higher than the value of 200 during 1985–2007 but has been nine times above 200 since the collapse of Lehman Brothers in September 2008.[3] Recent research has shown a direct relationship between political uncertainty and economic outcomes. However, the impact of political uncertainty on real estate markets is an understudied area although real estate is one of the largest asset classes in the economy. Since the Brexit referendum in June 2016, in the U.K., house sales in the prime area of central London plunged by 19% and house prices went down 14% (between June 2016 and October 2019).[4] Commercial real estate in the U.K. also suffered from Brexit and the uncertainty surrounding the U.K.–Europe trade deal. Commercial real estate investments experienced a sharp drop of 33% in 2016.[5] In the U.S., policy uncertainty negatively affects house price growth. Figure 1 illustrates this negative relationship. House price growth tends to slow down in election years at both the national and state level. During the period from 1982 to 2018, house price growth in off-presidential election years was 0.22% higher than in election years[6], while house price growth in off- gubernatorial election years was 0.76% higher than in election years[7], on average. In Italy, where the political crisis has been ongoing for several years without a stable government, residential house prices have been falling consistently in real terms since Q1 2007 and stood 29% lower by Q3 2019.[8] Investors have long attributed those moves in housing markets to the uncertainty associated with political events. However, a lack of causal evidence links political uncertainty to changes in housing markets.

[3] See the index of economic policy uncertainty (EPU) developed in Baker, Bloom, and Davis (2016). During the period 1985-2007, this index has been only above the value of 200 during Gulf War S, 9/11, and Gulf War II, and only once above 250 (i.e., during the 9/11 event). However, during the period 2008-2019, this index has been nine times above the value of 200 and four times above 250: during the debt ceiling debate in 2011, the Trump Election in 2016, and twice during the rising tariffs and trade policy tensions between the U.S. and China in 2018 and 2019. Notice that we cannot use the EPU index in our empirical analysis because EPU is measured at the national level, not at the state or more granular level..

[4] Financial Times, October 24, 2019: "Brexit bargains: London's luxury homes take big price cuts" https://www.ft.com/content/b788a366-f4c1-11e9-b018-3ef8794b17c6.

[5] CBRE report, February 14, 2020: "From user to guest: The user in the center of Real Estate" (unpublished).

[6] Data source from Freddie Mac: http://www.freddiemac.com/research/indices/house-price-index.page

[7] Data collected for this empirical research (1982-2018). Detailed descriptive statistics are presented in Table 1.

[8] Data source from Bank of International Settlements: https://www.bis.org/statistics/pp_selected.htm?m=6%7C288%7C596.

[Insert Figure 1 around here]

In this paper, we attempt to fill this void by empirically examining whether and to what extent uncertainty associated with potential changes in government leadership affects housing markets. The public authority has the power to regulate the economy through various tools including enforcing laws and regulations, imposing taxes, and providing rights and protection. These tools play an important role in shaping housing markets. Therefore, any changes in the structure of the government and its associated policies could result in instability and the uncertainty that influences decisions related to housing investments.

We focus specifically on US residential housing markets and study the causal impact of political uncertainty surrounding elections on housing and mortgage markets. We do so because the majority of residential housing purchases are financed with mortgages, which suggests that there is a strong link between mortgage and housing markets. The key feature of housing investments is that although housing can offer investors greater control over the value and use of their investment, direct investments in housing presents sizeable transaction costs. As argued by real-option theory, transaction costs in housing investments can increase the real-option value of delaying an investment under high uncertainty circumstances, which may dampen the effect on house price growth and transaction activity as investors wait for more and clearer signals before making investment decisions.

In addition, we argue that political uncertainty can also impact the number of building permits. In the United States, a city obtains a building permit delineating where the construction will take place. The city is required by law to enforce various construction and development policies at the local, state, and federal level. Because obtaining a building permit can be perceived as buying an option to build or reconstruct a housing unit, investors might want to avoid the uncertainty generated by gubernatorial elections and the associated potential changes in construction and development regulations to be implemented by newly elected governments. Therefore, we argue that investors are more likely to apply for building permits before an election takes place, which leads to a surge in the number of building permits in election years. As the number of potential new constructions increases, there would be an expectation of a future increase in the supply of housing units, which in turn might have further dampening impacts on house price growth.

We used state and county-level data for 50 states in the United States from 1982 to 2018 to examine the impact of political uncertainty on housing and mortgage markets. We summarize our empirical study with three sets of results. First, we show that political uncertainty has a negative relationship with house price growth and the number of housing transactions but a positive relationship with the number of building permits issued. To address potential endogeneity concerns, we employed the neighboring-state estimation methodology, comparing house price growth, number of housing transactions, and number of building permits between a state with a gubernatorial election and its neighboring state without an election. This methodology rests on the assumption that neighboring states share similar unobservable shocks that we explain in detail later in the paper. Moreover, we performed the equivalent analysis at the county level, comparing house price growth, number of housing transactions, and number of building permits between a county with a gubernatorial election at the state border and its neighboring county located in a state without an election.

Second, we demonstrate that the degree of uncertainty matters, that is, the impact of political uncertainty on housing markets increases with the degree of political uncertainty. In particular, we provide evidence of a greater decrease in house price growth and the number of housing transactions, but a greater increase in the number of building permits when gubernatorial election outcomes are less clear.

Third, we demonstrate that political uncertainty causes a decline in residential mortgage activity on the demand and supply sides of mortgage markets. Evidence suggests that mortgage supply and mortgage demand fall during gubernatorial election years. At the bank level, we show that banks reduce the volume of mortgages originated in their headquarter states when gubernatorial elections are scheduled, while the number of mortgage applications also drops. However, we found that the magnitude and significance level are greater on the demand side at state and bank level.

The use of US gubernatorial elections as a source of political uncertainty has several advantages in the study. First, the sample for investigation is larger for gubernatorial elections than for presidential elections. Over 37 years from 1982 to 2018, the United States had 508 gubernatorial elections compared to only 9 presidential elections, which would not be a reliable source for making meaningful statistical inferences. Second, it is important to note that policy changes are not exogenous by nature; rather, they might be triggered by various political and economic shocks. However, US gubernatorial elections can be considered exogenous events as they are prescheduled and not held due to any economic situation. Hence, the use of gubernatorial elections in our empirical setting helps mitigate the potential endogeneity problem arising between political uncertainty and economic conditions. Last, housing markets in any state are significantly affected by changes in the state government's policies and regulations, including but not limited to changes in building code, tax code, housing subsidies, employee-relocation expense, and environmental-protection rules. Different governing parties may favor different sets of industries, and for residential housing, those industry-specific policies can influence housing demand, supply, and price in the area where firms are under those industry-specific policies.

Our paper contributes to two main bodies of literature. First, we contribute to the growing body of literature that studies the channel through which economic factors respond to political uncertainty. Past literature examined several components of political uncertainty including political instability (Alesina et al., 1996; Jong-A-Pin, 2009; Aisen and José-Veiga, 2013), corruption (Leff, 1964; Mauro, 1995; Mo, 2001; Lash, 2004) and changes in legal and regulatory environments (Mauro, 1995; La Porta et al., 1997; Battalio et al., 2011). Many theoretical papers, however, centered on the impact of political uncertainty on corporate-investment decisions. The common argument is that uncertainty associated with changes in financial regulations and macroeconomic policies would hinder a firm's investment. Early theoretical works (Cukierman, 1980; Bernanke, 1980) suggested firms are more likely to delay investments when they are in a state of uncertainty, preferring to collect more information. Others (Pindyck, 1988; Ingersoll et al., 1992; Bloom, 2009) provided theoretical frameworks to identify the effects of political-uncertainty shocks on corporate-investment incentives. Various empirical evidence supported these theories. Julio and Yook (2012) documented, across countries, that firms reduce investment expenses during national election years in which political uncertainty is heightened. Jens (2017) suggested that firms' investment at the state level in the United States diminishes in periods of escalating political uncertainty due to gubernatorial elections, after controlling for general state economic conditions. Çolak, Durnev, and Qian (2017) provided evidence that fewer IPOs exist in a state when it is holding a gubernatorial election.

Second, our paper contributes to the growing body of literature on the impact of policy and political uncertainty on asset pricing. Theoretical works by Pastor and Veronesi (2012; 2013) provided a general equilibrium model showing that political uncertainty can dampen asset prices and command a risk premium of a greater magnitude in times of weak economic conditions. They argued that investors demand a higher return on their investment, raising the cost of capital for firms, which creates more constraints on firms' investment decisions. Their analysis of within-country and cross-country evidence supported their theoretical prediction that political uncertainty has negative impacts on asset prices. In stock markets, Brogaard and Detzel (2015) employed the economic policy uncertainty index (EPU), constructed by Baker, Bloom, and Davis (as in S. Baker, Bloom, and Davis, 2016), to identify the negative relationship between economic policy uncertainty and US stock market return. Liu, Shu, and Wei (2017) documented that political uncertainty associated with the Bo scandal in China caused a significant drop in the prices of stocks traded in the Chinese market. In bond markets, evidence found by Gao and Qi (2012) suggested that bond investors are less likely to invest and demand a higher risk premium to invest in municipal government bonds when political uncertainty is high due to gubernatorial elections. Handler and Jankowitsch (2018) studied the impact of political uncertainty on prices and trading activity of Italian sovereign bonds and found a significant price fall with lower liquidity in markets before a political event. Our findings in residential housing markets also lend support to their theoretical framework.

We organize the rest of the paper as follows: Section 2 builds on existing theoretical models in the literature to develop our testable hypotheses. Section 3 describes our data. Section 4 defines our identification strategies and reports empirical results. Section 5 examines the reverse effect, that is, how housing variables behave in post-election years. Section 6 provides cross-sectional analyses with two subsamples of high- and low-uncertainty in gubernatorial election outcomes. Section 7 analyses the potential impact of gubernatorial elections on mortgage-lending activities. Section 8 provides the conclusions of the paper.

2. Theoretical predictions

In this section, we begin by demonstrating that elections, particularly those involving state governments, contribute greatly to uncertainty. This viewpoint will allow us to define our hypotheses regarding how political uncertainty affects incentives in housing markets, using as a basis various formal theories.

Elections are an essential source of economic uncertainty because the outcome of a race affects subsequent government decisions (Mattozzi, 2008). Who wins elections affects the income of companies and individuals. Sectors may be favored (or harmed) by the change of direction, following the election. Therefore, the more polarized the supply of electoral proposals, the more uncertainty results. In presidential debates, candidates sometimes stand on opposite sides of specific issues, posing very divergent post-election scenarios. For example, running for election in 2009, the Obama administration raised a debate about reducing the interest tax deduction for high income households. Endorsing such a resolution entails an increase in the cost of home mortgages for this economic group; therefore, this risk becomes intrinsic to the electoral outcome. Because of the climax of policy uncertainty caused by these sector-specific regulation debates, firms tend to delay salary negotiations until after the elections (Garfinkel and Glazer, 1994).

In the United States, state governments are autonomously responsible for implementing state housing policies and regulations (taxes, subsidies, building codes, landlord–tenant rights, and responsibilities) at the local level, affecting state citizens' consumption behavior and living standards. As a result, state governments' elections generate inherent uncertainty with different degrees of risk, depending on the competitiveness of the race and policy differences between candidates (Canes-Wrone and Park, 2014). Having stated how state elections generate a climax of policy uncertainty, we can now discuss various theoretical approaches that provide a framework for defining our hypotheses on how political uncertainty affects housing markets.

We have several options in ways to approach uncertainty's effect on investments and many economic theories to describe it. Risk-return tradeoff theory, first formalized by Markowitz in 1952, came to be known as modern-portfolio theory. The theory shows that investors aim to achieve the highest expected return for a certain level of risk and will take on extra risk only if they are compensated by higher returns on their investments. For this reason, investors expect asset prices to fall in periods of high uncertainty. Following Markowitz, Myers, in 1977, pioneered the rationale for applying option-pricing theory to the valuation of real investments while considering investors' learning and adaptive behavior. Myers' contributions suggested that the greater the uncertainty triggered, the greater the real option value of delaying investing and financing decisions. The intuition behind real-options theory is that uncertainty, in general, can result in bad economic outcomes; therefore, the option value of delaying investments until the uncertainty is resolved increases. Past theoretical and empirical studies document that uncertainty negatively affects corporate investment decisions because of the increased value of the real option of waiting to learn more about the markets (Dixit and Pindyck, 1994; Leahy and Whited, 1996; Abel and

Eberly, 1994; Julio and Yook, 2012; Jens 2017). Various empirical evidence in stock markets also supports these theories. Pastor and Veronesi (2013), Brogaard and Detzel (2015), and Liu, Shu, and Wei (2017) documented evidence that investors dampen stock prices, on average, in periods of heightened uncertainty surrounding a political event. In bond markets, Handler and Jankowitsch (2018) found that bond prices and bond-trading activities fall significantly in periods of political uncertainty.

However, for several reasons, housing should not be treated like other financial instruments. According to Corradin, Fillat, and Vergara (2014; CFV henceforth), three housing-specific characteristics make portfolio-allocation decisions nontrivial. First, housing is both a durable consumption good and an investment asset. Second, moving to a new house involves high transaction costs; therefore, homeowners optimally want to rebalance their housing position less frequently than other investment assets (decisions are irreversible in the short term). The existence of transaction costs makes housing consumption lumpy. Third, house prices present a certain degree of predictability.

In 1990, Grossman and Laroque (GL henceforth), introduced a well-known portfolio choice problem that accounts for the fixed adjustment costs of housing. In the GL model, an agent only moves to a more valuable house when her wealth-to-housing ratio reaches an optimal upper boundary. Similarly, an agent only moves to a less valuable house when her wealth-to-housing ratio reaches an optimal lower boundary. Two lines of research departed from this seminal paper. First is literature on (S, s) models that empirically investigate the inaction region and test the GL model (Abel and Eberly, 1994; Bertola, Guiso, and Pistaferri, 2005). Second are the implications of portfolio choice in the presence of housing (see, e.g., Flavin and Yamashita, 2002; Damgaard, Fuglsbjerg, and Munk, 2003; Cocco, Gomes, and Maenhout, 2005; Yao and Zhang, 2005; Flavin and Nakagawa, 2008; Stokey, 2009; Fischer and Stamos, 2013; CFV).

In CFV, unlike GL, optimal limits vary over time and depend on the dynamics of the expected growth rate of house prices. As a result, in the model, two state variables determine the agent's decisions: (a) the wealth-to-housing ratio, and (b) the time-varying predictability of the growth rate of house prices. House price growth is predictable in the sense that the agent knows with certainty the economy's time-varying expected growth-rate regime. Switching from one regime to another implies a band displacement of optimal boundaries (the inaction region) upwards or downwards. In transitioning from a regime of expected high growth to a low one, the upper bound restriction loosens up for agents who are becoming richer, as they would value the option of waiting to buy cheaper. However, for those who are becoming poorer, the lower boundary courses up, as they would sell before the property depreciates. In this sense, time-varying drifts in the mean (μ) of the house price Markov chain growth derive implications in the portfolio choice.

Adopting the theoretical framework of the CFV, it is possible to add uncertainty to the model by increasing the value of the variance (σ) in the growth of the Markov chain of house prices. Uncertainty increases the region of inactivity for agents who are getting richer and for those who are getting poorer. This explains why households postpone purchases during elections by accepting a larger deviation between the current wealth-to-housing ratio and the optimal return point. Figure 2 illustrates the mechanism by which increasing uncertainty affects the boundaries of the inaction region in such a way that agents decide to keep with their current houses until the uncertainty is gone. Therefore, during periods of high uncertainty, the number of transactions falls.

[Insert Figure 2 around here]

Another innovation we can add to this model is the possibility that agents can reduce this undesirable political uncertainty at a given cost (*Q*). If we assume that, in this simplified scenario, the house consumer (demand) and the construction firm (supply) are the same agents, then this down payment Q that reduces uncertainty looks like a housing permit. Because state-run elections generate friction and we lack information about the duration of this unwanted uncertainty, individuals may decide to buy an option to protect the transaction from volatility. Individuals who have postponed buying a more spacious home would be able to execute this option immediately or in the future. This option would enable them to enlarge their existing home or build themselves a much larger one. In this context, during periods of high uncertainty, purchases of housing permits should increase.

In this sense, it is the agents who decide how much risk they want to reduce, that is, how much they want to narrow the region of inaction by lowering the band. In Figure 2, panel B illustrates an example of where agents pay the exact amount of money necessary to make the bounds operative and secure the transaction immediately. However, this is not necessarily the only possible case. If the agent purchases the permit, she can execute it later, or never execute it at all. It will depend on her income dynamics, the duration of the uncertainty, and the post-election environment.

Figure 3 shows a viable alternative scenario. The agent buys the permit, but it does not hit the boundary until election uncertainty dissipates and the new upper band is located below the permit threshold. Eventually, the transaction is completed, and the agent buys a bigger house, but because electoral uncertainty ends, not because the building permit is operated. In any case, this model incorporates the possibility that the transaction may take place immediately after the purchase of the building permit, at some point during the period of electoral uncertainty, or in the post-election period.

[Insert Figure 3 around here]

We can also comment on the case in which uncertainty increases even more following an election so that the upper band is above the threshold paid by the permit. In that case, the agent can execute the option to restrict the risk in the new uncertainty regime. It is precisely this risk against which agents are hedging by purchasing the permit.

This stylized generalization of the CFV model allows us to conclude that uncertainty provides agents with a clear incentive to purchase instruments (in this case building permits) to reduce risk. Agents may eventually execute the purchase of these permits or not. This statement is fundamental because it allows us to infer the notion that a building permit can fulfill an insurance function and a deal-closing one.

The abovementioned results perfectly align with consensus among experts that higher uncertainty indeed reduces housing transactions and prices and increases the purchase of housing permits. Some additional noteworthy works analyze the optimal decision to execute irreversible investments when economic uncertainty is high (Bernanke, 1980; Cukierman, 1980; Pindyck, 1988). The first systematic modeling began with Cukierman. Using a Bayesian framework, he showed that when uncertainty increases, the firm finds it profitable to delay investment decisions to collect more information, even under risk neutrality. Bernanke, in contrast, developed a model for the option value of avoiding irreversible actions. In Bernanke's theory, refraining from an irreversible action has value because one retains the option of taking or not taking the action in the future. More recently, we note the work of Carrol and Dunn (1997), who presented a model of home purchases in which the risk of unemployment fluctuates over time, and Hassler (1996), who extended the model by including a stochastic process for risk level. Although the mechanism differs from paper to paper, the key result is qualitatively similar: as uncertainty increases, households postpone purchases. In particular, researchers have studied the impact of uncertainty on the real estate market (Miles, 2008; Christidou and Fountas, 2017). Christidou and Fountas (in the spirit of Miles but with some differences) used data on housing permits and prices for the 48 contiguous US states for the period 1988 to 2012. They also found that uncertainty in most states tends to decrease house price growth and increase the purchase of housing permits. Following the theories and arguments mentioned above, we propose three hypotheses about the expected impact of political uncertainty on housing markets, as follows:

Hypothesis 1*: House price growth and the number of housing transactions are lower in election years than in nonelection years, whereas the number of building permits is greater in election years than in nonelection years.*

We argue that during a period of political uncertainty, the investor´s option value of postponing the transactions grows; therefore, house prices would drop or at least grow at a lower rate until the uncertainty resolves. We also tested changes in the number of building permits in election years, arguing that the number of investors will rise who want to guarantee they can exercise their rights to build and reconstruct, regardless of election outcomes. This proposition may be counterintuitive because house price growth appears to positively correlate with the number of building permits (see Figure 4). In Hypothesis 1, we examine whether this correlation holds in election years at the state level.

[Insert Figure 4 around here]

We used the number of transactions as a measure of sales in housing markets to test the abovementioned theoretical predictions more directly. One may claim that the impact of gubernatorial elections on house price growth is vague because while housing demand decreases, so does housing supply in a state of political uncertainty. However, earlier research on housing markets in the United States showed that house price growth is demand-driven as the supply side is strongly persistent and responds significantly less than the demand side to external factors (Glaeser and Gyourko, 2006; Head, Lloyd-Ellis, and Sun, 2014). Applying these viewpoints, we argue that demand in housing markets would respond more than supply to political uncertainty. Thus, a decrease in housing demand would lead to a lower house price growth or even a fall in house prices.

Hypothesis 2*: The higher the degree of political uncertainty, the larger its impact on housing markets. Specifically, the decrease in house price growth and the number of housing transactions in election years, and the increase in the number of building permits are greater when the election outcome is more uncertain.*

In addition to the revised theory that states that the greater the uncertainty the greater the value of the option to delay irreversible investments and the house price growth reduction, we define our second hypothesis about the degree of political uncertainty surrounding gubernatorial elections and its impact on housing markets. In our stylized derivation of the CFV model, more uncertainty widens the region of inactivity, which reduces the number of transactions and thus increases the purchase of housing permits.

Hypothesis 3: *Residential mortgage-lending activity is lower in election years than in nonelection years, with a reduction in mortgage volume and the number of mortgage applications.*

Finally, we argue that political uncertainty matters for mortgage markets. As most home purchases are performed using leverage, the housing market clearly connects to mortgage markets. This brings us to our third hypothesis.

3. Data

The full sample in this study covers state-level housing-market data, election data, and economic data for the period 1982 to 2018 for all 50 states in the United States. Housing-market data include the house price index, number of transactions, and number of building permits. House price indices provide a general picture of the health of housing markets, closely watched by market participants. We used the house price index instead of the price level because the house price index is constructed from a large number of repeated housing transactions. The value of a particular house must be observed at least twice for that house to be counted in the index. This feature and breadth of the index data allows us to conduct our research in a fair and practical way. In the United States, the two main house price indices frequently cited are the Federal Housing Finance Agency (FHFA) House price index and the S&P/Case-Shiller index. Both indices attempt to track the repeat sales of single-family housing units to measure the housing-value appreciation or depreciation in a particular market. The S&P/Case-Shiller index only covers selected markets including specific metropolitan areas, top-20, top-10 metro areas, and nationwide, whereas the FHFA House price index provides more comprehensive geographical areas including states, counties, and zip codes. The FHFA House price index provides two types of indices: the "purchases only" index and the "all transactions" index; the latter covers the longest history and offers the most granular level of housing-market data in the United States. In the scope of this study, we opted for state-level "all transactions" FHDA House price index as a proxy for house prices for all 50 states in the United States Then, we created a variable R^H, which measures the annual return in the house price index. *Transaction* is the state-level number of housing transactions per year, available for the period 1982 to 2018, provided by CoreLogic. *Permit* is the number of building permits issued by a state in a year.

The gubernatorial election data is from the Congressional Quarterly (CQ) electronic library. The data collected includes all election years, candidate names, winning parties, and voting margins. *Election* is a binary variable equal to one if a gubernatorial election occurred in a state. Gubernatorial elections are held on the first Tuesday of November, with different states holding elections in different years (see the Appendix for a more detailed description of gubernatorial elections in the United States). Three states held special non-prescheduled elections—California in 2003, Utah in 2010, and Oregon in 2016—however, neither the exclusion nor inclusion of these observations affects the empirical results.[9] *Pres_election* is a binary variable equal to one if there is a presidential election during a year in the sample. *Incumbent_absence* is a hand-collected binary variable equal to one if the incumbent governor did not take part in the election due to either term-limit regulation or personal reasons. *Winning_margin* is the difference between the percentage of votes won by the first- and second-place candidates. We sort gubernatorial elections based on winning margin into terciles, then define *Election_closeness* as a binary variable equal to one if the election's winning margin is in the lowest tercile (5.1%).

Other variables included to control for the state-level economic conditions were retrieved from the Bureau of Economic Analysis (bea.gov), the Bureau of Labor Statistics (bls.gov), the US Census Bureau (census.gov), and the Federal Emergency Management Agency (fema.gov). The main control variables are *GDP* as the annual growth rate in state gross domestic product; *Unemployment* as the annual state unemployment rate; *Population* as the annual growth rate in the

[9] Three special gubernatorial elections are also included. Our results are robust to the removal of these three special elections from the sample. The first special gubernatorial election is the 2003 California recall election that resulted in replacing the incumbent Governor Gray Davis (Democratic party) with Arnold Schwarzenegger (Republican party). The second one is the 2010 Utah special election to fill the remaining term of the incumbent Jon Huntsman as he resigned in 2009. The third on is the 2016 Oregon special election due to the resignation of Governor John Kitzhaber.

population; *Emergency* as a binary variable equal to one if a state declares an emergency in a given year; and *Homeownership* as the annual growth rate in the proportion of owner-occupied households.

Table 1 presents descriptive statistics for the whole sample of 1,850 state-year observations as well as the subsamples of observations with gubernatorial elections only.

[Insert Table 1 around here]

The house price growth (R^H) in the two subsamples appears to be smaller than in the whole sample (3% in the subsamples versus 4% in the whole sample). The mean of the number of housing transactions (*Transaction*) is also lower in the two subsamples than in the whole sample (50,612 in the subsample with gubernatorial elections only and 49,748 in the subsample with close elections only versus 54,074 in the whole sample). The number of building permits (*Permit*), in contrast, exhibits higher means in the two subsamples (29,811 and 30,102 in the two subsamples versus 28,714 in the whole sample). All these measures in the housing markets display stronger volatility in two subsamples with gubernatorial elections than in the whole sample.

4. Empirical research designs and results

4.1. Research design I

4.1.1. Panel data OLS regression with two-way fixed effects

We first performed OLS regressions with two-way fixed effects (TWFE) to examine the impact of political uncertainty resulting from gubernatorial elections on three state-level housing variables: the house price growth, the number of housing transactions, and the number of building permits.

$$R^H_{s,t} = a_0 + a_1 Election_{s,t} + a_2 Z_{s,t-1} + \mu_s + \mu_t + \varepsilon_{i,t} \quad (1a)$$

$$Transaction_{s,t} = b_0 + b_1 Election_{s,t} + b_2 Z_{s,t-1} + \mu_s + \mu_t + \varepsilon_{i,t} \quad (1b)$$

$$Permit_{s,t} = c_0 + c_1 Election_{s,t} + c_2 Z_{s,t-1} + \mu_s + \mu_t + \varepsilon_{i,t} \quad (1c)$$

where $R^H_{s,t}$, $Transaction_{s,t}$ and $Permit_{s,t}$ are respectively the house price growth, the number of housing transactions, and the number of building permits in State *s* and Year *t ;* Our main variable of interest is $Election_{s,t}$ which is a binary variable that equals one if there is an election scheduled in State s and Year t, and 0 otherwise; $Z_{s,t-1}$ is the set of control variables in State s being lagged for one year ($t-1$) to reduce potential endogeneity issues between housing variables and other macroeconomic variables; μ_s is state fixed effects; μ_t is time-fixed effects; $\varepsilon_{s,t}$ is the error term. We included state- and time-fixed effects to address the unobserved heterogeneity across states and years in the economic and political environment and used the 2-dimensional standard error clustered by state and year to address concerns of heteroskedasticity and correlations in the error terms.

Table 2, Panel A (Columns 1, 2, and 3) shows the estimation results of our OLS regression analyses. The results show that the estimated coefficients of the election binary $Election_{s,t}$ are negative and significant (with p-value ranging from 1% to 4%) for Equations (1a) and (1b), suggesting that political uncertainty caused by gubernatorial elections leads to declines in both house price growth (−0.5%) and the number of housing transactions (approximately −3,219 transactions). The estimation result for Equation (1c) on the number of building permits, however, indicates an increase in permits granted in gubernatorial election years (approximately +583 permits).

[Insert Table 2 around here]

4.1.2. Difference in differences with multiple time periods

The OLS regression models with TWFE, presented above, can lead to estimation bias, as extensively discussed in econometric literatures (Chaisemartin and D'Haultfoeuille, 2020; Sant'Anna and Zhao, 2020; Wooldridge, 2021; Goodman-Bacon, 2021; Callaway and Sant'Anna, 2021; A. Baker, Larcker, and Wang, 2022). One of the main reasons is that TWFE models require homogeneity in treatment-effect dynamics across different treatment groups, and only two time periods. However, in this research, all states are treated with gubernatorial elections, and the elections happened multiple times with different cycles across states. For this paper, we do not go into the econometric details of the reasons and solutions for potential problems of TWFE. We borrow the econometric work from Callaway and Sant'Anna (2021) to estimate the Average

Treatment of gubernatorial-election effect on the Treated State *s* in Year *t* ($ATT_{s,t}$).[10] First, we performed pretrend tests (Chi-square), setting the assumption of parallel trends as the null hypothesis (H0: All pretreatment effects are equal to zero). With *p*-values ranging from 21% to 36%. Testing results indicate no significant evidence against the parallel-trend assumption. Then, we performed aggregating regressions to estimate $ATT_{s,t}$ for all three housing variables. Pretrend tests and ATT estimation results are reported in Table 2, Panel B. The estimation results for $ATT_{s,t}$ suggest that political uncertainty caused by gubernatorial elections, on average, tends to decrease HPI (−0.3%) and the number of housing transactions (approximately −2166 transactions), but increase the number of building permits granted (approximately +502 permits).

4.2. Research Design II

4.2.1. Difference–in–differences neighboring analyses: State-level analyses

One benefit of using data on gubernatorial elections is that these elections are considered prescheduled events, so they can be considered exogenous events; hence, partially alleviating the problem of potential endogeneity between political uncertainty and other economic movements. However, unobservable shocks could exist in the socioeconomic environment that are not adequately captured in the above model specifications. In this research design, we addressed this concern by employing the neighboring-state difference-in-differences methodology (Çolak, Durnev, and Qian, 2017) with the assumption that neighboring states share similar unobserved shocks. Then by taking differences in the dependent variables, the unobservable shocks denoted as $\alpha_{s,t}$ can be cancelled.

$$State\ s:\ R^H_{s,t} = a_0 + a_1 Election_{s,t} + a_2 Z_{s,t} + a_3 \alpha_{s,t} + \mu_s + \mu_t + \varepsilon_{s,t} \quad (2)$$

$$State\ j:\ R^H_{k,t} = a_0 + a_1 Election_{j,t} + a_2 Z_{j,t} + a_3 \alpha_{j,t} + \mu_j + \mu_t + \varepsilon_{j,t} \quad (3)$$

where $R^H_{s,t}$ is the house price growth in State *s* and Year *t* ; $Election_{s,t}$ is a binary variable that equals one if there is a gubernatorial election in State *s* and Year *t*, and zero otherwise; $Z_{s,t}$ is the set of control variables at the state level; $\alpha_{s,t}$ are unobserved time-variant state variables; μ_s are

[10] This process is performed using package CSDID version 1.6, available in Stata. Further technical details of the process can be found in the following sources: https://www.stata.com/meeting/us21/slides/US21_SantAnna.pdf; https://bcallaway11.github.io/did/articles/multi-period-did.html; https://friosavila.github.io/playingwithstata/main_csdid.html.

unobserved time-invariant state variables; μ_t are unobserved time variables; and $\varepsilon_{s,t}$ is the error term.

We took the difference between Equations (2) and (3) to derive the difference-in-differences equation:

$$(R^H_{s,t} - R^H_{j,t}) = a_0 + a_1\,(Election_{s,t} - Election_{j,t}) + a_2\,(Z_{s,t} - Z_{j,t}) + a_3(\alpha_{s,t} - \alpha_{j,t}) + (\mu_s - \mu_j)$$
$$+ (\mu_t - \mu_t) + (\varepsilon_{s,t} - \varepsilon_{j,t}); \qquad (4)$$

The strong assumption made in this setting is that housing-market variables are subject to similar unobservable shocks at the same time; therefore, the terms $a_3(\alpha_{s,t} - \alpha_{j,t})$ and $(\mu_s - \mu_j)$ are cancelled. The term $(\mu_t - \mu_t)$ is also cancelled, resulting in the following regressions:

$$\Delta R^H_{sj,t} = a_0 + a_1\,\Delta Election_{sj,t} + a_2\,\Delta Z_{sj,t} + \Delta\varepsilon_{sj,t} \qquad (5a)$$

$$\Delta Transaction_{sj,t} = b_0 + b_1\,\Delta Election_{sj,t} + b_2\,\Delta Z_{sj,t} + \Delta\varepsilon_{sj,t} \qquad (5b)$$

$$\Delta Permit_{sj,t} = c_0 + c_1\,\Delta Election_{sj,t} + c_2\,\Delta Z_{sj,t} + \Delta\varepsilon_{sj,t} \qquad (5c)$$

where $\Delta R^H_{sj,t}$, $\Delta Transaction_{sj,t}$ and $\Delta Permit_{sj,t}$ are respectively the differences in house price growth; the number of housing transactions; and the number of building permits between State *s* and its neighboring State *j* in Year *t;* $\Delta Election_{sj,t}$ is the main variable of interest, equal to one if State *s* has a gubernatorial election and its neighboring State *j* does not in Year *t,* and zero when both State *s* and its neighboring State *j* do not have gubernatorial election in Year *t*; $\Delta Z_{sj,t}$ is the vector of the differences in state-level control variables between State *s* and State *j* in Year *t*. In total, we made 3,891 state pair-year observations of which we made 983 observations with $\Delta Election_{sj,t} = 1$ (a state with an election and its neighboring state without one), and 2,908 observations with $\Delta Election_{sj,t} = 0$ (both states without an election).

Table 3 presents 50 states in the United States and their neighboring states (denoted as NS). Two states, Alaska and Hawaii, have no neighbors, and we excluded their data from our tests in this research design. On average, each state has four neighboring states. Maine has only one neighboring state, whereas Missouri and Tennessee share borders with eight other states. This table also presents neighboring states with different election cycles as well as those with the same election cycles. Figure 5 visualizes gubernatorial election cycles in the United States.

[Insert Table 3 and Figure 5 around here]

Table 4 reports the regression results for Equations (5a), (5b), and (5c). Columns 1, 3, and 5 report regression results for the whole sample including all pairs of neighboring states, whereas Columns 2, 4, and 6 report regression results for a subsample that includes only pairs of neighboring states with different election cycles. We used weighted least squared regressions to account for the notion that our state pair-year observations have different probabilities of being sampled, with weight being the number of neighboring states. States with more neighboring states had a greater probability of being selected in the sample. The main variable of interest is $\Delta Election$, and the dependent variables are ΔR^H (the difference in house price growth); $\Delta Transaction$ (the difference in the number of housing transactions), and $\Delta Permit$ (the difference in the number of building permits) between a state and its neighboring state. We compared with estimated coefficients of $\Delta Election$ in whole-sample regressions and found estimated coefficients of $\Delta Election$ in subsample regressions were greater in magnitude and statistical significance. In Table 4 (Columns 1 and 2), the estimated coefficients of $\Delta Election$ are −0.0021(−0.21%) for the whole-sample regression and −0.0028 (−0.28%) for the subsample regression, which implies that house price growth decreases in a state that holds a gubernatorial election compared to its neighboring state without one. Table 4 illustrates the negative impact of political uncertainty on housing-transaction activities (Columns 3 and 4) with the estimated coefficients of $\Delta Election$, which are approximately −1,124 for whole-sample regression and −1,382 for the subsample regression. Estimated coefficients of $\Delta Election$ in Column 5 (+206 in the whole-sample regression) and Column 6 (+257 in the subsample regression) suggest an increase in the number of building permits issued in a state with a gubernatorial election compared to its neighbor that does not hold one in the same year.

[Insert Table 4 around here]

4.2.2. Difference-in-differences neighboring analyses: County-level analyses

The focus of our study is on the impact of political uncertainty on housing markets at the state level; however, we perform deeper, granular county-level analyses in this section. Using county-level data allows us to investigate cross-border neighboring counties that are more likely to share similar characteristics than neighboring states. Residents in cross-border regions could relocate and commute more easily between neighboring states; hence, one might argue that political uncertainty that happens to the housing market in a state might also have a comparable impact on the cross-border region of that state with its neighbors. For this reason, we employed methodology similar to that presented in section 4.2.1, but we used a panel of adjacent cross-border county pairs instead of neighboring states, with variables being the differences between border counties. Among 3,142 counties and equivalents in the United States, we considered 1,143 adjacent cross-border counties. We show regression analysis results for Equations (5a), (5b), and (5c) using county-level in Table 5 (Columns 1, 3, and 5).

In certain cases, however, some cross-border counties are not conveniently connected, as they are separated by rivers or lakes without a bridge or a transportation system installed. To address this issue, we further restricted our sample to cross-border counties in metropolitan statistical areas (MSAs). This restriction comes at a loss of observations as there are 292 cross-border counties in MSAs only, but the sample size at the county level is still much larger than at the state level, with 48 states considered. The results for this subsample analysis appear in Table 5 (Columns 2, 4, and 6).

[Insert Table 5 around here]

Table 5 reports the weighted least squared OLS regression results for Equations (5a), (5b), and (5c), respectively. The main variable of interest is ΔElection, and the dependent variables are ΔRH (the difference in the house price growth); ΔTransaction (the difference in the number of housing transactions), and ΔPermit (the difference in the number of building permits) between a county and its cross-border neighbor. In Table 5 (Columns 1 and 2), the coefficient of ΔElection is still −0.002, implying house price growth decreases by 0.2% in a county located in a state with a gubernatorial election compared to its cross-border neighbor without one. Table 5 (Column 3 and 4) illustrates the negative impact of political uncertainty on housing-transaction activities with about 14 (all cross-border counties) and 11 (cross-border counties in MSAs only) fewer transactions in a county located in a state with a gubernatorial election compared to its cross-border neighbor without one. In Table 5 (Column 5 and 6), we show approximately three more building permits were issued in a county located in a state with a gubernatorial election compared to its cross-border neighbor without one. These findings at the county level using a neighboring border-identification strategy further demonstrate the real and negative impacts of political uncertainty on housing markets.

5. Reverse effect: Post-election analysis

As explained in the theoretical background section of this paper, the combined effect of a reduced investment in housing and an increased number of building permits issued would further dampen house price growth in election years. In this section, we investigate the reverse effect of housing-market variables in the first 2 years following a gubernatorial election. Specifically, we test whether the house price growth and the number of housing transactions increase while the number of building permits decrease in the 2 years post-election. We estimated regressions similar to Equations (1a), (1b) and (1c); however, we replaced the *Election* variable with the binary variable for year T = 1 and T = 2 (with the election year set at T = 0). We estimate the following regressions:

$$R^{H}_{s,t} = a_0 + a_1 Post\_election\_1_{s,t} + a_2 Z_{s,t} + \mu_s + \mu_t + \varepsilon_{s,t} \quad (6a)$$

$$R^{H}_{s,t} = a_0 + a_1 Post\_election\_1_{s,t} + a_2 Post\_election\_2_{s,t} + a_3 Z_{s,t} + \mu_s + \mu_t + \varepsilon_{s,t} \quad (6b)$$

$$Transaction_{s,t} = b_0 + b_1 Post\_election\_1_{s,t} + b_2 Z_{s,t} + \mu_s + \mu_t + \varepsilon_{s,t} \quad (6c)$$

$$Transaction_{s,t} = b_0 + b_1 Post\_election\_1_{s,t} + b_2 Post\_election\_2_{s,t} + b_3 Z_{s,t} + \mu_s + \mu_t + \varepsilon_{s,t} \quad (6d)$$

$$Permit_{s,t} = c_0 + c_1 Post\_election\_1_{s,t} + c_2 Z_{s,t} + \mu_s + \mu_t + \varepsilon_{s,t} \quad (6e)$$

$$Permit_{s,t} = c_0 + c_1 Post\_election\_1_{i,t} + c_2 Post\_election\_2_{i,t} + c_3 Z_{s,t} + \mu_s + \mu_t + \varepsilon_{i,t} \quad (6f)$$

Figure 6 illustrates the average house price growth, the average number of housing transactions, and the average number of building permits over the 4-year election cycle. Table 6 presents the results of six OLS regressions. In Columns 1, 3, and 5, the main variable of interest is the 1-year post-election binary (*Post_election_1*); the estimated coefficient of the binary variable is highly significant and positive for R^H and *Transaction*, but negative for *Permit,* as expected. In Columns 2, 4, and 6, the two main variables of interest are the 1-year and 2-year post-election binary (*Post_election_1* and *Post_election_2*); the estimated coefficients of the binary variables are significantly positive for R^H and *Transaction* but negative for *Permit*. Economically, these results imply that, in the year following an election, house price growth increases by 0.6%, the number of transactions increases by approximately 976, and the number of building permits issued decreases by approximately 435.

[Insert Figure 6 around here]

The results are consistent with our argument that investors delay making housing transactions while applying for more building permits in the environment of greater political uncertainty due to elections; however, once the uncertainty is resolved, we observe a substantial reverse effect in housing markets at the state level.

[Insert Table 6 around here]

6. Cross-sectional analysis: The uncertainty degree of election outcomes

We made 983 observations in the merged difference-in-differences neighboring-state sample in which a gubernatorial election is held in a state and not in its neighboring state. We first classify elections into two subsamples: *High_Uncertainty* and *Low_Uncertainty*. These subsamples are based on two measures: (a) *Close* as a binary variable equal to one if the election's winning margin is in the lowest tercile (5.1%), and zero otherwise; (b) *Incumbent_absence* is a hand-collected binary variable equal to one if the incumbent governor did not take part in the election either due to term-limit regulation or personal reasons. As most incumbent governors are reelected (82.6% in our sample spanning from 1982 to 2018) if they are not restricted by term-limit regulation or voluntarily withdraw from reelection due to personal reasons, we argue that the absence of the incumbent might lead to higher uncertainty surrounding an election.

To examine whether the impact of political uncertainty on housing markets differs between the two subsamples, we then reestimated Equations (5a), (5b), and (5c) for *High_Uncertainty* and *Low_Uncertainty* election subsamples. We find that the estimated coefficient of Δ*Election* is more negative in Equations (5a) and (5b), but more positive in Equation (5c) for the *High_Uncertainty* subsample than for the *Low_Uncertainty* subsample. We further performed a Wald test of the difference in the coefficients between each pair of *High_Uncertainty* and *Low_Uncertainty* regressions. As reported in Table 7 (Panel A, B, C), the difference is significant for the classification of elections based on *Election_closeness* and on *Incumbent_absence.*

Accordingly, these results show that higher uncertainty gubernatorial elections lead to a greater decline in the house price return and the number of housing transactions, but a greater increase in the number of building permits compared to lower uncertainty elections. In other words, the negative impact on house price growth and transaction activities is mainly due to elections with highly uncertain outcomes.

[Insert Table 7 around here]

7. Political uncertainty and mortgage markets: Empirical strategy and results

Most homeowners and investors need leverage to finance their housing investments with mortgage loans. As a result, housing and mortgage markets connect closely. In addition, political uncertainty can affect banks' mortgage-lending activities as the banking industry is highly regulated and potential changes in government leadership and policies may influence banks' credit supply. In this section, we explore mortgage-lending activities by investigating whether high political uncertainty also aligns with reduced mortgage-lending activities at the state level and bank level.

7.1. Data

We used the annual mortgage-loan data between 1990 and 2018 from the Home Mortgage Disclosure Act (HMDA). The loan-level HMDA data provides details on a substantial proportion of mortgage markets as the Act mandates reporting for most regulated depository institutions including banks, credit unions, thrifts, and other finance companies in the United States. The HMDA data includes loan application, approval status, loan amount, and details on borrowers and lenders. We only included home-purchase mortgage loans from bank lenders and we dropped mortgages with missing loan characteristics such as loan size, loan type, and lender's approval decision. We Winsorized mortgage loans based on their sizes at a 1% level. We also excluded mortgages subsidized by the Veterans Administration and the Federal Housing Authority. We then aggregated the data and derived three main variables at the state and bank levels for our analysis: log(*Volume*) as the natural logarithm of the volume of mortgages originated (with volume in thousands of dollars), *Application* as the annual relative change in the number of mortgage applications, and *Approval_rate* as the ratio of the number of mortgage applications approved over the total number of mortgage applications.

For the bank-level analysis, we used the data on banks' financial statements collected from Call Reports. The Call Reports data also provided us with the location of a bank's headquarters, which allowed us to identify the home state of each bank in the sample. To examine the within-bank variations in mortgage lending over time, we merged the annual HMDA data with the Call Reports data in the period 1990 to 2018. Our sample resulted in 116,284 observations at the bank-state-year level. Similar to Acharya and Mora (2015),[11] we derived six variables from the Call Reports data representing banks' financial characteristics that may affect their lending decisions: *Size* as the logarithm of total Assets; *Return_on_equity* as the ratio of net income to total equity; *Liquid_assets* as the ratio of liquid assets to total assets; *Home_mortgages* as the ratio of residential mortgage loans to total loans; *Core_deposit* as the ratio of core deposit to total assets; and *Deposit_cost* as the ratio of interest expense on core deposit to core deposit. Table 8 presents the summary statistics of the variables used in this analysis.

[Insert Table 8 around here]

7.2. Methodology and empirical results

At the state level, we used OLS regressions with TWFE and the difference-in–difference neighboring-state methodology described in section 4. We examined the supply side and the demand side of mortgage markets in election years. In the OLS analyses, we have two dependent variables that capture mortgage supply over time. First, we used $\log(Volume)_{s,t}$ which measures the logarithm of total mortgage volume originated in State s in Year t. Second, we used $Approval\_rate_{s,t}$, which measures the mortgage-approval rate in State s in Year t. To capture mortgage demand over time, we used $Application_{s,t}$, which measures the relative change in the total number of mortgage applications in State s in Year t. We then ran the following regressions:

$$\log(Volume)_{s,t} = a_0 + a_1 Election_{s,t} + a_2 Z_{s,t} + \mu_s + \mu_t + \varepsilon_{s,t} \quad (7a)$$

$$Approval\_rate_{s,t} = b_0 + b_1 Election_{s,t} + b_2 Z_{s,t} + \mu_s + \mu_t + \varepsilon_{s,t} \quad (7b)$$

[11] Detailed derivation of these bank-level variables can be found in Acharya and Mora (2015): https://pages.stern.nyu.edu/~sternfin/vacharya/public_html/pdfs/OnlineAppendix_070913.PDF

$$Application_{s,t} = c_0 + c_1 Election_{s,t} + c_2 Z_{s,t} + \mu_s + \mu_t + \varepsilon_{s,t} \quad (7c)$$

Our main variable of interest is $Election_{s,t}$ which equals one if there was a gubernatorial election in State *s* and Year *t*, and zero otherwise; $Z_{s,t}$ is the set of control variables at the state level; μ_s is the state fixed effects; and $\varepsilon_{s,t}$ is the error term. Table 9 reports estimation results for the baseline multivariate regressions (7a), (7b), and (7c).

[Insert Table 9 around here]

For the difference-in-differences neighboring methodology, we considered two dependent variables to capture mortgage supply over time. First, we used $\Delta\log(Volume)_{sj,t}$, which measures the difference in the logarithm of total mortgage volume originated between State *s* and State *j* in Year *t* . Second, we used $\Delta Approval\_rate_{sj,t}$ which measures the difference in the mortgage-approval rate between State *s* and State *j* in Year *t*. For the demand side, we used $\Delta Application_{sj,t}$, which measures the difference in the relative annual change in the total number of mortgage applications between State *s* and State *j* in Year *t*. We then ran the following regressions:

$$\Delta\log(Volume)_{sj,t} = a_0 + a_1 \Delta Election_{sj,t} + a_2 \Delta Z_{sj,t} + \Delta\varepsilon_{sj,t} \quad (8a)$$

$$\Delta Approval\_rate_{sj,t} = b_0 + b_1 \Delta Election_{sj,t} + b_2 \Delta Z_{sj,t} + \Delta\varepsilon_{sj,t} \quad (8b)$$

$$\Delta Application_{sj,t} = c_0 + c_1 \Delta Election_{sj,t} + c_2 \Delta Z_{sj,t} + \Delta\varepsilon_{sj,t} \quad (8c)$$

where $\Delta\log(Volume)_{sj,t}$, $\Delta Approval\_rate_{sj,t}$ and $\Delta Application_{sj,t}$ are respectively the differences in the logarithm of total originated mortgage volume; the mortgage approval rate; and the relative annual change in the total number of mortgage applications between State *s* and its neighboring State *j* in Year *t;* $\Delta Election_{sj,t}$ is the main variable of interest, which equals one if State *s* has a gubernatorial election and its neighboring State *j* does not in Year *t*, and zero when both State *s* and its neighboring State *j* do not have gubernatorial election in Year *t*; $\Delta Z_{sj,t}$ is the vector of the differences in state-level control variables between State *s* and State *j* in Year *t*. In total, we assessed 2,938 state pair-year observations of which 657 observations with $\Delta Election_{sj,t} = 1$ (a state with an election and its neighboring state without an election), and 2,281 observations with $\Delta Election_{sj,t} = 0$ (both states without an election) for the period 1990 to 2018. Table 10 shows estimation results for difference-in-differences neighboring-state specifications (8a), (8b), and

(8c). Results indicate that mortgage supply and demand at the state level are both significantly lower in election years.

[Insert Table 10 around here]

At the bank level, we focused on bank lenders and dropped all mortgages originated by credit unions, thrifts, and other nonbank lenders. We also used the timing of gubernatorial elections as a proxy for exogenous political shocks and employed difference-in-differences methodology to study the dynamics of banks' mortgage lending in election years. For the supply side, we considered two dependent variables that capture banks' mortgage-lending activities: $\log(Volume)_{i,s,t}$ as the natural logarithm of mortgage volume originated by Bank i in State s in Year t ; and $Approval\_rate_{i,s,t}$ as the approval rate of Bank i in State s in Year t . For the demand side, we used $Application_{i,s,t}$, which measures the annual relative change in the number of mortgage applications received by Bank i in State s in Year t. We estimate the following specifications:

$$\log(Volume)_{i,s,t} = a_0 + a_1 Election_{s,t} + a_2 B_{i,s,t-1} + a_3 Z_{s,t-1} + \mu_{i,s} + \mu_{s,t} + \varepsilon_{i,s,t} \quad (9a)$$

$$Approval\_rate_{i,s,t} = a_0 + a_1 Election_{s,t} + a_2 B_{i,s,t-1} + a_3 Z_{s,t-1} + \mu_{i,s} + \mu_{s,t} + \varepsilon_{i,s,t} \quad (9b)$$

$$Application_{i,s,t} = a_0 + a_1 Election_{s,t} + a_2 B_{i,s,t-1} + a_3 Z_{s,t-1} + \mu_{i,s} + \mu_{s,t} + \varepsilon_{i,s,t} \quad (9c)$$

Our main variable of interest is $Election_{s,t}$, which is equal to one if there was a gubernatorial election in State s and Year t, and zero otherwise. $B_{i,s,t-1}$ denotes a set of control variables at the bank level; $Z_{s,t-1}$ is the vector of control variables at the state level. We also included bank-state fixed effects and state-time-fixed effects in these estimations. Table 11 exhibits the estimation results for the specifications (9a), (9b), and (9c). The estimated results at the bank level show that mortgage volume and supply are both significantly lower in election years, suggesting that mortgage markets are negatively affected by political uncertainty surrounding gubernatorial elections.

[Insert Table 11 around here]

8. Conclusion

Our paper shows large and significant dampening effects on the performance of residential-housing markets in the United States in a period of high political uncertainty. We employed gubernatorial elections in the United States and an identification based on neighboring states to address potential endogeneity issues. As evidenced in our analysis in the previous sections, both house price growth and the number of transactions are lower in an election year, which suggests investors demand a higher premium for undertaking political risk. Our results also suggest that the number of building permits granted in the period leading to the gubernatorial elections increases. One possible explanation for this result is that applying for a building permit is equivalent to buying an option to construct; hence, permit holders can hedge against potential regulatory changes from the newly elected government. We find these results are stronger during election years in which election outcomes are more uncertain.

Our study contributes to the growing body of literature on the impact of political and policy uncertainty on the economy by demonstrating two points. First, uncertainty from political sources can significantly affect investors' decision-making in housing markets. Second, political uncertainty matters for the financial sector's lending activity regarding the supply and the demand side of mortgage markets. These findings also provoke suggestions for extended research on the impact of political uncertainty. Future studies can investigate whether the patterns found in our paper hold with other types of investment or in different political environments outside the United States. Further work should shed light on the endogenous nature of political cycles that are prevalent in many countries and provide more evidence regarding the mutual interaction between economic performance and the timing of elections at the national and state level.

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Appendix. Variable descriptions

A. Housing-market data

Housing data includes annual data on the house price index, number of transactions, and number of building permits at the state level. The variables related to housing are the following:

- The house price index is published by the Federal Housing Finance Agency (FHFA). The $HPI_{i,t}$ is a weighted, repeat-sales index that measures average price changes in repeat sales or refinancing on the same properties in State *s* in Year *t*.
- $R^{H}_{s,t}$ is the house price growth or the annual return in the *HPI* in State *s* in Year *t*, and is calculated as follows.

$$R^{H}_{s,t} = \frac{HPI_{s,t} - HPI_{s,t-1}}{HPI_{s,t-1}}$$

- $Transaction_{s,t}$ is the number of housing transactions in State *s* in Year *t*. The data are from CoreLogic.
- $Permit_{s,t}$ is the number of building permits in State *s* in Year *t*. The data are published by the U.S. Census Bureau (census.gov).

B. Gubernatorial-election data

The gubernatorial-election data in our sample covers all gubernatorial elections across 50 states in the United States in the period 1982 to 2015. We collected most of the data from the CQ Electronic Library. In general, gubernatorial elections are held on the first Tuesday in November, with the earliest date being the 2nd of November and the latest date being the 8th of November. The variables related to gubernatorial elections are the following:

- $Election_{s,t}$ is a yearly binary variable that is equal to one if there is a gubernatorial election in State *s* in Year *t*, and zero otherwise.
- $Pres\_election_{t}$ is a yearly binary variable that takes a value of one if there is a presidential election in the United States in Year *t*.
- $Winning\_margin_{s,t}$ is the difference between the percentage votes won by the first- and second-place candidates in a gubernatorial election in State *s* in Year *t*.

- $Election\_closeness_{s,t}$ is a binary variable equal to one if the $winning\_margin_{s,t}$ is in the lowest tercile (5.1%). As shown in section 6, we divided our sample into two subsamples: High_Uncertainty and Low_Uncertainty, based on $Election\_closeness_{s,t}$: $Election\_closeness_{s,t}$ is equal to one for the High_Uncertainty subsample, and zero for the Low_Uncertainty subsample.
- $Incumbent\_absence_{s,t}$ is a hand-collected binary variable equal to one if the incumbent governor did not take part in a gubernatorial election in State *s* in Year *t* either due to term-limit regulations or personal reasons.

C. Mortgage data

Mortgage data are from Federal Financial Institutions Examination Council (FFIEC). Data are made available publicly according to the Home Mortgage Disclosure Act of 1975 (HMDA). The HMDA requires most mortgage lenders to disclose information at the application level about their mortgage-lending activities every year. We aggregated mortgage data at the state level and created three variables: log(*Volume*); *Approval_rate*; and *Application.*

- $\log(Volume)_{s,t}$ is the logarithm of the volume of mortgages originated in State *s* in Year *t*, with volume reported in thousands of dollars; $\log(Volume)_{i,s,t}$ is the logarithm of the volume of mortgages originated by Bank *i* headquartered in State *s* in Year *t*, with volume reported in thousands of dollars.
- $Approval\_rate_{s,t}$ is the number of mortgage applications approved divided by the total number of mortgage applications in State *s* in Year *t*; $Approval\_rate_{i,s,t}$ is the number of mortgage applications approved divided by the total number of mortgage applications in Bank *i* headquartered in State *s* in Year *t*.

$$Approval\_rate_{s,\,t} = \frac{Number\ of\ approved\ mortgages_{i,t}}{Number\ of\ mortgage\ applications_{i,t}}$$

$$Approval\_rate_{i,s,t} = \frac{Number\ of\ approved\ mortgages_{b,i,t}}{Number\ of\ mortgage\ applications_{b,i,t}}$$

- $Application_{s,t}$ is the relative change of the number of mortgage applications in State *s* in Year *t*; $Application_{i,s,t}$ is the relative change of the number of mortgage applications in Bank *i* headquartered in State *s* in Year *t.*

$$Application_{s,t} = \frac{Number\ of\ mortgage\ applications\ _{s,t} - Number\ of\ mortgage\ applications_{s,t-1}}{Number\ of\ mortgage\ applications_{s,t-1}}$$

$$Application_{i,s,t} = \frac{Number\ of\ mortgage\ applications_{i,s,t} - Number\ of\ mortgage\ applications_{i,s,t-1}}{Number\ of\ mortgage\ applications_{i,s,t-1}}$$

D. Call reports data

We extracted commercial banks' financial-statement data from the Bank Regulatory data section of Wharton Research Data Services. Commercial banks are required to report either "Consolidated Reports of Condition and Income" FFIEC 031 for banks with domestic and foreign offices or "Consolidated Reports of Condition and Income" FFIEC 041 for banks with domestic offices only. These reports cover detailed financial statements of commercial banks in the United States, as well as their headquarter states, which enabled us to perform analyses on the impact of gubernatorial elections. All variables described below are for Bank *i* in State *s* in Year *t*, and we followed Acharya and Mora (2015) to derive these variables from call reports[12].

- *Size* is the logarithm of the total assets (item RCFD2170 in call reports), with total assets reported in thousands of dollars.
- *Core_deposit* (implicit) is the sum of transaction deposits, savings, and small-time deposits that form a stable source of funds divided by total assets. The quarterly average of core deposits is RCON3485 + RCONB563 + RCON3469 (before 1997Q1)/ RCONA529 (after 1997Q1).
- *Deposit_cost* (implicit) is the interest expense on core deposits divided by the quarterly average of core deposits. The interest expense on core deposits is RIAD4508 + RIAD0093 (RIAD4509 + RIAD4511 before 2001Q1) + RIADA518 (RIAD4512 before 1997Q1).
- *Return_on_equity* is net income divided by total equity (RIAD4340 divided by RCFD3210).
- *Return_on_assets* is net income divided by total assets (RIAD4340 divided by RCFD2170).
- *Equity ratio* is total equity divided by total assets (RCFA3210 divided by RCFD2170).
- *z-score* is a measure of a bank's solvency risk. It is measured by a bank's buffers (capitalization and return) divided by its return volatility (*Return_on_assets***Equity ratio*/std(*Return_on_assets*)).

[12] https://pages.stern.nyu.edu/~sternfin/vacharya/public_html/pdfs/OnlineAppendix_070913.PDF

- *Liquid_assets* is the sum of liquid assets divided by total assets. Liquid assets are cash, federal funds sold, reverse repossessions, and securities, excluding mortgage-backed and asset-backed securities: Cash: RCFD0010; federal funds sold: RCFD1350 (before 2002Q1) + RCONB987 + RCFDB989 (from 2002Q1); securities excluding mortgage-backed and asset-backed securities before 2009Q2: (RCFD1745 + RCFD1773) - (RCFD8500 +RCFD8504 + RCFDC026 + RCFD8503 + RCFD8507+ RCFDC027); after 2009Q2: (RCFD1754+ RCFD1733) – (RCFDG300 + RCFDG303+ RCFDG304 + RCFDG307 + RCFDG308 + RCFDG311 + RCFDG312 + RCFAG315+ RCFDG316 + RCFDG319+ RCFDG320 + RCFDG323+ RCFDG324 + RCFDG327 +RCFDG328 + RCFDG331+ RCFDG336 + RCFDG339 + RCFDG340 + RCFDG343 + RCFDG344 + RCFDG347 + RCFDC026 + RCFDC027).
- *Home_mortgage* is the volume of residential-mortgage loans divided by total loans. Residential mortgage loans are RCON1797 + RCON5367 + RCON5368. Total loans are RCFD2122.

E. Other macroeconomics variables

We retrieved macroeconomic data and financial-market data from various sources including the Bureau of Economic Analysis (bea.gov), the Bureau of Labor Statistics (bls.gov), the U.S Census Bureau (census.gov), the Federal Emergency Management Agency (fema.gov), and Federal Research Economic Data (FRED; fred.stlouisfed.org). The list of control variables follows:

- $GDP_{s,t}$ is the gross domestic product's growth rate in State *s* in Year *t.*
- $Unemployment_{s,t}$ is the unemployment rate in State *s* in Year *t.*
- $Population_{s,t}$ is the annual growth rate of the population in State *s* in Year *t.*
- $Emergency_{s,t}$ is a binary variable that takes the value of one if State *s* in Year *t* declares an emergency in a given year and zero otherwise.
- $Homeownership_{s,t}$ is the growth rate of the proportion of owner-occupied households in State *s* in Year *t*.

Figures

Figure 1: Policy Uncertainty and House price Growth

Figure 1 exhibits the dynamics of the U.S. Economic Policy Uncertainty Index (left axis scale) and the monthly growth in U.S. house prices (right axis scale) from January 1991 to April 2020. The U.S. Economic Policy Uncertainty Index was developed and constructed by S. Baker, Bloom, and Davis (2016). The monthly growth in house prices was computed using the seasonally adjusted Federal Housing Finance Agency (FHFA) monthly house price index for the U.S.

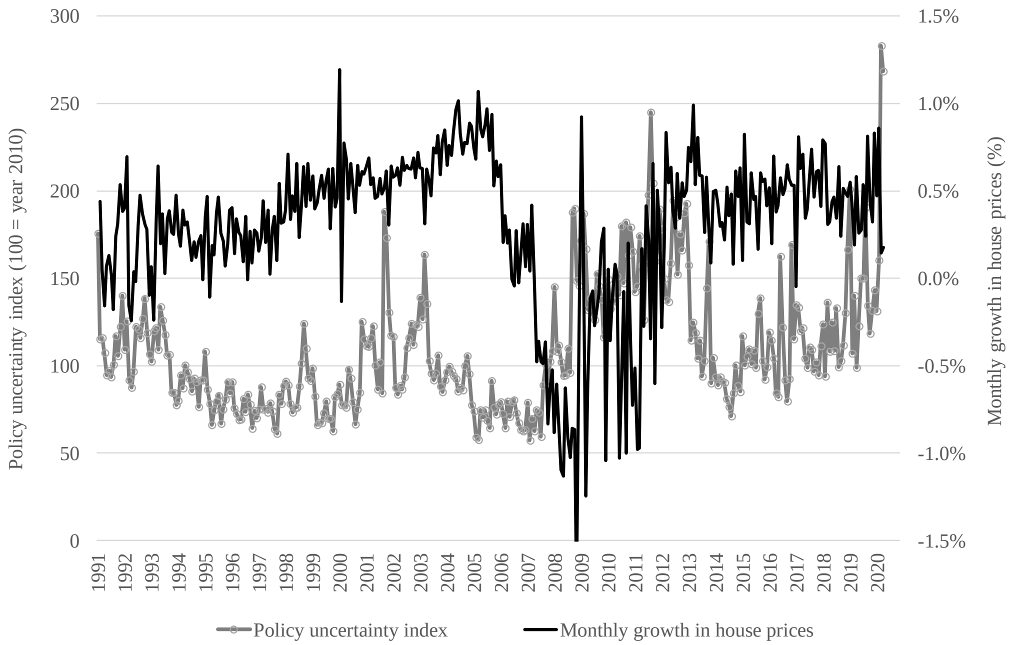


Figure 2: Illustration of the Mechanism with Uncertainty

Figure 2 illustrates: A) The hypothetical path of the wealth-to-housing ratio and upper and lower bounds for a two-regime Markov-switching process (i.e., high and low uncertainty). The number of transactions falls as the inaction region widens; B) Agents can buy a housing permit incurring a Cost Q to make the bounds operative and secure the transaction.

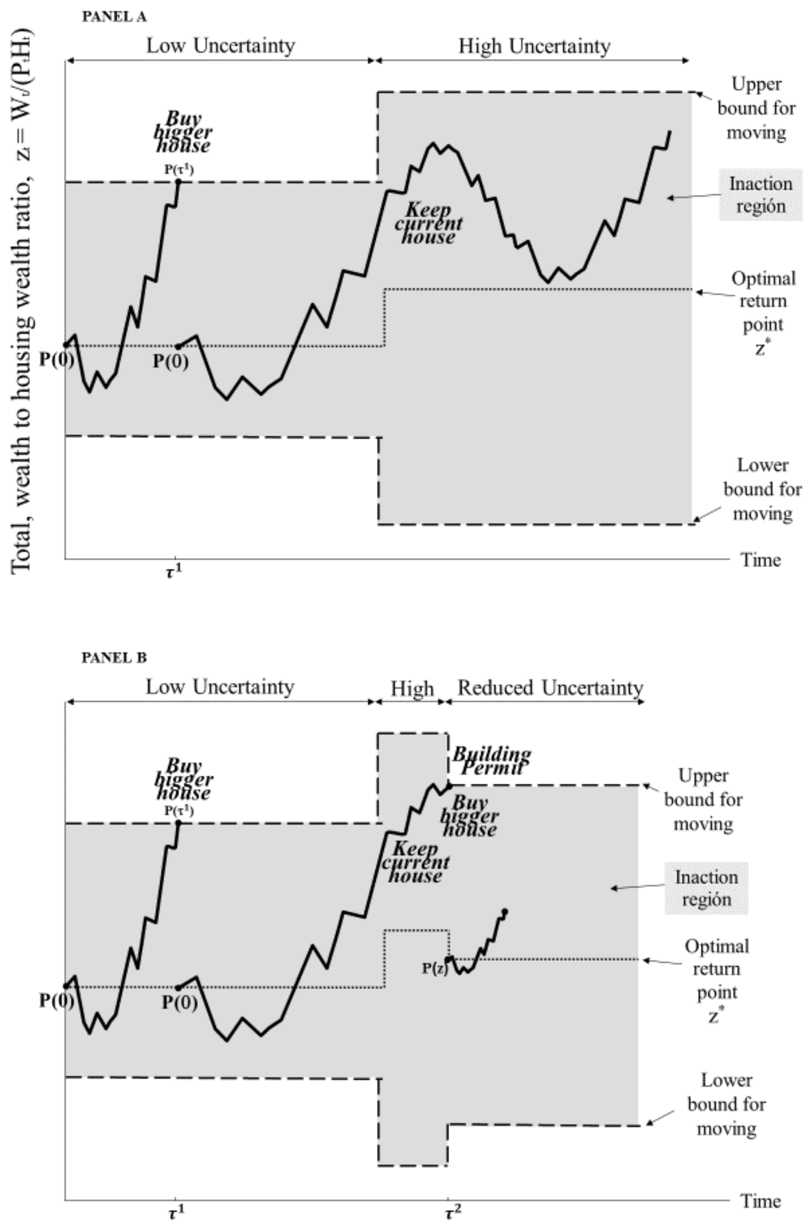


Figure 3: Illustration of the Mechanism with Housing Permits

Figure 3: Agents can purchase housing permits regardless of whether or not they later decide to foreclose.

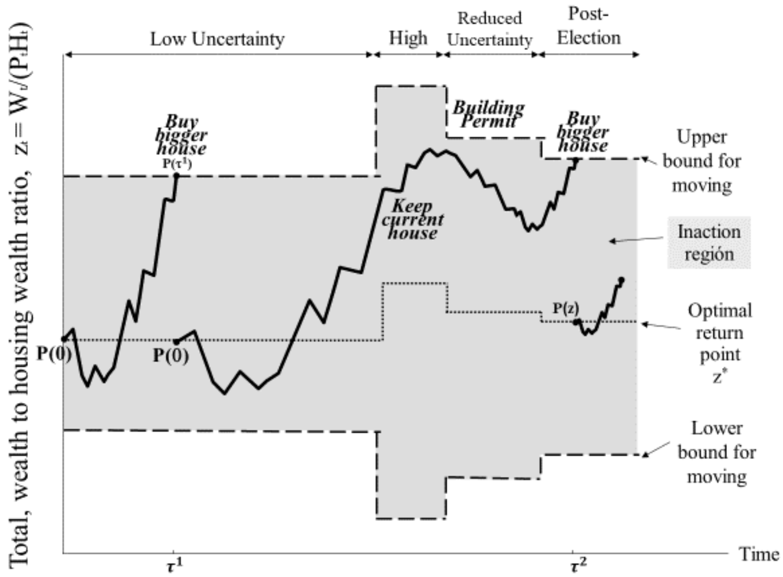


Figure 4: House Price Growth and Building Permits

Figure 4 exhibits the correlation between the annual percentage change in the all-transaction house price index and the number of new private housing units authorized by building permits in the United States from 1982 to 2018.

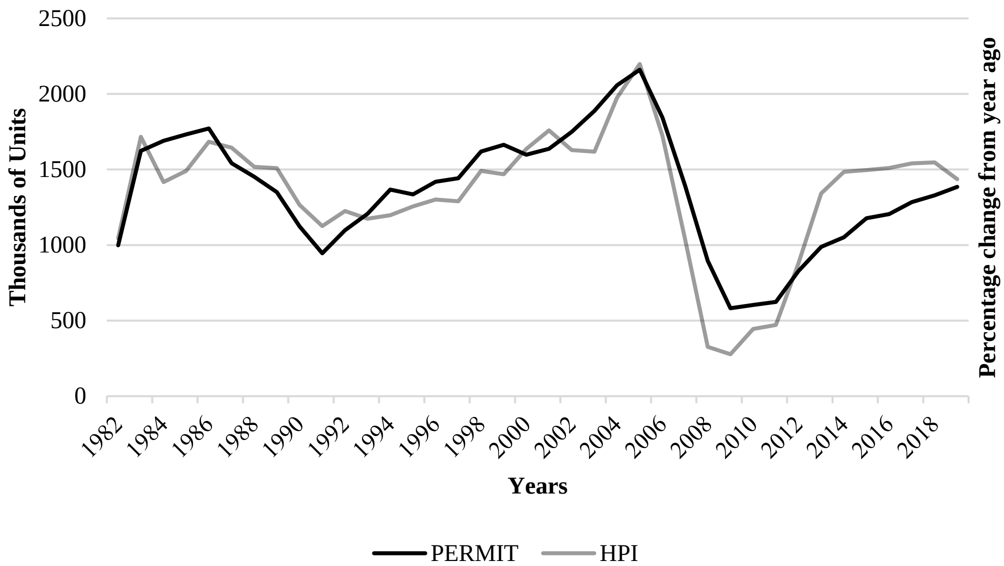


Figure 5: Gubernatorial election cycles in the U.S.

Figure 5 exhibits the 4-year gubernatorial election cycle in the United States using the period 2014 to 2017.

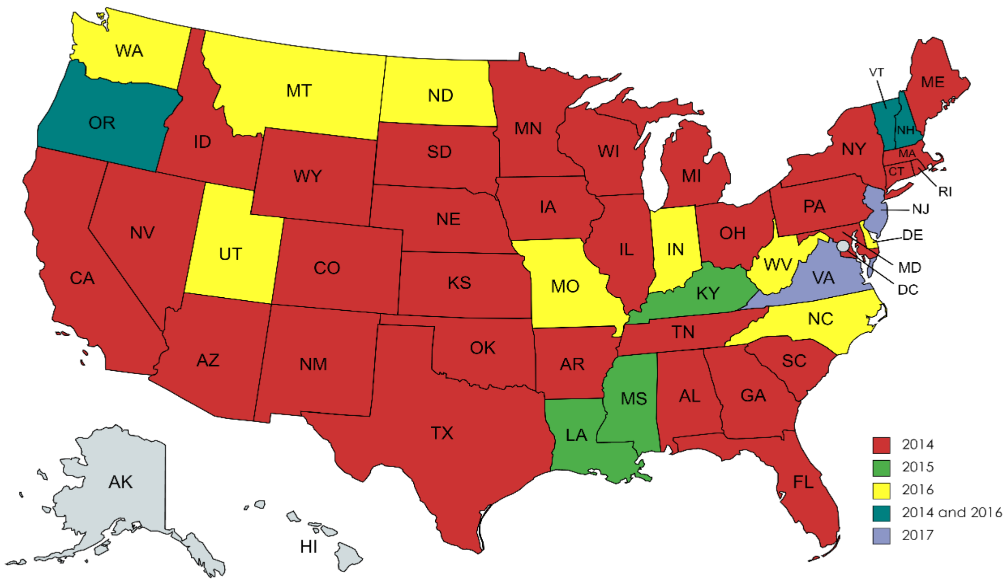
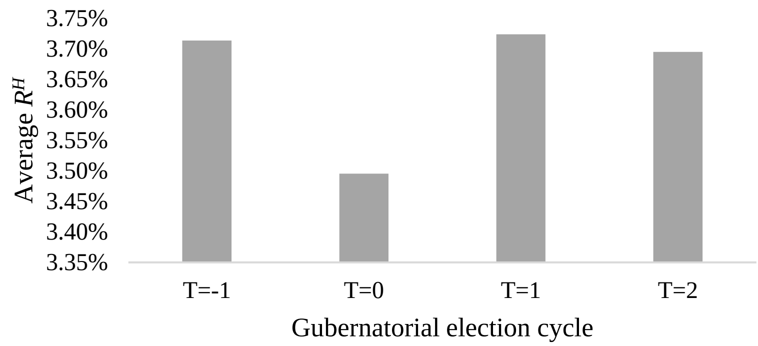


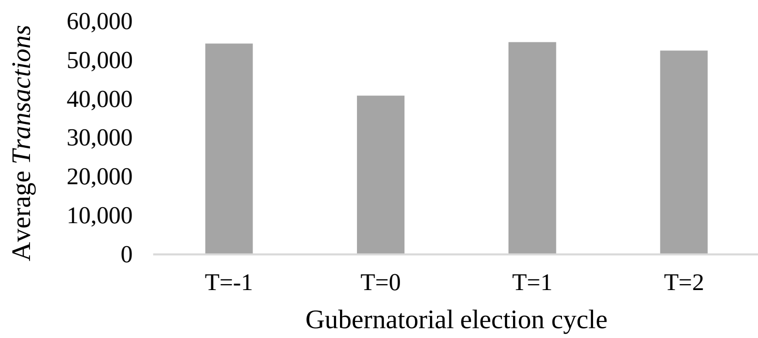
Figure 6: Housing Markets over the Gubernatorial-Election Cycle

Figure 6 plots the average-across-state house price growth R^H (Panel A), averaged-across-state number of housing transactions *Transaction* (Panel B), and averaged-across-state number of building permits *Permit* (Panel C) over the gubernatorial election cycle during the sample period of 1982 to 2018. The 50 states have 508 gubernatorial elections including 47 states with a 4-year election cycle and 3 states (NH, RI, VT) with a 2-year election cycle. In these graphs, we only include states with a 4-year election cycle with the election year is set at T=0. The sample period is 1982 to 2018.

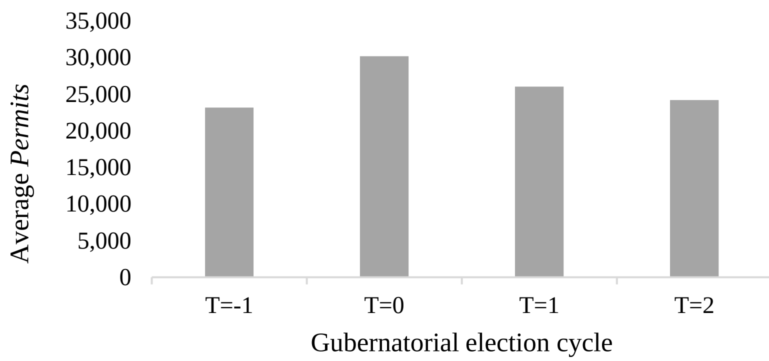
Panel A. Average R^H and Gubernatorial election cycle



Panel B. Average Number of Transactions and Gubernatorial-Election Cycle



Panel C. Average Number of Building Permits and Gubernatorial-Election Cycle



TABLES

Table 1: Summary Statistics

Table 1 provides the summary statistics for the variables we used in our study. All variables are in annual terms: R^H is the relative change or the return of the FHFA house price index at the state level; *Transaction* is the number of housing transactions at the state level; *Permit* is the number of building permits issued at the state level; *Election* is a dummy variable that equals one if a state holds a gubernatorial election and zero otherwise; *Pres_election* is a dummy variable that equals one if there is a presidential election and zero otherwise; *Incumbent_absence* is a dummy variable that equals one if the incumbent is absent from the election due to term limit or personal reasons; *Winning_margin* is the difference between the percentage votes won by the first- and second-place candidates in a gubernatorial election; *Election_closeness* is a dummy variable equal to one if the *Winning_margin* is in the lowest tercile (5.1%) and zero otherwise; *GDP* is the growth rate in gross domestic product at the state level; *Unemployment* is the unemployment rate at the state level; *Population* is the growth rate in the number of residents at the state level; *Emergency* is the dummy variable that equals one if a state declares it is in an emergency situation and zero otherwise. The Appendix shows a detailed description of the variables.

	Whole sample				
Housing variables	Min	Mean	Max	Std. deviation	Num. of obs.
R^H	-0.30	0.04	0.53	0.06	1,850
Transaction	0	54,074	980,433	109,688	1,850
Permit	555	28,714	314,641	36,071	1,850
Political variables	Min	Mean	Max	Std. deviation	Num. of obs.
Election	0.00	0.27	1.00	0.44	1,850
Pres_election	0.00	0.24	1.00	0.42	1,850
Incumbent_absence	0.00	0.40	1.00	0.49	508
Winning_margin	0.00	0.16	0.65	0.14	508
Election_closeness	1.00	0.34	0.00	0.47	508
State-level control variables	Min	Mean	Max	Std. deviation	Num. of obs.
GDP	-0.26	0.05	0.25	0.03	1,850
Unemployment	0.02	0.06	0.18	0.02	1,850
Population	-0.06	0.01	0.12	0.01	1,850
Emergency	0.00	0.30	1.00	0.46	1,850
Homeownership	-0.03	0.04	0.09	0.03	1,850

Table 1: Summary Statistics (cont.)

Housing variables	Min	Mean	Max	Std. deviation	Num. of obs.
	Sub-sample with gubernatorial elections only				
R^H	-0.15	0.03	0.53	0.07	508
Transaction	0	50,612	780,870	107,340	508
Permit	692	29,811	314,641	33,655	508
	Sub-sample with close elections only (with winning margin less than 5.1%)				
Housing variables	Min	Mean	Max	Std. deviation	Num. of obs.
R^H	-0.15	0.03	0.17	0.07	167
Transaction	0	49,748	780,870	112,891	167
Permit	789	30,102	203,238	33,604	167

Table 2: House price Growth, Transactions, and Building Permits in Election Years

Panel A: OLS Regression with Two-Way Fixed Effects

Table 2: Panel A reports the results of the specifications in Equations (1a), (1b), and (1c) that examine the impact of gubernatorial elections on house price growth R^H (Column 1), the number of housing transactions (Column 2), and the number of building permits (Column 3). State and time-fixed effects are included. Standard errors are clustered by state and year and reported in parentheses. *** significant at 1% level. ** significant at 5% level. * significant at 10% level. Sample period: 1982–2018.

	R^H	*Transaction*	*Permit*
	(1)	(2)	(3)
Election	−0.005***	−3,219.293***	583.193***
	(−6.21)	(−7.32)	(4.87)
GDP (lagged)	0.426***	3,188.769***	444.973***
	(5.91)	(3.61)	(2.69)
Unemployment (lagged)	−0.107**	−706.088***	−1,688.747***
	(2.14)	(3.80)	(−4.18)
Population (lagged)	0.722**	4,335.058***	7,536.735**
	(1.97)	(4.01)	(2.31)
Homeownership (lagged)	0.030*	−2,083.753	1,586.937*
	(1.77)	(−1.52)	(−1.69)
Emergency	−0.001	694.743**	1162.844
	(−0.21)	(−2.17)	(0.84)
R^2	0.383	0.410	0.329
Number of observations	1850	1850	1850
Clustered by state and year	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes

Table 2: House Price Growth, Transactions, and Building Permits in Election Years (cont.)

Panel B: Difference-in-Difference with Multiple Time Periods

Table 2: Panel B reports *p*-values of chi-square tests for pretrend assumptions and the results of the specifications in Equations (1a), (1b), and (1c) that examine the average treatment effects denoted as $ATT_{s,t}$ of gubernatorial elections on the house price growth R^H (Column 1), the number of housing transactions (Column 2), and the number of building permits (Column 3) of the treated states using the difference-in-difference methodology with multiple periods. State and time-fixed effects are included. Standard errors are clustered by state and year and reported in parentheses. *** significant at 1% level. ** significant at 5% level. * significant at 10% level. Sample period: 1982–2018.

	R^H	*Transaction*	*Permit*
	(1)	(2)	(3)
P-value of pretrend test	0.281	0.363	0.209
ATT (Treatment: Gubernatorial Election)	−0.003***	−2,166.380***	502.319**
	(−5.09)	(−4.25)	(2.14)

Table 3: U.S. States and Their Neighboring State

State	State code	Num. of neighboring states	Neighboring states (*) NS1	NS2	NS3	NS4	NS5	NS6	NS7	NS8
Alabama	AL	4	**MS**	TN	GA	FL				
Arkansas	AR	6	**MO**	**MS**	**LA**	TX	OK	TN		
Arizona	AZ	5	**UT**	CO	NM	CA	NV			
California	CA	3	**OR**	NV	AZ					
Colorado	CO	7	**UT**	NE	KS	OK	NM	AZ	WY	
Connecticut	CT	3	MA	RI	NY					
Delaware	DE	3	**PA**	**NJ**	**MD**					
Florida	FL	2	GA	AL						
Georgia	GA	5	**NC**	SC	FL	AL	TN			
Iowa	IA	6	**MO**	WI	IL	MN	NE	SD		
Idaho	ID	6	**MT**	**UT**	**OR**	**WA**	WY	NV		
Illinois	IL	5	**IN**	**KY**	**MO**	IA	WI			
Indiana	IN	4	**MI**	**OH**	**KY**	**IL**				
Kansas	KS	4	**MO**	OK	CO	NE				
Kentucky	KY	7	**OH**	**WV**	**VA**	**TN**	**MO**	**IL**	**IN**	
Louisiana	LA	3	**AR**	**TX**	MS					
Massachusetts	MA	5	**NH**	**VT**	RI	CT	NY			
Maryland	MD	4	**DE**	**VA**	**WV**	PA				
Maine	ME	1	**NH**							
Michigan	MI	3	**IN**	WI	OH					
Minnesota	MN	4	**ND**	WI	IA	SD				
Missouri	MO	8	**IA**	**IL**	**KY**	**TN**	**AR**	**OK**	**KS**	**NE**
Mississippi	MS	4	**TN**	**AL**	**AR**	LA				
Montana	MT	4	**SD**	**WY**	**ID**	ND				
North Carolina	NC	4	**VA**	**SC**	**GA**	**TN**				

**Neighboring states with different election cycles are presented in bold letters.*

Table 3: U.S. states and their neighboring state (cont.)

State	State code	Num. of neighboring states	Neighboring states(*)							
			NS1	NS2	NS3	NS4	NS5	NS6	NS7	NS8
North Dakota	ND	3	**MN**	**SD**	MT					
Nebraska	NE	6	**MO**	KS	CO	WY	SD	IA		
New Hampshire	NH	3	**ME**	**MA**	VT					
New Jersey	NJ	4	**NY**	**CT**	**DE**	**PA**				
New Mexico	NM	5	**UT**	OK	TX	AZ	CO			
Nevada	NV	5	**OR**	**UT**	AZ	CA	ID			
New York	NY	5	**VT**	**NJ**	PA	MA	CT			
Ohio	OH	5	**WV**	**KY**	**IN**	MI	PA			
Oklahoma	OK	6	**MO**	KS	AR	TX	NM	CO		
Oregon	OR	4	**WA**	**ID**	**NV**	**CA**				
Pennsylvania	PA	6	**NJ**	**DE**	**WV**	OH	NY	MD		
Rhode Island	RI	2	MA	CT						
South Carolina	SC	2	**NC**	GA						
South Dakota	SD	6	**ND**	**MT**	IA	NE	WY	MN		
Tennessee	TN	8	**KY**	**VA**	**NC**	**MS**	**MO**	GA	AR	AL
Texas	TX	4	LA	AR	OK	NM				
Utah	UT	6	**ID**	**WY**	**CO**	**NM**	**AZ**	**NV**		
Virginia	VA	5	**MD**	**NC**	**TN**	**KY**	**WV**			
Vermont	VT	3	**MA**	**NY**	NH					
Washington	WA	2	**ID**	**OR**						
Wisconsin	WI	4	MI	IL	IA	MN				
West Virginia	WV	5	**PA**	**MD**	**VA**	**KY**	**OH**			
Wyoming	WY	6	**MT**	**UT**	NE	CO	SD	ID		

**Neighboring states with different election cycles are presented in bold letters.*

Table 4: House Price Growth, Transactions, and Building Permits in Election Years

Difference–in–Difference Neighboring Analyses at the State Level

Table 4 reports the results from the difference-in-differences neighboring-state methodology with the specifications in Equations (5a), (5b), and (5c) that examine the impact of gubernatorial elections on the differences in house price growth ΔR^H (Column 1 and 2), the number of housing transactions Δ*Transaction* (Column 3 and 4), and the number of building permits Δ*Permit* (Column 5 and 6) between a state and its neighboring state. All are weighted least square OLS regressions with weight being the number of neighboring states. Standard errors are clustered by state pair and year and reported in parentheses. *** significant at 1% level. ** significant at 5% level. * significant at 10% level. Sample period: 1982–2018.

	ΔR^H		Δ*Transaction*		Δ*Permit*	
	(1)	(2)	(3)	(4)	(5)	(6)
	Whole-sample	Sub-sample	Whole-sample	Sub-sample	Whole-sample	Sub-sample
Δ*Election*	-0.0021***	-0.0028***	-1123.794***	-1582.016***	206.883***	312.421***
	(-7.22)	(-5.03)	(-8.06)	(-6.11)	(5.35)	(4.78)
Δ*GDP (lagged)*	0.115**	0.124***	410.116*	391.475**	126.523*	160.544**
	(2.03)	(2.72)	(-1.77)	(-1.99)	(1.69)	(2.58)
Δ*Unemployment (lagged)*	-0.106	-0.166**	-602.932**	-721.264	-244.031*	-402.084*
	(0.64)	(2.87)	(1.97)	(1.22)	(1.68)	(1.69)
Δ*Population (lagged)*	1.176***	1.160***	1705.024***	1794.482*	1349.279***	1644.365***
	(4.02)	(4.71)	(3.01)	(1.72)	(4.38)	(4.56)
Δ*Homeownership (lagged)*	0.038**	0.183	1321.473**	967.277*	408.415***	160.544**
	(1.72)	(1.65)	(2.15)	(1.94)	(3.27)	(2.58)
Δ*Emergency (Lagged)*	-0.001	0.001	-706.329	-814.148*	-331.187	-464.346
	(0.87)	(0.53)	(0.85)	(1.85)	(1.49)	(1.35)
R_squared	0.382	0.251	0.494	0.351	0.218	0.220
Number of observations	3891	2218	3891	2218	3891	2218
Clustered by state pair and year	Yes	Yes	Yes	Yes	Yes	Yes

Table 5: House price Growth, Transactions, and Building Permits in Election Years

Difference-in-Difference Neighboring Analyses at the County Level

Table 5 reports the results from the difference-in-differences neighboring analyses using cross-border counties in all regions (Columns 1, 3, and 5) and in MSAs regions only (Columns 2, 4, and 6) with the specifications in Equations (5a), (5b), and (5c) that examine the impact of gubernatorial elections on the differences in house price growth ΔR^H (Column 1 and 2), the number of housing transactions $\Delta Transaction$ (Column 3 and 4), and the number of building permits $\Delta Permit$ (Column 5 and 6) between a county and its cross-border neighbor. Standard errors are clustered by county pair and year and reported in parentheses. *** significant at 1% level. ** significant at 5% level. * significant at 10% level. Sample period: 1982–2018.

	ΔR^H		$\Delta Transaction$		$\Delta Permit$	
	All regions	MSAs only	All regions	MSAs only	All regions	MSAs only
	(1)	(2)	(3)	(4)	(5)	(6)
Δ*Election*	-0.002***	-0.002***	-14.237***	-11.379***	3.022***	2.938***
	(-6.21)	(-5.69)	(-7.32)	(-6.94)	(4.87)	(4.16)
Δ*GDP (lagged)*	0.093**	0.128**	5.166**	4.116**	1.623**	1.325**
	(2.46)	(2.37)	(-2.18)	(-2.07)	(2.09)	(2.19)
Δ*Unemployment (lagged)*	-0.108**	-0.120***	-6.937***	-6.203**	-2.440*	-2.410*
	(2.02)	(2.81)	(2.36)	(1.99)	(1.88)	(1.77)
Δ*Population (lagged)*	0.917***	1.062***	8.102***	11.154***	3.199**	5.972***
	(3.49)	(3.95)	(3.91)	(3.72)	(2.40)	(4.03)
Δ*Homeownership (lagged)*	0.043**	0.040**	6.415**	6.214**	4.329***	4.085***
	(2.00)	(2.12)	(2.51)	(2.05)	(3.03)	(3.73)
Δ*Emergency (Lagged)*	-0.002*	-0.001	-4.167	-3.306	-3.118	-2.319
	(1.67)	(0.96)	(0.82)	(1.22)	(1.04)	(1.51)
R_squared	0.515	0.406	0.328	0.284	0.216	0.297
Number of observations	89,416	22,504	89,416	22,504	89,416	22,504
Clustered by cross-border county pair and year	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Post-Election Analyses

Table 6 presents the results of six OLS regressions (6a), (6b), (6c), (6d), (6e), and (6f) to examine the post-election reversal effect on the house price growth R^H (Columns 1 and 2); the number of housing transactions *Transaction* (Columns 3 and 4); and the number of building permits *Permit* (Columns 5 and 6). State and time-fixed effects are included. Standard errors are clustered by state and year and reported in parentheses. *** significant at 1% level. ** significant at 5% level. * significant at 10% level. Sample period: 1982–2018.

Variables	R^H		*Transaction*		*Permit*	
	(1)	(2)	(3)	(4)	(5)	(6)
Post_election_1	0.007***	0.006***	761.244***	976.027***	-355.617***	-435.041**
	(-3.28)	(-3.01)	(-4.87)	(-3.50)	(5.29)	(4.81)
Post_election_2		0.003*		1034.419**		-293.724**
		(1.75)		(2.05)		(1.99)
GDP (Lagged)	0.312***	0.305***	473.127***	433.956***	396.592***	368.104***
	(3.85)	(3.72)	(-4.19)	(-3.67)	(3.78)	(3.42)
Unemployment (Lagged)	-0.236***	-0.214***	-1748.306***	-1681.705***	-721.004***	-634.124***
	(3.96)	(4.03)	(-4.24)	(-4.57)	(3.23)	(3.03)
Emergency	-0.001	-0.001	1267.913	1145.250	694.447**	589.288**
	(-0.26)	(-0.23)	(0.90)	(0.87)	(2.14)	(2.09)
Population(Lagged)	0.808***	0.762***	-7323.057	-6239.53	8910.639***	7244.391***
	(6.99)	(5.82)	(-0.46)	(-0.41)	(4.32)	(3.08)
Homeownership (Lagged)	0.043**	0.055**	5541.029**	6355.766**	3218.438**	3834.591**
	(2.47)	(2.89)	(-2.18)	(-1.81)	(2.02)	(1.97)
R_squared	0.154	0.156	0.147	0.182	0.156	0.171
Number of observations	1850	1850	1850	1850	1850	1850
Clustered by state and year	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Table 7. Subsamples by Degree of Uncertainty in Election Outcomes

Table 7 presents the results from the OLS regressions for the high political-uncertainty and low political-uncertainty subsamples, separately. Panel A presents results for house price growth, Panel B for the number of transactions, and Panel C for the number of building permits. The subsamples are identified based on two measures: *Election_closeness* is a dummy variable equal to one if the winning margin is in the lowest tercile (5.1%) and zero otherwise (the winning margin is the difference between the percentage votes won by the first- and second-place candidates in a gubernatorial election); *Incumbent_absence* is a dummy variable that equals one if the incumbent is absent from the election due to term limits or personal reasons and zero otherwise. We classify elections as of high uncertainty if either *Election_closeness* equals one or *Incumbent_absence* equals one; the rest of the elections are classified as of low uncertainty. Standard errors are clustered by state pair and year and reported in parentheses. *** significant at 1% level. ** significant at 5% level. * significant at 10% level. We report the Wald test *F*-statistics to check if coefficients are the same between subsamples. Sample period: 1982–2018.

Panel A. House price Growth (R^H) and Gubernatorial Elections

	Election closeness		Incumbent absence	
	High_Uncertainty	Low_Uncertainty	High_Uncertainty	Low_Uncertainty
Δ*Election*	-0.003***	0.001	-0.003***	-0.002***
	(-9.31)	(1.08)	(-6.44)	(-3.07)
Δ*GDP (Lagged)*	0.186	0.208*	0.206**	-0.185
	(0.97)	(1.81)	(2.29)	(-0.64)
Δ*Unemployment (Lagged)*	-0.546***	-0.820***	-0.394	-0.216
	(3.81)	(-3.27)	(-1.38)	(-1.12)
Δ*Population (Lagged)*	1.895***	0.925*	1.704***	1.609***
	(5.13)	(1.78)	(3.72)	(3.54)
Δ*Homeownership (Lagged)*	0.166*	0.308*	0.213*	0.194
	(1.79)	(1.26)	(1.90)	(1.62)
Δ*Emergency (Lagged)*	-0.003	-0.009***	-0.001	-0.007***
	(-1.17)	(-3.38)	(-0.42)	(-2.59)
R_squared	0.124	0.133	0.125	0.104
Number of observations	292	691	434	549
Wald test (reported F-stat and p_value)	3.92**		4.03**	
	(0.047)		(0.045)	

Table 7. Subsamples by Degree of Uncertainty in Election Outcomes (cont.)

Panel B. Changes in the Number of Housing Transactions and Gubernatorial Elections

	Election closeness		Incumbent absence	
	High_Uncertainty	Low_Uncertainty	High_Uncertainty	Low_Uncertainty
Δ*Election*	-1437.426***	-808.977**	-1658.681***	-953.204**
	(-5.36)	(2.23)	(-3.72)	(-2.26)
Δ*GDP (Lagged)*	2249.724***	1833.215*	2591.880**	1455.614
	(3.44)	(-1.73)	(-2.47)	(-1.27)
Δ*Unemployment (Lagged)*	-3018.722***	-2714.590***	-1568.473***	-1058.895***
	(3.59)	(2.82)	(3.01)	(3.26)
Δ*Population (Lagged)*	2065.368**	1604.369**	2886.904***	1765.291**
	(3.03)	(3.17)	(2.88)	(1.97)
Δ*Homeownership (Lagged)*	325.018	1419.276	653.721	2497.871
	(-0.09)	(1.08)	(-0.40)	(1.56)
Δ*Emergency (Lagged)*	-1018.532	1419.213	-1763.691	2297.118
	(-0.09)	(1.08)	(-0.40)	(1.56)
R_squared	0.107	0.124	0.162	0.189
Number of observations	292	691	434	549
Wald test (reported F-stat and p_value)	4.23**		4.76**	
	(0.040)		(0.029)	

Table 7. Subsamples by the Degree of Uncertainty in Election Outcomes (cont.)

Panel C. Changes in the Number of Building Permits and Gubernatorial Elections

	Election closeness		Incumbent absence	
	High_uncertainty	Low_uncertainty	High_uncertainty	Low_uncertainty
Δ*Election*	415.837***	184.103**	387.499***	108.610**
	(4.57)	(2.05)	(7.89)	(2.12)
Δ*GDP (Lagged)*	145.212***	86.329***	168.009***	115.036***
	(5.47)	(3.02)	(2.86)	(3.46)
Δ*Unemployment (Lagged)*	158.062**	197.433***	241.008***	259.392**
	(2.21)	(2.58)	(3.21)	(2.50)
Δ*Population (Lagged)*	504.754***	689.442***	846.001***	763.55***
	(3.59)	(3.73)	(3.26)	(3.91)
Δ*Homeownership (Lagged)*	188.710	395.016	263.823	859.132
	(0.59)	(0.58)	(1.21)	(1.50)
Δ*Emergency (Lagged)*	598.543	652.578	613.909	597.112
	(1.15)	(1.29)	(0.88)	(1.02)
R_squared	0.153	0.177	0.174	0.191
Number of observations	292	691	434	549
Wald test (reported F-stat and p-value)	3.87**		5.01**	
	(0.049)		(0.025)	

Table 8: Summary Statistics of the Mortgage and Bank Characteristic Data:

Bank-Level Variables

Table 8 provides the summary statistics for the variables we used in our study. We derived all variables annually and at the state level as well as the bank level. log(*Volume*) is the natural logarithm of the volume of mortgages originated. *Approval_rate* is the number of mortgage applications approved divided by the total number of mortgage applications. *Application* is the annual percentage change in the number of mortgage applications. *Deposit_cost* is the interest expense on core deposits divided by the quarterly average cost of core deposits. *Core_deposit* is the sum of transaction deposits, savings, and small-time deposits that form a stable source of funds divided by total assets. *Return_on_equity* is net income divided by total equity. *Liquid_assets* is the sum of liquid assets divided by total assets; liquid assets include cash, federal funds sold, reverse repossessions, and securities excluding mortgage-backed securities and asset-backed securities. *Size* is the logarithm of the total assets. *Home_mortgage* is the volume of residential-mortgage loans divided by total loans. The Appendix shows a detailed description of the variables.

Variable	Min	Mean	Max	St.dev	Num. of obs.
State-level					
Log(Volume)	9.18	13.89	19.58	1.32	1450
Approval_rate	0.75	0.91	0.96	0.14	1450
Application	-0.98	0.18	0.68	0.20	1450
Bank-level					
Log(Volume)	0.69	9.07	19.42	1.83	116,284
Approval_rate	0.00	0.92	1.00	0.16	116,284
Application	-0.24	0.11	0.15	0.19	116,284
Deposit_cost	0.02	0.03	0.04	0.01	116,284
Core_deposit	0.56	0.69	0.81	0.10	116,284
Return_on_equity	-0.31	0.12	0.26	0.04	116,284
Liquid_assets	0.17	0.28	0.46	0.12	116,284
Size	9.07	12.12	21.45	2.08	116,284
Home_mortgage	0.11	0.26	0.43	0.09	116,284

Table 9: State-Level Baseline OLS

Political Uncertainty and Mortgage Markets

Table 9 reports the results of the baseline OLS estimates of the specifications in Equations (7a), (7b), and (7c) that examine the impact at the state level of gubernatorial elections on the volume of mortgages originated log(*Volume*), the mortgage-approval rate *Approval_rate*, and the relative change in the number of mortgage applications *Application*. State- and time-fixed effects are included. Standard errors are clustered by state and year and reported in parentheses. *** significant at 1% level. ** significant at 5% level. * significant at 10% level. Sample period: 1990–2018.

	Log(Volume)	*Approval_rate*	*Application*
Election	-0.072***	-0.048**	-0.094***
	(-4.16)	(-2.07)	(-5.21)
GDP (lagged)	0.405***	0.895**	0.924***
	(8.34)	(2.30)	(4.67)
Unemployment (lagged)	-0.906**	-0.822***	-0.529***
	(-3.11)	(-4.97)	(-10.08)
Emergency (Lagged)	-0.004*	-0.008**	-0.016*
	(1.66)	(1.98)	(1.71)
Population(lagged)	0.758**	0.593*	0.846***
	(2.64)	(1.89)	(9.02)
Homeownership (Lagged)	0.561*	0.108**	0.085*
	(1.87)	(-2.34)	(-1.71)
R_squared	0.2416	0.2803	0.4214
Number of observations	1450	1450	1450
Clustered by state and year	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes
Time fixed effects	Yes	Yes	Yes

Table 10: Neighboring State Analysis: Political Uncertainty and Mortgage Markets

Table 10 reports the results from the difference-in-differences neighboring-state methodology with specifications in Equations (8a), (8b), and (8c) that examine the impact of gubernatorial elections at the state level on the differences in the volume of mortgages originated Δlog(*Volume*), the mortgage-approval rate Δ*Aprroval_rate*, and the annual relative change in the number of mortgage applications Δ*Application* between a state and its neighboring state. Standard errors are clustered by state pair and year and reported in parentheses. *** significant at 1% level. ** significant at 5% level. * significant at 10% level. Sample period: 1990–2018.

	Δ*Log(Volume)*	Δ*Approval_rate*	Δ*Application*
Δ*Election*	-0.058**	-0.032*	-0.089***
	(2.01)	(1.45)	(3.16)
Δ*GDP (Lagged)*	0.237***	0.649**	0.774**
	(7.88)	(1.73)	(2.12)
Δ*Unemployment (Lagged)*	-0.814**	-0.728***	-0.446***
	(2.48)	(4.61)	(9.32)
Δ*Population (Lagged)*	0.529**	0.213*	0.628***
	(2.17)	(1.54)	(7.00)
Δ*Homeownership (Lagged)*	0.026	0.009**	0.112*
	(1.02)	(2.08)	(1.72)
Δ*Emergency (Lagged)*	-0.004*	-0.008**	-0.016*
	(1.66)	(1.98)	(1.71)
R_squared	0.522	0.564	0.481
Number of observations	2938	2938	2938
Clustered by state pair and year	Yes	Yes	Yes

Table 11: Political uncertainty and mortgage markets: Bank-level analysis

Table 11 reports the results of specifications (9a), (9b), and (9c) that examine the impact of gubernatorial elections at the bank level on the volume of mortgages originated log(*Volume*), the mortgage-approval rate *Approval_rate*, and the annual relative change in the number of mortgage applications *Application*. Standard errors are clustered by bank and year and reported in parentheses. *** significant at 1% level. ** significant at 5% level. * significant at 10% level. Sample period: 1990–2018.

	log(Volume)	*Approval_rate*	*Application*
Election	-0.046***	-0.063**	-0.087***
	(3.51)	(2.53)	(4.09)
Size	0.033***	0.024***	0.086**
	(10.41)	(3.67)	(1.98)
Home_mortgages	0.948**	0.489*	0.052
	(2.57)	(1.86)	(1.20)
Core_deposits	0.657***	0.704**	0.029**
	(4.79)	(2.34)	(2.22)
Deposit_cost	4.077***	6.352**	0.008
	(3.23)	(2.49)	(1.32)
Liquid_assets	2.328*	3.589**	1.903
	(1.84)	(2.04)	(1.27)
Return_on_equity	6.142	2.787	3.026
	(0.95)	(0.45)	(0.45)
State control variables	Yes	Yes	Yes
R-squared	0,43	0,41	0,38
Number of observations	116,284	116,284	116,284
Bank-State fixed effects	Yes	Yes	Yes
State-Time fixed effects	Yes	Yes	Yes