Political Polarization and Corporate Investment*

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ABSTRACT

Using data on roll-call voting patterns of U.S. state legislators from 1993 to 2016, we find a negative relationship between firm investment and state legislative polarization, measured as the ideological distance between the Democratic and Republican party medians. An increase of one standard deviation in the average within-state polarization leads to a 4.5% reduction in firm investment rates, controlling for growth opportunities and economic conditions. In response to heightened political polarization, firms are more likely to move their corporate headquarters to less polarized states. We find that polarized states have lower passing rates for legislative bills and higher volatility in economic policy, suggesting that legislative gridlock and policy instability may be two possible mechanisms through which polarization affects firm decisions. Our paper provides new insights into the real effects of political polarization.

Keywords: Political polarization; Corporate investment; State legislatures; Partisan ideology.

JEL Classification: G18, G31, D72, D81

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1. Introduction

There is general agreement that political polarization in the U.S. has been increasing rapidly in recent years, both among legislators and voters (Baker et al. (2014)). Poole and Rosenthal's (1985) measure of polarization, based on voting-based ideological locations of legislators, has been increasing since the 1960s. Increased polarization has been shown to be an impediment to cooperation in political settings, leading to gridlock and a variety of policy and governance failures.[1] But does political polarization also affect economic behavior in nonpolitical settings? This topic has recently received increased attention from academics, policymakers, and the media, with many business leaders arguing that extreme political polarization and dysfunction induced by the current polarized political system is the biggest obstacle to strengthen U.S. economic growth and competitiveness, as it prevents meaningful progress on actions needed to address core economic and social weaknesses.[2] In this paper, we investigate how political polarization affects firms' real investment decisions.

Despite the frequency of appeals to unity by business and political leaders,[3] there is a lack of empirical evidence directly linking the polarization of political parties within the U.S. to changes in firm behavior. Existing empirical work has focused on partisan conflict based on text-based counts of conflict-related keywords from news media (Azzimonti (2018)) or other indirect measures of political preferences, such as income, ethnicity, or religion (Cukierman, Edwards and Tabellini (1992), Svensson (1998), and Frye (2002)). We fill this void in the literature by empirically ex-

[1] This line of research suggests that political polarization leads to a variety of negative policy outcomes including declines in legislative productivity (Binder (1999)), increasing income inequality (McCarty, Poole and Rosenthal (2006)), and smaller size and lower quality of government (Alesina, Baqir, and Easterly (1999), Lindqvist and Östling (2010), and Alesina and Zhuravskaya (2011)). Moreover, polarization of legislatures indicates a growing disconnect between public opinion and policy making, resulting in potentially biased representation in Congress (Bartels (2010) and Bonica et al. (2013)).

[2] Source: "A Recovery Squandered: The State of U.S. Competitiveness 2019," Harvard Business School U.S. Competitiveness Project, December 18, 2019, `https://www.hbs.edu/competitiveness/Pages/default.aspx`.

[3] Having been frustrated with partisan polarization and gridlock in Washington during his presidency, Obama said in a 2016 interview with CBS News, "The one thing that gnaws on me is the degree of continued polarization, and it's gotten worse over the last several years." Source: Barack Obama Interview with Lee Cowan, *CBS News*, January 24, 2016. `https://www.cbsnews.com/news/obama-looks-back-upon-his-presidency-and-beyond/2/`.

amining how political polarization of parties in state legislatures affects corporate investments in the United States. We also provide motivation and evidence for several unexplored mechanisms through which that relationship occurs.

Economic theory emphasizes a number of mechanisms through which political polarization may affect political and economic outcomes. First, political polarization causes legislative gridlock and inaction that reduces the ability of the government to implement its political agenda (McCarty (2007)). The resulting legislative gridlock impedes the optimal response to adverse shocks and inhibits the introduction of coherent economic policies aimed at solving them (Alesina and Drazen (1991)).[4] To the extent that polarization negatively affects those responses, it may leave firms open to investment risks created by economic shifts brought on by financial crises or economic downturns. This lowers firms' expected returns, and hence discourages investment. We refer to this mechanism as the legislative gridlock channel. Second, high political polarization and fragmentation makes future economic conditions less credible and predictable because firms expect a potential turnover in government to bring sharp swings in policy (Frye (2002) and Azzimonti and Talbert (2014)). In that case the government turnover leads to a revision of previous policy and consequently no side is able to implement a stable policy program across time.[5] Because political polarization introduces instability and uncertainty about economic policy, this may hold back firm investment (Baker et al. (2014, 2016)). We view this mechanism as the policy instability channel. Both channels predict a negative relationship between political polarization and investment.[6] We take these two predictions to the data and find them to be consistent with the data.

[4]In support of this view, Mian, Sufi and Trebbi (2014) provide evidence from a large sample of countries showing that, following a financial crisis, heightened ideological polarization weakens ruling coalitions and creates legislative gridlock that hampers reform efforts.

[5]For example, consider a firm in a polarized state which is planning to make an investment after the introduction of an economic reform program. Facing the probability that the current government may give way to a new government with far different policy preferences that will put any such investment at risk, it will refrain from investing.

[6]Although the two underlying mechanisms discussed above are different, they are both related in the sense that polarization creates government inefficiency and dysfunction that impedes investment. We refer to the general decline in investment in response to increased political polarization stemming from any one or both of these adverse potential consequences as the "political dysfunction hypothesis."

One of the main challenges in this line of research is finding an appropriate measure of political polarization. Our approach uses roll call data from state legislatures to measure polarization both across states and over time. Shor and McCarty (2011) have recently developed measures of state legislator ideology which can be used to measure party positions and polarization over time for the fifty states. These measures use roll call data for all state legislative chambers to characterize legislators' voting behavior and are constructed such that they are comparable across states and time. By convention, more positive scores represent more conservative preferences, and more negative scores represent liberal preferences. We use these estimates to construct a chamber-level measure of legislative polarization that reflects the difference in roll call estimates between the median Democratic and Republican members of the state legislature. Since all states except Nebraska have bicameral legislatures, we aggregate scores from two chambers to obtain a state-level measure.[7] The values of the measure range from approximately zero to three, with higher levels indicating states and chambers with more polarized legislatures. As Shor and McCarty (2011) show, these measures show considerable variation in polarization across states and legislative chambers over time, which allows us to more precisely identify the effects of political polarization.

To estimate the effect of state-level political polarization on corporate investment, we use the measure proposed by Shor and McCarty (2011) that averages the polarization measures from the two chambers in each state. Besides the standard proxies for investment opportunities (Tobin's Q and cash flows), we also control for state-level economic conditions (GDP growth rate). This is meant to alleviate endogeneity concerns stemming from the fact that polarization tends to be countercyclical and could therefore be capturing the effect of poor economic prospects. Using a panel of U.S. public firms from 1993 to 2016 and the roll call-based measures of state legislative polarization, we find evidence of a significant and negative relationship between political polariza-

[7]The aggregate measure helps avoid chamber-level polarization measures that are sensitive to small sample sizes, as most state legislatures' upper chambers have fewer than 50 members. However, because states' lower chambers usually have more members than their upper chambers, this approach will produce aggregate estimates of polarization effects on investment that more closely reflect their effects on the lower chambers. Therefore, in robustness tests, we also present results distinguished by upper and lower chambers and find similar results.

tion and firm investment. The magnitude of the estimates is economically large. In our preferred specification, we estimate that an increase of one standard deviation in the average within-state legislative polarization is associated with an average decrease in investment rates of approximately 4.5% relative to the average investment rate in the sample. The results are robust across a wide range of subsamples, model specifications, identification strategies, and characterizations of key variables.

Since the polarization measure is computed by having Republican party median ideology minus Democratic party median ideology, we next ask whether polarization in either direction (Republican or Democrat) have larger effects on investment. In particular, we examine whether the asymmetry in party ideologies, the extent to which one party is more extreme than the other, matters more than the distance between the parties. To assess the asymmetric polarization effects, we estimate our regressions separately using the average, across the two chambers, of the two Democratic and Republican party medians as our measure of ideological asymmetry. This measure capture the overall conservatism or liberalism of one party. The result shows little evidence of an asymmetric polarization effect in ideology between the two parties. Using other similar measures of asymmetric polarization, such as those based on the relative conservativeness of a state's Republican legislators compared to the state's Democrats, do not meaningfully change our results. Taken together, the results appear to suggest that polarization itself, and not any particular political leaning, is responsible for the negative impact of polarization in state legislatures.

Next, we explore the specific mechanisms behind the effects of polarization on investment. Greater polarization of state legislatures could lead to lower investment through two possible channels, namely, legislative gridlock and policy instability, when the government fails to implement its political agenda or frequently flip-flops on previously held policy positions due to heightened partisan conflict among political parties. To test the gridlock channel, we study both the relation between political polarization and legislative gridlock as well as how legislative gridlock affects the sensitivity of investment to polarization. Following existing literature, we use the productivity

of landmark legislation to capture the actual degree of legislative gridlock.[8] In particular, we focus on a single but important policy area: energy policy, and measure state legislative productivity as the percentage of all introduced energy bills that eventually become enacted into law by a state legislature during a legislative cycle.[9] Using our measure of legislative gridlock, we find that higher political polarization increases gridlock by reducing the ability of legislatures to enact significant proposals that address pressing issues. In the further sensitivity analysis, we find that the adverse impact of polarization on firm investment is significantly larger when legislative gridlock is more intense and severe. Taken together, the evidence suggests that legislative gridlock could be an important mechanism through which political polarization impedes firm investment.

An alternative mechanism for the negative effects of polarization on investment stresses the potential for political polarization to produce more extreme policies, more policy uncertainty, and less policy stability (Baker et al. (2014)). To the extent that the lack of confidence and skepticism about the stability of economic policies force firms to reduce or delay capital investment, another potential link between polarization and investment is established. We examine the policy instability channel using an indicator of state-level policy instability based on the volatility of actual state policy outcomes (Azzimonti and Talbert (2014)). More specifically, following Seegert (2018), we measure state-level policy instability as the volatility of state tax revenue as a percentage of output. Using this measure, we find a positive and significant correlation between state-level policy instability and the degree of political polarization. We also find that firm investment rates are more negatively affected by political polarization when firms face more policy instability. The findings are again consistent with our hypothesis that macroeconomic instability associated with frequent

[8]Of course, political polarization makes compromise more difficult, but this should affect major policy changes much more than routine adjustments. We expect that polarization should have no effect on overall levels of legislative productivity, only on landmark pieces of legislation. Our empirical results clearly demonstrate that political polarization does not imply general legislative gridlock, but it does render important policy change more difficult.

[9]Quantifying legislative productivity in this manner allows us to capture bill significance in a way that raw bill counts cannot. As discussed in §3.4, our measure of legislative productivity takes account of bill significance and is commonly viewed as a better indicator of political gridlock than those raw productivity numbers that have relied exclusively on aggregate counts of all bills.

changes in government policies can be another underlying mechanism through which political polarization translates into lower firm investment rates.

Our analysis then turns to examine whether state-level legislative polarization affects a firm's location choice. Using data on firms' headquarters location changes, we study whether firms relocate in response to increased political polarization. Given that the cost of heightened political polarization might place a high enough burden on a firm, it would find it beneficial to relocate to another state with less polarized politics. Linking relocation decisions to changes in state legislative polarization, we find evidence that firms are significantly more likely to move away from highly polarized states to less polarized states in response to the adverse effects of increasing partisan conflicts on the local economy.

Despite the clear advantages of using U.S. state legislative roll call data to measure political polarization, there are several challenges to empirically establish the relation between polarization and firm investment. First, it is difficult to distinguish the effect of polarization from other factors, such as investment opportunities, that could also affect firms' investment decisions. Second, the effect of political polarization on investment can be confounded by economic weakness as poor economic conditions in a state, including low firm investment, can arguably generate a great deal of political discord and disagreement as voters or legislators react to the poor local economy. The existing literature has shown that populism and polarization tend to arise during times of economic hardship and job insecurity (e.g., Inglehart and Norris (2016) and Algan et al. (2017)). This suggests that causality may also run in the opposite direction. Therefore, the OLS specification will likely estimate a lower effect of political polarization on investment if polarization is related to economic weakness. To address this source of endogeneity in measuring polarization, we employ two instrumental variables that explore settings rarely considered in the finance literature. The first instrument uses partisan bias in legislative redistricting as an instrument for state-level political

polarization. The second instrument is a quasi-natural experiment tied to the staggered adoption of legislative term limits across states and over time.[10]

Both instruments are orthogonal to potential outcomes and capture some kind of exogenous variations in state-level political polarization in the first-stage estimation but are less susceptible to the endogeneity problem of reverse causality and omitted variable bias discussed above. The estimates from the instrumental variable regressions support a causal interpretation that political polarization affects firm investment. For example, when using term limits as an instrument, the decline in investment caused by the higher political polarization associated with the adoption of state legislative term limits is greater than 10%, more than twice the decline predicted with the OLS specification. This is likely due to some of the decline in investment caused by higher political polarization being confounded by economic factors. Therefore, in the absence of the endogeneity brought on by lower investment causing higher polarization, a larger effect of polarization on investment is measured.

This paper directly connects to the large literature on the real effects of political institutions. In particular, a predominant stream of recent research explores a variety of underlying channels which can drive a causal effect of political cycles on financial markets and firm-level outcomes. Government spending (Belo, Gala, and Li (2013)), campaign contributions (Cooper, Gulen, and Ovtchinnikov (2010) and Akey and Lewellen (2017)), changes in the degree of political connectedness (Faccio (2006), Fisman (2001) and Akey (2015)), political uncertainty (Julio and Yook (2012), Jens (2017) and Kelly, Pastor and Veronesi (2016)), and political bias (Santa-Clara and Valkanov (2003) and Di Giuli and Kostovetsky (2014)) have been shown to matter in explaining how politics influence. Here, we focus on U.S.institutions and corporate investment by U.S.public firms. Complementary to investigating the relationship between politics and finance through the lens of partisanship, our paper thus adds to this line of research by showing evidence that political

[10]The instruments are explained and motivated in greater detail in Section 3.6.

polarization between parties has a negative effect on firm investment and the effect is likely to work through the channel of legislative dysfunction.

Our paper also contributes to the political economy literature on the consequences of political polarization. The literature has almost exclusively focused on the origins and causes of political polarization as well as how it impacts political outcomes such as governance and policymaking, but empirical evidence on the economic consequences of polarization is relatively scarce.[11] This is not the first paper relating political polarization to economic performance empirically.[12] However, to the best of our knowledge, this paper provides the first investigation of the effect of political polarization on firm investment rates using a measure of polarization based on state legislative roll-call votes across all 99 state legislative chambers for the period 1993-2016. The paper closest to ours is Azzimonti (2018), who constructs a new quantitative measure of partisan conflict based on news provided by the media to show that news about political disagreement adversely affect capital investment rates at the firm level. We improve on this strand of the literature in several important ways. First, and perhaps most importantly, we use the roll call-based measure of state legislative ideology drawn from Shor and McCarty (2011) to reflect a rise in the actual ideological polarization between political parties, allowing us to precisely estimate the effect of local partisan polarization on local investment decisions. While the country-level partisan conflict index tracks changes in aggregate media coverage of partisan conflict, it fails to clearly identify and separate partisan conflict at the various levels of government. It is also possible that rising partisanship in the media is merely a reflection of the fact that economic agents, such as voters or investors have increasingly distinct views about economic conditions, rather than a rise in actual partisan conflict.

[11] See, for example, Barber and McCarty (2015) for a recent review of the political science literature on polarization.

[12] Different from our paper that uses direct measures of polarization political between parties, this line of research has focused on political polarization and various economic outcomes using indirect measures of political preferences among the mass public based on their income, ethnicity, or religion. See, for example, Alt and Lassen (2006), Cukierman, Edwards and Tabellini (1992), Frye (2002), and Svensson (1998). However, if political views do not follow straight from economic self-interest or group identification, polarization in terms of income, ethnicity, or religious beliefs may not fully capture the true level of polarization among the political elites.

This suggesting that the news-based measure of partisan conflict may not fully capture the true level of political polarization.

The remainder of the paper proceeds as follows. Section 2 describes the sample, measurement of variables, and summary statistics. Section 3 discusses the identification strategy and presents our main empirical results on the effect of political polarization on firm investment, including various subsample analyses, multiple robustness checks, and an examination of possible channels through which this effect occurs. Section 4 concludes.

2. Data

2.1. Measuring Ideological Polarization in State Legislatures

Our preferred measure of state legislative polarization is derived from a dataset of ideology scores for individual state legislators, originally developed by Shor and McCarty (2011), and updated since. Although an individual state legislator may cast hundreds or even thousands of roll call votes, their voting behavior can usually be parsimoniously summarized in terms of a single left-right ideology score, their estimated ideal point. Using millions of state legislative roll call votes, Shor and McCarty (2011) have recently developed such ideal points for nearly every state legislator which can be used to measure party positions and polarization over time for the 50 states. These estimated ideal points summarize the ideological differences between different legislators, as expressed in their roll-call votes for and against legislative proposals. The roll call-based score covers all legislators but is not comparable across states. In order to establish comparable ideal points between legislators across chambers and states, Shor and McCarty (2011) also use legislator responses to the National Political Awareness Test (NPAT), a common survey that measures a state legislator's self-assessed ideology run by the nonpartisan Project Vote Smart.[13] An NPAT-

[13]The NPAT asks questions on a wide range of political issues including fiscal policy, foreign policy, social issues, criminal justice, immigration policy, and environmental policy in identical form across states over time. This survey

based ideal point is then estimated in a similar fashion based on legislator responses to the survey, which covers fewer legislators but is in a common space. The authors project the roll call-based state legislative scores to NPAT common space via a least squares regression, under the assumption of ideological consistency (on average). Using these data and methods, Shor and McCarty (2011) are able to place all state legislators' ideal points in a common space so that these estimated scores are comparable both over time and across states.[14]

The ideology data of Shor and McCarty (2011) are cross-sectional, providing a single average measure capturing the ideology of each state legislator which is constant over the course of his or her legislative career. Consequently, changes in chamber-level ideology are generated only from legislator turnover, and not from changes in individual legislator ideology over time.[15] These estimated ideal points of state legislators are similar to the DW-NOMINATE scores, which are frequently used to describe members' liberal-conservative positions in the U.S. Congress based on their roll call voting records (Poole and Rosenthal (1997)). By convention, Shor and McCarty's ideology measure is centered on zero with scores below signifying more liberal Democrats and scores above zero indicating more conservative Republicans. The data have been subsequently updated and expanded by the authors, and now contain more than 20,000 different ideology scores for most state legislators who held office from 1993 through 2016.

To capture state-level legislative polarization, we utilize aggregations of Shor and McCarty's dataset on the individual ideal points of state legislators. For each state-year, party ideological medians within each chamber are calculated. Following the estimation method of congressional polarization from Poole and Rosenthal (1997), we measure state legislative polarization as the distance between the median ideal points of the Democratic and Republican parties, averaged

has been widely used by scholars to describe legislator's ideology preference. See, for example, Ansolabehere, Snyder and Stewart (2001a, 2001b). More information about the survey is available at: `http://votesmart.org/`. This large set of common questions provides significant leverage for making cross-state comparisons.

[14]Making comparisons over time is facilitated by the overlapping memberships of succeeding legislatures. See Shor and McCarty (2011) for a detailed discussion of their estimation process.

[15]The assumption that within-legislator ideological movement is relatively small is empirically well documented. See, for example, Poole (2007).

across both legislative chambers.[16] The reason to average the two chamber distances is that state legislative chambers do not make laws in isolation. A bill passed in one chamber also requires passage in the other plus a gubernatorial signature.[17] This relationship suggests that the combined ideological distance between the party medians, averaged across both lower and upper chambers in a state may be the most appropriate measure of state legislative polarization. Polarization is thus represented by how far the center (median) of Democratic party differs from that of Republican party. When that distance is larger, it means that the two parties are more polarized in the state legislature and passing new legislation will be difficult. When the distance is smaller, it simply implies that there is less polarization.

[Insert Table 1 about here]

Using data from California in 2000 as an example, Panel A of Table 1 demonstrates the process how we aggregate across upper and lower chambers to arrive at a single measure for ideological polarization within each state. Panel B shows that there are 1,038 state-year observations for the polarization measure, which are less than 1,200 (50 states for 24 consecutive years between 1993 and 2016) because of some missing observations for ideology and polarization for some states in some years. Missing values occur when a state does not make roll call vote data available for a particular year. Most of these instances belong to the early 1990s and the exclusion of that period does not meaningfully alter our results. The mean level of polarization during the years of our study is 1.44 with a standard deviation of 0.50. The levels of polarization range from 0.20 in the Arkansas legislature in 1993 and 1994 to 3.44 in the Colorado legislature in 2015 and 2016.

[Insert Table 2 about here]

[16] This is our preferred measure of polarization. The idea underlying this measure is that leaders are elected by majority rule and thus have an incentive to push the policy of the median party member. Our results are robust to the use of an alternative, party-free, measure of polarization, which measures the average ideological distance between any two members in the state legislatures (combined chambers). See Shor and McCarty (2011) for more details.

[17] All states except Nebraska have bicameral legislatures. Note the Shor and McCarty data are also available for Nebraska.

Table 2 summarizes the legislative polarization in each state. The 50 states are arranged from most to least polarized based on the mean level of polarization, averaging across all years of our sample. The level of polarization of each state in 2016 is also compared with its level in 1996.[18] The "Change" column shows the amount and direction of percentage change in polarization that each state has experienced over those 20 years. We can observe interesting variation in the levels and trends in polarization across states and over time. First, California has the most polarized legislature of any state, with Colorado a distant second. California is dominated by Democrats, which enables the state to avoid some of the gridlock that the U.S. Congress faces. At the same time, Louisiana, Rhode Island, and Arkansas, are among the least polarized states, which isn't totally surprising. In Louisiana and Arkansas, both parties are fairly conservative, and in Rhode Island, they are both fairly liberal. Second, not only are states polarized, that polarization has increased over time in most states. Arkansas, Hawaii and Nebraska are polarizing so quickly that the degree of polarization has more than tripled between 1996 and 2016, though from a relatively low base. Over this period, 25 state legislatures have seen sharp increases in polarization ($Change \geq 30\%$), 4 have become less polarized ($Change < 0$), and 21 have increased moderately ($0 \leq Change < 30\%$). Most discussion about partisan polarization focuses on the federal level. Table 2 reveals that polarization is also a fact at the state level.

[Insert Figure 2 about here]

Figure 2 further breaks down the trends in the ideology of Democrats and Republicans across time for each state. We use the average, across the two chambers, of the party median ideology to capture the ideological position of the party. In each plot, the red line shows Republican median and the blue line represents Democratic median. Polarization is thus represented by the ideological gap between the median Democrat and Republican in the state legislature. What becomes immediately obvious is the wide variation in polarization at the state legislative level. The partisan gap

[18] Because those measures are unavailable for several states before 1996, the comparison is limited to the past 20 years.

between the two parties is clearly on the rise in most states. There are only few states that have seen a decrease in polarization. While the median Republican and Democrat are quite close to one another in states such as Arkansas, Rhode Island, and Louisiana, there is a much larger distance between the two parties in Washington, Colorado, and California, which is by far the most polarized state according to the data. We also see asymmetric polarization. The median of the Republican party has moved further to the right than the median of the Democratic party has moved to the left in more state legislatures, but this is by no means universally true across all states. In states like Alabama and Mississippi, the ideological polarization is actually driven by the Democratic party.

It is also noted that while Republicans are on average always more conservative than Democrats within each state, it is not always the case across the states. For example, the median Republican in Massachusetts is more liberal than the median Democrat in Louisiana. On the other hand, the median Democrat in Arkansas is more conservative than the median Republican in New Jersey. This suggests that the relationship between partisan polarization and ideology is much stronger within states than across states. Focusing our analysis on 50 state legislatures, as opposed to a single U.S. Congress, provides us considerable cross-sectional and time-series variation in political polarization to assess its likely impact on corporate investment.

2.2. Firm and State Data

We obtain firm characteristics data from Compustat North America Fundamentals Annual files for the period from 1993 to 2016. The sample period is chosen to match the availability of the state legislative polarization variable. For the analysis, we match firm-level data with the state legislative polarization and macroeconomic data by firm's state of headquarters.[19] The primary

[19]There is a potential issue with this approach in that Compustat only reports firm's current state of headquarters, not its historical headquarters, which introduces measurement error if the firm has relocated. However, the number of firms that relocate is on average small and should introduce only a small amount of noise to our results. For example, Pirinsky and Wang (2006) find only 118 examples of relocation in a sample of more than 5,000 firms over 15 years. Heider and Ljungqvist (2015) identify that only 4% of firm's headquarter states are misrecorded in Compustat for the

variable of interest in this paper is investment, defined as capital expenditures (CAPX) scaled by beginning-of-year book value of total assets (TA). Since the goal of the estimation is to isolate the effect of political polarization on firm investment, we include Tobin's Q and cash flow as control variables in each estimation. Tobin's Q (TQ) is measured as the market value of equity plus the book value of assets minus book value of equity minus deferred taxes, all divided by beginning-of-year book value of total assets. Cash flow is calculated as the operating cash flow (CF) scaled by beginning-of-year book value of total assets. The inclusion of Tobin's Q and a measure of cash flow to proxy for the incentive to invest is standard in a classical investment regression (Julio and Yook (2012), Gulen and Ion (2016), and Jens (2017)).

Our initial sample contains all U.S. domestic firms in the Compustat annual files including those over-the-counter (OTC) traded firms, which tend to be small technology stocks. To be included in our analysis, firms must have non-missing observations for all the financial variables for at least three years. Firms with total assets equal to or less than zero, or capital expenditures less than zero are excluded. There are only a handful of observations with capital expenditures greater than 1.5 times total assets. We exclude these instances as probable data errors. Following convention (e.g., Farre-Mensa and Ljungqvist (2016), and Jens (2017)), we also exclude financials (SIC codes between 6000 and 6999) and utilities (SIC codes between 4900 and 4999) because their cash holdings and investment policy may respond to regulatory supervision. This amounts to a sample of 8,514 unique firms with 85,008 firm-year observations from 1993 to 2016 that have been matched with yearly polarization data.[20] Panel C of Table 1 presents summary statistics for the main financial variables considered in our analysis. The median firm in our sample has an investment ratio of 0.034, a Tobin's Q of 1.746 and a cash flow of 0.061.

The year-on-year growth in state GDP is also included in the analysis to account for the general economic conditions within a state. We obtain the annual percentage change in state GDP from

fiscal year 2011. In robustness tests, we show that our results are robust to using a more general measure of a firm's geographical presence based on Garcia and Norli (2012)'s dataset on the state-level operations of individual firms.

[20] In unreported analysis, we show that even though we have imposed several filters on the data, our final sample is similar to the entire Compustat universe.

the U.S. Bureau of Economic Analysis (BEA).[21] All continuous variables are winsorized at the 1st and 99th percentiles to reduce the influence of extreme outliers.[22] The Appendix provides a comprehensive description of variable definitions and data sources.

3. Empirical Results

This section describes the identification strategy and presents our empirical results for the effect of state legislative polarization on firm investment.

3.1. The Sensitivity of Investment to Changes in Political Polarization

To evaluate the effect of state-level political polarization on firm investment, we consider an augmented version of the standard investment-Q specification that also includes polarization as an additional regressor. The main regression model is specified as follows:

$$\frac{CAPX_{it}}{TA_{i,t-1}} = \alpha_i + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 TQ_{i,t-1} + \beta_3 \frac{CF_{it}}{TA_{i,t-1}} + \beta_4 \%\Delta GDP_{j,t-1} + \varepsilon_{ijt} \tag{1}$$

where i indexes firms, j indexes states and t indexes years. The dependent variable, investment, is measured as capital expenditures (CAPX) scaled by beginning-of-year book value of total assets (TA). The explanatory variable of interest is the amount of political polarization in state j in year t, $Polar_{jt}$, defined as the ideological distance between the Democratic and Republican party medians, averaged across both lower and upper chambers in the state legislature. Intuitively, the larger the difference between the two party medians, the more polarized the state legislature is. We use the investment-Q framework as the baseline specification, augmented by controls for changing

[21] BEA website is available at `http://www.bea.gov/`

[22] The results are robust to alternatively winsorizing firm characteristics at the 5th and 95th percentiles.

firm characteristics and growth opportunities.[23] We employ a common measure of Tobin's Q, the ratio of the market value of assets to the book value of assets, as our proxy for the incentive to invest. Cash flow (CF) is defined as net income before extraordinary items plus depreciation and amortization. Tobin's Q is measured at the beginning of the year and cash flow is scaled by beginning-of-year total assets for each firm. Finally, %Δ GDP is calculated as the year-on-year growth in state GDP and is meant as an additional control for state economic conditions. As discussed in the robustness section, our main results are robust to various alternative specifications as well as to different measures of corporate investment and proxies for the incentive to invest.

Firm α_i and year γ_t fixed effects are also included in the specification. Standard errors are robust to heteroskedasticity and clustered by firm throughout the paper. This specification is the most appropriate in a panel with a large cross-section of firms but a small number of periods (Petersen (2009)). For robustness, we repeat our analysis with standard errors double clustered by firm and year, as well as by state and year and find similar results.

[Insert Table 3 about here]

Table 3 summarizes the results for our baseline specification. The first column presents the regression of investment on the polarization variable alone. The following columns sequentially add firm and year fixed effects, Tobin's Q, cash flow, and GDP growth. Across all specifications in Table 3, we find that investment is positively related to Tobin's Q and economic growth, but is negatively related to cash flow.[24] Consistent with the hypothesis that political polarization dampens

[23] Eberly, Rebelo, and Vincent (2009) find that simple investment-Q regressions empirically perform well relative to other investment regression models.

[24] To a large extent, the negative relationship between cash flow and investment could be attributed to the inclusion of OTC traded firms, which tend to be small technology stocks and account for roughly 32% of the firm-year observations in our sample. Compared with exchange traded firms, OTC firms tend to be smaller in size and on average exhibit lower (negative) cash flows, higher growth opportunities, and appear more financially constrained. In unreported analysis, we show that the investment-cash flow sensitivity is negative (positive) for OTC (exchange) traded firms and the exclusion of those OTC firms does not meaningfully alter our results. Jens (2017) and Atanassov, Julio and Leng (2019) offer similar explanations for the negative relationship between cash flow and investment documented in their papers.

firm investment, the coefficient on *Polar* is negative, economically meaningful, and statistically significant, ranging between -0.0023 and -0.0177 depending on the specification. The estimates reported in column (4), which represent the baseline specification throughout the rest of analysis, show that an increase of one standard deviation in the average within-state legislative polarization leads to a decrease of -0.0028 ($= -0.0177 \times 0.1560$) in the investment rates of the average firm, after controlling for growth opportunities and economic conditions. In terms of magnitudes, this translates into an economically significant -4.5% ($= -0.0028/0.0616 \times 100\%$) reduction in firm investment rates, relative to the unconditional mean investment rate of 0.0616 in the overall sample of firms. Taken together, the results from the baseline specification lend empirical support to the notion that increased political polarization in state legislatures leads firms to lower investment rates.

3.2. Partisan Control of State Government

Having uncovered strong evidence of a negative relationship between political polarization and firm investment, we now turn to examine whether the effects of polarization differ in the cross-section. In particular, we investigate whether there is heterogeneity in the effect according to partisan control of state government. This investigation is motivated by the predictions made by the political science literature, which often anticipates that divided party control of government creates legislative obstacles and reduces overall legislative productivity or output (e.g., Coleman (1999), Binder (2003) and Chiou and Rothenberg (2003)). As already discussed, the main mechanism by which we believe polarization affects investment is the legislative gridlock channel. To the extent that divided government negatively affects policy change, it exacerbates the problems of political polarization.

To explore this possibility, we examine the role of partisan control of state government. Like the federal government, each state government is made of an executive branch and a legislative

branch that consists of two separate legislative chambers, a lower and an upper chamber.[25] Partisan control of state government can exist in various configurations. A unified state government occurs when the lower chamber, the upper chamber, and the office of the governor are each controlled by one political party. On the other hand, a state government is divided if one party controls the executive branch while another party controls one or both chambers of the legislative branch.[26] We set a *Divided Government* dummy to one if the partisan control of a state government is divided, and zero if it is unified.[27] We note that at the state level, about half of the U.S. states are divided on average between 1993 and 2016.

[Insert Table 4 about here]

To examine the sensitivity of investment to political polarization conditional on the partisan control of state government, we first split the sample of firms into two subsamples according to whether the government is divided or unified in that state in that year, and we then reestimate the baseline specification in Equation (1) separately for the subsample of firms with divided vs. unified party control of government. We also add to the baseline specification an interaction term between the *Divided Government* dummy and our measure of political polarization to directly assess the differential effects of partisan alignment. As a robustness check, we also include interactions of the *Divided Government* dummy with all the control variables in the baseline model to ensure that the estimated interaction effect of interest is not confounded by other firm- or state-level variables. Table 4 presents the estimation results from the above tests. Consistent with the idea that increased political polarization impedes firm investment, the coefficient on *Polar* is large, negative, and statistically significant across all columns. As expected, the interaction between polarization and

[25]Every state except Nebraska has a bicameral legislature. Since we are interested in the partisan control of state governments, we exclude Nebraska, which has a unicameral, or one-chamber legislature of members with no party affiliations.

[26]For example, divided government can occur in a split branch form, when the governor is confronted with majorities from the opposing party in both legislative chambers. Divided government can also be in the form of a split legislature, when different parties hold the upper and lower chambers, regardless of the governor's party affiliation.

[27]Data on state legislative partisan composition are obtained from `http://www.ncsl.org/research/about-state-legislatures/partisan-composition.aspx`.

divided government in column (3), which picks up the differential effect of a divided government on investment sensitivity to political polarization, has a negative and significant coefficient. This suggests that the adverse effect of polarization on investment is more pronounced during periods of divided government. The estimates in column (4) further show that the interaction effect remains even after addressing possible confounds from the control variables.[28] Taken together, the evidence presented in this section finds strong empirical support for the idea that divided party control of state government exacerbates the problems of political polarization.

We also note that the estimated coefficient on the *Divided Government* dummy alone is positive and significant, implying that on average firms have more incentives to invest under divided than unified control of state government. This is consistent with a reduction in policy uncertainty when government is divided, as the likelihood of policy changes decreases (e.g., Duquerroy (2019)).[29] Thus, the effect of divided party control of government on firm investment appears to be opposite to the effect of political polarization. The idea here is that although existing research often posits that periods of divided government and high ideological polarization between the two parties act separately or jointly to decrease the production of significant laws, they differ in how they shape the final policy outputs of government. Our results suggest that having a divided government brings necessary status quo that leads to more moderate (economic) policies and thus a lower probability of significant policy changes. This may increase expected returns to investment. However, the status quo becomes an undesirable outcome when political polarization is too high, as the resulting legislative gridlock will likely dominate any political compromise attempts, making it extremely difficult for the government to enact policies responsive to the country's most pressing challenges. The above evidence also helps rule out the possibility that the political polarization variable may merely capture the effect of a divided government.

[28]For brevity, we suppress the coefficient estimates of the interaction terms between political polarization and the control variables in column (4), though none of these interacted controls are statistically significant.

[29]For example, Duquerroy (2019) provides a new perspective on the economic effects of checks and balances by showing that corporate investment responds negatively to transitions from divided to unified governments, suggesting that unified government temporarily discourages investment by raising policy uncertainty.

3.3. Ideological Distance vs. Ideological Asymmetry

Our previous results suggest that political polarization, measured as the distance between the median ideology of the two major political parties within state legislatures, exerts a significant negative effect on firm investment. This effect, however, could occur in a number of different ways. By definition, political polarization increases when both parties symmetrically move away from the political center. Alternately, the effect may be asymmetric, where one party becomes more extreme at a faster rate over time than the other. While partisan polarization at the national level has been driven by Republicans moving to the right, there is much more variation across the states. According to Figure 2, some states like Colorado and Kansas, have witnessed Republican-led asymmetric polarization, whereas in other states like Arizona and Utah, the Democrats have apparently polarized more. And finally, there are states like Missouri and Nebraska where both parties are polarizing roughly equally and simultaneously. Therefore, there is the possibility that our previous results might be driven by the asymmetry of the parties' ideological positions, rather than the ideological distance between the parties.

To account for this possibility, we reestimate the baseline regression model in Equation (1) but including several measures of asymmetric polarization as additional regressors, independent of the overall level of polarization. In particular, we construct four measures of ideological asymmetry drawn from Shor and McCarty's (2011) dataset of state legislator ideology to capture possible asymmetric polarization effect. The first measure is the median ideology of the Republican party (I_R) or the Democratic party (I_D), averaged across both legislative chambers. By construction, positive values on the ideological spectrum reflect right-of-center Republican positions (i.e., $I_R \geq 0$) and negative values indicate Democratic positions that are left of center (i.e., $I_D \leq 0$). The second measure I_W is based on the median idealogy of the whole state legislature. A positive median value indicates that political polarization is tilted to the right at the state level. The third measure, $I_R - |I_D|$, captures the extent to which the Republican party has moved to the ideological right further than the Democratic party has shifted to the left. According to this measure, $I_R - |I_D| = 0$,

if both parties move away from the ideological center in a symmetrical way. A positive asymmetry score, therefore, implies that the state legislature's Republican party is more conservative than the Democratic party is liberal. Finally, the forth measure of ideological asymmetry, $\frac{I_R}{I_R - I_D}$, is computed as the Republicans' contribution to the ideological distance between the two parties. A score above 0.5 suggests that the Republicans are more conservative than the Democrats are liberal. While the first measure captures the overall conservatism or liberalism of one party, the other three captures the relative conservativeness of a state's Republican legislators compared to the state's Democrats.

[Insert Table 5 about here]

We report the estimation results of the above tests in Table 5. The dependent variable in all columns is firm investment, measured as capital expenditures scaled by lagged book value of total assets. The key independent variable is the overall level of political polarization, *Polar*, measured as the ideological distance between the two party medians. In column (1), we use the average, across the two chambers, of the Republican party medians (I_R) to capture the absolute level of ideological asymmetry within state legislatures. To more rigorously investigate the asymmetric polarization effect, in columns (2) to (4), we estimate the baseline specification separately for each of the three relative measures of ideological asymmetry. Across all specifications, we find that political polarization remains a significant negative predictor of capital investment. However, none of these asymmetric ideology measures is statistically significant. The result shows little evidence of an asymmetric polarization effect in ideology between the two parties. We obtain substantively similar results when using the mean-based measures of ideological asymmetry. Taken together, these tests help disentangle the separate effects of polarization and ideological asymmetry, and suggest that the effect we are estimating can be attributed to the overall level of polarization defined as the ideological distance between the parties, and not to the asymmetry of the parties' ideological positions.

3.4. Possible Underlying Mechanisms

Up to this point, we have documented pervasive evidence that political polarization of state legislatures impedes firm investment. In this subsection, we further explore possible underlying economic mechanisms through which this occurs. Economic theory suggests that greater political polarization could lead to lower investment rates through two channels. First, political polarization leads to legislative gridlock that reduces the capacity of policymakers to address pressing issues facing the economy (Alesina and Drazen (1991) and Binder (1999)). This makes government policies less effective in reducing investment risk, and thereby firms have less incentive to invest. Second, political polarization increases the probability of sharp changes in economic policy that undermines confidence in the government's ability to implement a credible and coherent policy program across time (Frye (2002) and Baker et al. (2014)). Indeed when investment is at least partially irreversible, this lowers expected returns, and hence discourages investment.

To test these channels, we adopt a two-stage identification approach. In the first stage, we examine the relation between political polarization and proxies for state legislative gridlock and policy instability. In the second stage, we study how gridlock and policy instability affects the sensitivity of investment to polarization. If political polarization impedes firm investment through the two channels, we expect to find that polarization exacerbates the problems of policy instability and gridlock in state legislatures in the first stage, whereas in the second stage, the estimated effect of polarization on firm investment is sensitive to state legislative gridlock and policy instability. These channels have not yet been formally explored in the literature on the real effects of political polarization on firm outcomes. Understanding the mechanisms that drive the relation between political polarization and firm investment is important for two main reasons. First, it improves our understanding of how polarization works and provides better insight into future research and policymaking. Second, it reduces the concern that the relation between polarization and investment is spurious and driven by other changes that may have occurred at the same time. Such a criticism will have the burden of explaining not only the main relation but also the two channels that we

document in this subsection. We present evidence in support of two such channels. It is of course challenging to provide definitive proof of underlying mechanism(s) by which political polarization impedes investment, so our tests are only suggestive.

3.4.1. Legislative Gridlock

Existing literature in political science has already identified possible harmful effects of political polarization on public policy. Much of this work identifies political polarization as a major source of legislative gridlock that disrupts the essential functions of policymakers and government. Sharp ideological divides between the major parties can tie state legislatures in knots and create political gridlock, implying much reduced rates of policy innovation and a decreased ability to adjust to changing economic circumstances (Binder (1999) and McCarty (2007)). Political gridlock is thus defined as the relative inability of government to enact laws on critical social and economic issues, such as a budget, in a timely fashion, which can be detrimental for the economy. After all, a nation's economic development ultimately rests on the government's ability to pursue reform, political, economic or administrative (Krueger (1993) and Rodrik (1993, 1996)). When political polarization is high, businesses and firms become pessimistic about the government's ability to take appropriate measures to reduce downside tail risks or less the effects of economic recessions at a time when timely and decisive political actions may be needed most, and therefore they have fewer incentives for investment in such a polarized environment (Frye (2002) and Azzimonti (2019)).[30]

Political gridlock exists and can be measured in many ways. Following Binder (2003), we measure gridlock as overall legislative productivity, also known as bill passage rate, which is the ratio of enacted bills to all introduced bills open for consideration. This most commonly used measure of political gridlock takes into account bills that fail to pass and thus captures the actual

[30]Increasing polarization impairs government efficiency and poses a risk to economic performance. In support of this view, Mian, Sufi and Trebbi (2014) provide evidence from a large sample of countries showing that, following a financial crisis, heightened ideological polarization weakens ruling coalitions and creates legislative gridlock that hampers reform efforts.

level of obstruction faced by policymakers in the lawmaking process. Recent studies on the politics of lawmaking show that political polarization creates stalemate and undermines legislative productivity. For example, McCarty, Poole and Rosenthal (2006) document that Congress enacted the vast majority of its significant legislation during its least polarized period. In a similar vein, Binder (1999), Jones (2001) and Lapinski (2008) find that political polarization is associated with increased levels of gridlock in Congress, as indicated by decreased legislative productivity. However, much of the attention on the impact of polarization has focused on Congressional gridlock. Despite the fact that many state legislatures are at least as polarized as Congress, there have been few attempts to document such a relationship at the state level. Using Shor and McCarty (2011) data on state level polarization, we go further in asking whether there is a negative cross-sectional relationship between the level of polarization and the degree of legislative gridlock observed in state legislatures.

To test the hypothesis, we manually collect data on bill introduction and enactment counts from the Council of State Government (CSG)'s Book of the States, across the fifty states for the years 1992 to 2016. After cleaning, the final data covers 50 states, over 25 years, and includes 909 non-missing observations for both introduced and enacted bills. The CSG data is relevant for this type of research because it provides an absolute measure of the quantity of enacted bills (bill passage count) as well as a ratio measure of gridlock (bill passage rate) that accounts for the amount of failed bills. We observe substantial variation in the number of bills introduced and enacted each year during a legislative cycle, which typically lasts for a period of two years and consists of two or more different kinds of legislative sessions, including regular sessions and extraordinary, or special sessions.[31] Following Binder (2003) and Mayhew (2005), we take data on bills proposed and passed each year and aggregate them over the entire legislative cycle to derive a reliable measurement of legislative productivity that reflects the percentage of bill enactments in

[31] All 50 states except Nebraska have bicameral legislatures and the length of terms of state representatives in the 49 American lower chambers is either two years or four years. In particular, representatives in 44 states have a two-year term and representatives in only five states (Alabama, Louisiana, Maryland, Mississippi and North Dakota) serve four-year terms.

terms of the overall legislative agenda. We choose to examine lawmaking productivity of entire legislative session instead of single years since legislative productivity in state legislative chambers is typically assessed by what they accomplish as a whole in each two-year session.

Because bills vary in importance, one potential concern is that these measures of legislative productivity are based on aggregate counts of all bills, which conflates significant bills with trivial ones. On average, more than 100,000 bills are introduced in state legislatures each year. A large number of them are considered routine or trivial bills, such as renaming a post office, which are unlikely to affect business operations and usually pass quickly with little or no opposition. That is, we expect productivity, when measured on aggregate legislation, to be unaffected by partisan polarization. On the contrary, it is much more difficult and contentious for state legislatures to enact the remaining few significant bills on critical social and economic issues such as health care or energy policy, which usually have a bigger impact on corporate decisions than the renaming of a post office and are often highly partisan and divisive among political parties. Therefore, the performance of legislatures on those politically contentious but socially important issues is often viewed as a more accurate measuring stick for success or failure in policymaking, and failing to account for bill significance can seriously underestimate the effect of political polarization on legislative gridlock.

We attempt to explicitly address this concern by taking bill significance into account. However, measuring bill significance can be a challenging task. State legislatures passed roughly 25,000 bills in 2014, and the scale alone makes it difficult to determine which bills are trivial and which bills are significant. Following the approach of Tsebelis (2002), we focus on a single but important policy area: energy policy. In particular, we focus on state legislation that addresses policy issues related to climate change, fossil energy, and renewable energy, which are among the most polarized issues and have generated much debate among policymakers.[32] Besides, these are the bills that policy

[32]As of February 2020, a study conducted by the Pew Research Center highlights the current political issues that have the most amount of partisanship. By far, addressing climate change was the most partisan issue with only 21% of Republicans considering it a top policy priority as opposed to 78% of Democrats. For example, on Thursday, June 20, 2019, all eleven Republican state senators walked out from the Oregon State Capitol, in order to prevent

experts identified as being important and can have a substantial impact on business operations.[33] Focusing on these specific policy areas allows for better data collection regarding bill significance. We obtain aggregate introduction and enactment counts of energy bills in selected subcategories from the National Council of States Legislatures (NCSL)'s Energy State Bill Tracking database for the period 2008 to 2016.[34] Subsequently, we measure state legislative productivity of important legislation in a given year as the percentage of all introduced energy bills that eventually become enacted by a state legislature over the entire legislative cycle (i.e., a two-year period). As discussed earlier, this measure takes account of bill significance and is commonly viewed as a better indicator of political gridlock than those raw productivity numbers that have relied exclusively on aggregate counts of all bills.

To formally evaluate the impact of political polarization on legislative gridlock at the state level, we follow the existing literature and use multiple regression to control for other variables

the Democratic-controlled Senate from having the quorum necessary to pass a major carbon cap-and-trade bill that would dramatically lower the state's greenhouse gas emissions by 2050. The Senate Republicans' walkout effectively killed the climate change bill and left dozens of other issues caught up in the impasse. The escalation of partisan conflict over government policies mirrors growing anti-democratic sentiment among Republicans and brings political gridlock to a new level in Oregon. In response, Senate Democrats threatened to fine absent Republican senators $500 per day for each day they delay a vote on the landmark climate plan, and in the meanwhile Oregon's Democratic governor, Kate Brown dispatched the state police to bring them back to the Capitol building to legislate. Ironically, back in 2001, Oregon House Democrats used a similar walkout as a way to thwart the passage of a Republican-backed redistricting bill, halting the work of the legislature for almost a week. Kate Brown, who was the Senate Democratic leader at that time, supported the walkout. The walkout tactic has been used outside of Oregon as well. For example, in 2003, Texas Democrats fled to neighboring Oklahoma to deny a quorum, holing up in a Holiday Inn to stop a vote on a redistricting bill pushed by Republicans. The Republican House speaker authorized the state troopers to find the missing Democrats and have them arrested. The Democrats eventually returned to Texas after the bill's deadline passed and it was effectively killed.

[33]For example, climate change regulations aimed at curbing greenhouse gas emissions, such as carbon taxes and cap-and-trade programs can significantly drive firm investment decisions and spur market innovation. While a carbon tax imposes a tax on each unit of greenhouse gas emissions, under the cap-and-trade program, firms emitting more than their legal limit must purchase extra carbon credits, in order to release emissions and continue production. This may impose additional costs to firms operating in energy-intensive industry sectors. Nevertheless, under both systems, firms that produce high levels of greenhouse gas emissions will have to invest more resources in cleaner production technologies and/or adopt greener ways of manufacturing in order to comply with increasingly stringent regulations on the emission of greenhouse gases.

[34]The NCSL Energy State Bill Tracking database records real-time information on energy-related bills that have been introduced and enacted in state legislatures since 2008. The database is available free of charge at `https://www.ncsl.org/research/energy/energy-legislation-tracking-database.aspx`.

that might also influence the performance of state legislatures. We estimate regression models of the following form:

$$\begin{aligned} Productivity_{jt} &= \alpha_j + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 Republican\ Governor_{jt} + \beta_3 Split\ Legislature_{jt} \\ &\quad + \beta_4 Unemployment_{jt} + \beta_5 \%\Delta GDP_{jt} + \varepsilon_{jt} \end{aligned} \tag{2}$$

where j indexes states and t indexes years. The dependent variable, $Productivity_{jt}$, is one of our three main measures of legislative productivity for state j in year t: the total counts of introduced and enacted bills, as well as the percentage of bills enacted into law during a legislative cycle.[35] As a legislative session usually lasts for two years, each of these measurements is calculated biannually for each state, from 1992 to 2016. The main independent variable is $Polar_{jt}$, which measures the difference in the median ideological position of Republican and Democratic legislators drawn from Shor and McCarty (2011). Higher values are associated with increased polarization. We include a small set of control variables. To isolate the impact of partisan control of government on state policymaking, we introduce a *split legislature* dummy variable into our empirical model, where *split legislature* takes a value of one when upper and lower chambers of the state legislature are themselves controlled by opposing parties, and zero otherwise. We control for a state having a *Republican governor* to account for the partisan preferences of the state executive, given that Shor and McCarty's ideology scores do not extend to governors. In particular, *Republican governor* equals one if state j has a Republican governor in year t. We also wish to account for local economic conditions by explicitly controlling for state unemployment rate and GDP growth rate. Finally, we include state α_j and year γ_t fixed effects to control for any invariant forces and cluster the standard errors by state and year to correct for potential cross-sectional and serial correlation in the error term ε_{jt} as suggested by Petersen (2009).

[Insert Table 6 about here]

[35] We use a log-linear model when the dependent variable is bill introduction counts or enactment counts because they are count variables, which are quite skewed.

Panel A of Table 6 presents the regression results. Specifically, we estimate the regression model separately in columns (1) to (3), where the dependent variable is one of the three productivity measures based on raw bill counts: $\ln(1+bill\ introductions)$, $\ln(1+bill\ enactments)$ and the *bill passage rate* as measured by the ratio of enacted bills to introduced bills. The results indicate that partisan polarization on average has no impact on the overall productivity of state legislatures. This is not surprising, given that those raw productivity numbers are based on aggregate counts of all introduced and enacted bills, which conflates the trivial bills with the consequential. As discussed above, failing to account for bill significance can seriously underestimate the effect of polarization on legislative gridlock. To more narrowly test our hypothesis, in columns (4) to (6), we repeat the analyses in the first three columns by focusing on the production of important legislation on selected energy issues. We find evidence that increased political polarization depresses state legislative productivity when productivity is measured on the basis of landmark legislation in a session. This is pertinent to our interpretation of legislative gridlock as a consequence of political polarization. The economic magnitude of this effect is also significant. The estimates reported in column (6) show that a one standard deviation (0.0931) increase in the average within-state polarization reduces the lawmaking productivity of state legislatures on energy issues by 0.0152 ($=0.0931\times0.1633$). Given that the average passage rate of energy bills is 0.2464, this corresponds to a decline in productivity of about 6.2% ($=0.0152/0.2464\times100\%$). Consistent with the findings in the literature (e.g., Rogers (2005)), other results generally indicate that split legislature has a negative impact on policy change, though not always statistically significant. To conclude, the results presented in Panel A of Table 6 provide strong support for the argument that heightened political polarization causes stalemate and gridlock in state legislatures, which undermines the performance and effectiveness of the legislative branch.

Given the evidence that polarization has reduced state legislatures' capacity to legislate, we continue our investigation of how the resulting legislative gridlock affects the sensitivity of firm investment to polarization. As discussed earlier, the most direct effect of legislative gridlock is that

public policy does not adjust to changing economic circumstances, which leads to a low probability of reforms aimed at reducing investment risks brought on by adverse shocks (e.g., financial crises or pandemic outbreaks) that have been associated with persistently negative effects on growth. This damages business confidence, and hence discourages investment by lowering firms' expected returns. To the extent that political polarization exacerbates the problems of legislative inaction and gridlock, we predict that the negative impact of polarization on investment is significantly larger for firms located in states with more politically polarized legislatures.

To test this possibility, we examine the role of legislative gridlock. We use the productivity of important legislation on energy issues to capture the actual degree of legislative gridlock in state legislatures and directly assess its impact on the sensitivity of firm investment to changes in political polarization. In particular, we estimate regression models of the following form by augmenting our baseline OLS specification in Equation (1):

$$\begin{aligned}\frac{CAPX_{it}}{TA_{i,t-1}} &= \alpha_i + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 \text{Polar}_{jt} \times \text{Low Productivity}_{jt} + \beta_3 \text{Low Productivity}_{jt} \\ &\quad + \beta_4 TQ_{i,t-1} + \beta_5 \frac{CF_{it}}{TA_{i,t-1}} + \beta_6 \%\Delta GDP_{j,t-1} + \varepsilon_{ijt} \end{aligned} \tag{3}$$

where i indexes firms, j indexes states and t indexes years. We use the same set of independent variables and controls as in our baseline OLS specification, except that we additionally include an indicator, *Low Productivity*, that equals one for firms in states with below-median legislative productivity, and its interaction with the polarization measure. We use this interaction term to test whether firms that are more vulnerable to legislative obstruction are impacted differentially by political polarization. The sample period is restricted to 2008-2016 in this analysis due to lack of energy legislation data prior to the start date. We include firm and year fixed effects in our regressions and cluster standard errors at the firm level as suggested by Petersen (2009).

Panel B of Table 6 reports the estimation results from the above tests. The dependent variable in all columns is firm investment, measured as capital expenditures scaled by lagged book value of

total assets. In the first two columns, we sort firms into terciles each year based on the median level of legislative productivity in the state to which each firm belongs, allowing for direct comparison of polarization's effects between the two subgroups (i.e., low vs. high legislative productivity).[36] While the negative polarization-investment relation is present in both subgroups, the larger negative coefficient estimate on *Polar* in the low productivity subgroup implies a much stronger effect of polarization on firm investment. In economic terms, the coefficient estimates reported in columns (1) and (2) indicate that for firms located in more polarized states (low legislative productivity), a one standard deviation increase in polarization causes firm investment rate to drop by about 9.7% relative to its average across those firms, compared to only a 5.4% decline for firms located in less polarized states (high legislative productivity). That is, the negative impact of political polarization on firm investment is 80% greater, for firms operating in more politically polarized environments. In column (3), we interact the indicator, *Low Productivity*, with the polarization measure to directly assess the role of legislative gridlock. The interaction term is negative and statistically significant, consistent with the prediction that the adverse effect of political polarization on firm investment is significantly larger for firms located in states with more polarized legislatures. In column (4), we further include interactions of *Low Productivity* with all the control variables in the baseline model to ensure that the estimated interaction effect of interest is not confounded by other firm- or state-level variables. We find similar interactive effects.

Taken together, the evidence presented in this subsection finds strong empirical support for the idea that political polarization likely impedes firm investment through the legislative gridlock channel, a failure of state government to pass major legislation that deals with real issues facing the economy. However, legislative gridlock is not specific to energy policy. Other pressing issues such as healthcare, environmental policy, and government spending are equally, if not more prone to state legislative gridlock, which may have a even greater negative impact on firm investment.

[36] When ranked by the average lawmaking productivity of the state legislature over the years of our sample period 2008-2016, the 25 least productive states have a mean legislative productivity of 13.7%, while this figure is 34.8% for the remaining 25 states.

That is, the above analysis, while focusing on obstruction and gridlock in a single policy area (i.e., energy policy), likely understates the magnitude of legislative gridlock as a potential underlying mechanism through which polarization hinders investment, causing our estimates to be a lower bound on the true magnitude. Overall, our findings suggest that polarization-induced legislative gridlock could be one plausible channel driving the effects.

3.4.2. Policy Instability

Another channel through which political polarization translates into a slower investment rate is its effect on policy instability. This channel stresses the potential for political polarization to produce more extreme policies, more policy uncertainty, and less policy stability (Frye (2002) and Baker et al. (2014)). The idea is that, as the two parties become increasingly ideologically distinct, partisan polarization between them is more likely to produce extreme policies by increasing the probability of sharp policy swings from one administration to another of the opposite party. More broadly, political polarization has made it difficult for governments to make credible and coherent policy programs over time. The resulting policy instability and uncertainty can damage business sentiment and the economy as a whole. The manufactured crisis creates an unfavorable climate in which firms are hesitant to make irreversible or costly investment decisions. For example, consider a firm in a polarized state which is planning to make an investment after the introduction of an economic reform program. Facing the probability that the current government may give way to a new government with far different policy preferences that will put any such investment at risk, it will refrain from investing.

There are several ways of computing economic policy instability. In this paper, we examine the policy instability channel using an indicator of state-level policy instability based on the volatility of economic policy outcomes themselves (Azzimonti and Talbert (2014)). Specifically, following Poterba (1994) and Seegert (2018), we measure state-level policy instability as the four-year rolling volatility of aggregate state tax revenue as a percentage of output, where aggregate tax revenue is

the sum of income, sales, and corporate tax revenues. We focus on these three revenue sources to be able to compare across states.[37] Data on tax revenues for all 50 states between 1993 and 2016 come from the Book of States and the U.S. Census of Governments. For robustness, we also use an alternative definition of policy instability based on year-over-year changes in state tax revenue.

To empirically assess the effect of political polarization on state policy instability, we estimate the following model:

$$\begin{aligned} Instability_{jt} &= \alpha_j + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 Republican\ Governor_{jt} + \beta_3 Split\ Legislature_{jt} \\ &\quad + \beta_4 Tax\ Change_{jt} + \beta_5 Unemployment_{jt} + \beta_6 \%\Delta GDP_{jt} + \varepsilon_{jt} \end{aligned} \tag{4}$$

where j indexes states and t indexes years. The dependent variable, $Instability_{jt}$, is policy-based measure of economic policy instability, which is measured by either the four-year rolling volatility of state tax revenue to output ratio or year-over-year changes in tax revenue. The key independent variable is polarization and all other control variables are the same as those used in Equation (2). We additionally control for changes in state tax rates to isolate the effect of tax rates on revenue volatility. State and year fixed effects are included in the estimation. To control for serial correlation, we cluster the standard errors at the state and year levels.

[Insert Table 7 about here]

Panel A of Table 7 reports the results of estimating the effect of political polarization on state policy instability using Equation (4). Column (1) reports volatility as the rolling standard deviation of revenue to output ratio, using a four-year window. Column (2) reports volatility as year-over-year changes in revenue. Across both columns, we find that the coefficient estimate on polarization is positive and statistically significant at the 5% level, regardless of which policy-based measure of economic policy instability is used, indicating that more polarized states experience higher

[37] As noted in Seegert (2018), these three revenue sources accounted for roughly 75% of total state government revenues in 2000.

volatility in economic policy. Overall, we find strong support for the view that political polarization can increase policy instability and macroeconomic fluctuations by making future economic policy less credible and predictable.

Having illuminated our understanding of whether polarization affects policy instability, we continue to test the policy instability channel by exploring implications of this hypothesis for the cross-section of investment rates. We argue that political polarization lowers firm investment by exacerbating the problem of policy instability. If that is the case, firms exposed to higher volatility in policy will be more negatively affected by increased political polarization. To test this prediction, we focus on the volatility of revenue to output ratio as the relevant indicator of policy instability and use a specification that interacts the policy-based measure of economic policy instability with political polarization in the baseline investment regression. In particular, we estimate the following model:

$$\begin{aligned}\frac{CAPX_{it}}{TA_{i,t-1}} &= \alpha_i + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 \text{Polar}_{jt} \times \text{High Instability}_{jt} + \beta_3 \text{High Instability}_{jt} \\ &\quad + \beta_4 TQ_{i,t-1} + \beta_5 \frac{CF_{it}}{TA_{i,t-1}} + \beta_6 \%\Delta GDP_{j,t-1} + \varepsilon_{ijt} \qquad (5)\end{aligned}$$

where i indexes firms, j indexes states and t indexes years. We use the same set of independent variables and controls as those used in our baseline OLS specification, except that we additionally include an indicator, *High Instability*, that equals one for firms in states with above-median level of policy instability, and its interaction with the polarization measure. The coefficient of interest is the interaction term, which picks up only the added effect of a higher exposure to policy instability on investment sensitivity to political polarization. As always, we include firm and year fixed effects in our regressions and cluster standard errors at the firm level as suggested by Petersen (2009).

Panel B of Table 7 reports the regression results estimating Equation (5). In the first two columns, we conduct separate tests for the subgroups of firms in states with high vs. low policy instability, in order to observe variation in the magnitude of changes in investment rates. Consis-

tent with the policy instability channel, we find that the adverse effect of political polarization on firm investment is only present in column (1), when firms face higher volatility in economic policy. In economic terms, the coefficient estimates in column (1) suggest that a one standard deviation increase in political polarization translates into a significant decrease of -0.31 percentage points, or a 5.4% drop in the average investment rate (0.056) for firms with a higher exposure to policy instability. Column (3) reports the results of the specification in which the polarization measure is interacted with the indicator for firms exposed to more volatile economic policy to directly assess the additional detrimental effects that policy instability may have on firm investment. The results provide support for the relevance of the policy instability channel. Specifically, the interaction term between *Polar* and *High Instability* is negative and statistically significant, suggesting that the estimated effect of political polarization on firm investment is sensitive to measures of policy instability. In other words, the way that macroeconomic policy is conducted matters for investment. Column (4) further interact the *High Instability* indicator with all the control variables in the baseline specification and the conclusion remains unchanged. Overall, our findings suggest the higher instability in economic policy caused by the increase in political polarization may be one mechanism that reduces investment as political polarization rises.

In this section, we have explored two possible underlying channels through which political polarization can affect firm investment and find evidence for each of the two channels separately. Finally, we also examine the effect of both mechanisms together in order to see if a particular mechanism dominates or if each of them has an independent effect. To assess these possibilities, we first calculate the correlation between measures of legislative gridlock and policy instability and find a very low correlation of only -0.02 between the two mechanism measures. We then interact political polarization with both mechanism measures in the same regression to further explore the two channels together. We find that both interactions have the same signs as before and remain statistically significant, suggesting that the two channels that we explore, namely, legislative gridlock and policy instability, play an important and independent role in explaining the relation between

political polarization and corporate investment.[38] Overall, regardless of the channel driving the effects, we demonstrate that firm investment is inversely related to increased political polarization.

3.5. Firm Responses to Increased Political Polarization

Political polarization causes gridlock and impedes effective governance, which poses a risk to economic performance. A natural question that follows is how firms respond to such increases in political polarization in state legislatures. Intuitively, an analysis of firms that change their headquarters location would seem to provide an interesting test. In this subsection, we explore whether changes in state legislative polarization affect corporate relocation decisions. Given that the cost of increased political polarization might place a high enough burden on a firm, it would find it beneficial to relocate to another state with less polarized politics.

Compustat's location data suffer from a major flaw as it only records a firm's most recent headquarter address, not its historical headquarter location. In order to identify corporate relocations across states and over time, we obtain firms' historical headquarters locations from the Notre Dame Software Repository for Accounting and Finance (SRAF) database. This database contains firms' historical headquarters information extracted from their annual 10-K filings via SEC's EDGAR online filing system and has data going back to about 1994 (Loughran and McDonald (2016)).[39] By comparing the state of a firm's headquarters location in two consecutive years, we identify headquarters relocations and the fiscal year in which the relocation took place. After cleaning, the final sample includes 7,964 unique firms (firms which appear only once are excluded) and 74,318 firm-year observations over the 1994 to 2016 period, among which 6,780 (85.1%) never relocate, 822 (10.3%) relocate once, 273 (3.4%) relocate twice, and 89 (1.1%) relocate three times or more. We also find that 50.2% of relocations are associated with a move to less polarized states. We define three variables to examine firm relocation: a *Relocation* dummy variable that equals one

[38] These results are unreported, but are available upon request.

[39] The SRAF database is available at: `https://sraf.nd.edu/data/augmented-10-x-header-data/`.

if the firm relocates its corporate headquarters to another state, and a $Relocation^{+}$ ($Relocation^{-}$) dummy variable that equals one if the firm moves to a more (less) polarized state.

To examine the effect of changes in state legislative polarization on firm relocation decisions, we employ an augmented version of the baseline investment specification that includes state tax incentives as an additional regressor. In particular, we estimate regression models of the following form:

$$Relocation_{ijt} = \alpha_i + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 Tax\ Change_{jt} + \beta_3 TQ_{i,t-1} + \beta_4 \frac{CF_{it}}{TA_{i,t-1}} + \beta_5 \%\Delta GDP_{j,t-1} + \varepsilon_{ijt} \tag{6}$$

where i indexes firms, j indexes states and t indexes years. The dependent variable, $Relocation_{ijt}$, is a dummy variable equal to one if firm i relocates its corporate headquarters from state j to another state between years t and $t+1$, and zero otherwise. As always, the independent variable of interest, $Polar_{jt}$, is measured as the distance between the Republican and Democratic party ideological medians, averaged across the two chambers. The larger the distance, the higher the polarization. The coefficient β_1 thus tests the hypothesis and measures the effect of changes in state legislative polarization on the likelihood of relocation. We use the same set of control variables as in our baseline specification in Equation (1), except that we additionally include state corporate income tax rate changes to capture the possible effect of state tax incentives on corporate relocations (Voget (2011)). $Tax\ Change_{jt}$ is a dummy variable equal to one (negative one) if state j raises (cuts) its corporate income tax rate in year t relative to year $t-1$, and zero otherwise.[40] We use a linear probability model to accommodate higher dimensional fixed effects that account for heterogeneity in corporate relocation decisions across firms and over time. We cluster standard errors at the state level to account for serial correlation and correlation within states.[41]

[40] We obtain the data on changes in state corporate income tax rates for the period 1993-2012 from Heider and Ljungqvist (2015). Following their approach, we extend the sample period to 2016 by conducting a manual search of state tax changes from the Council of State Government's Book of the States (primarily the chapter "state finance").

[41] In unreported robustness tests, we obtain similar results by using a logit model to capture marginal effect estimates. Our results remain robust if we cluster standard errors at the firm level or at both the firm and year levels.

[Insert Table 8 about here]

Table 8 reports the estimation results that assess the impact of political polarization on firm relocation. The unit of analysis is at firm-year level. In column (1), we regress the *Relocation* dummy on our measure of state legislative polarization and other control variables including state tax incentives. The result shows no significant effect of political polarization on the out-of-state mobility of corporate headquarters. In columns (2) and (3), we take into account the degree of political polarization in the state before and after the move in order to more narrowly pin down the effect of polarization on relocation. Specifically, in column (2), we replace the dependent variable with $Relocation^{-}$ dummy and find a negative and significant coefficient. The likelihood that a firm moves to a less polarized state increases by 1.39 percentage points ($= 0.0902 \times 0.1546$) following a one standard deviation increase in the average within-state legislative polarization. In terms of economic significance, this corresponds to a 9.35% increase relative to the unconditional probability of the firm leaving the state. Next, we focus on instances of relocations where firms move to more polarized states. Column (3) shows that the coefficient on the polarization measure is negative and significant. The estimation result suggests that a one standard deviation increase in state legislative polarization results in a 10.51% reduction in the likelihood of the firm moving away to a more polarized state. Taken together, the results in the last two columns also help explain the statistically insignificant polarization effect in column (1): the increase in the probability of a firm moving to a less polarized state caused by increased levels of polarization is offset by the decrease in the likelihood of a shift toward a more polarized state.

In summary, our evidence lends further support to the main hypothesis that heightened political polarization undermines government efficiency and dampens firm investment. In response to such adverse consequences, firms move away from highly polarized states to less polarized states.[42]

[42]Relocations are rare events, however, and often related to merger and acquisition activity, making it difficult to draw causal conclusions about how a polarized political environment could affect firm relocation decisions. Further, changing headquarters is itself an endogenous choice. Thus, the findings presented here are perhaps best viewed as suggestive, not conclusive.

3.6. Controlling for Endogeneity

Unlike the partisan conflict index (PCI) that captures an increase in media coverage of partisan conflict, the roll call-based measure of state legislative polarization reflects a rise in the actual ideological conflict between policymakers, which is potentially a more suitable proxy for political polarization than the PCI. Despite the clear advantages of using roll call data, investigating the impact of political polarization on corporate investment is a challenging task due to the potential endogeneity between partisan conflict and the state of the economy as the economic downturn itself can arguably generate a great deal of political discord and uncertainty. For example, by showing that causality also runs in the opposite direction, Algan et al. (2017) raise the specter of a feedback loop between poor economic performance and polarization that gets worse over time. As such, the potential endogeneity of reverse causality and omitted variable bias can impose significant bias in our results.

A common practice in the applied economics literature to address endogeneity concerns is through the use of instrumental variable estimation. In the context of our paper, a proper instrument is a variable that carries a significant relationship with state legislative polarization and affects firm investment only through this relationship. In this subsection, we address endogeneity in measuring polarization by employing two identification strategies that explore settings rarely considered in the finance literature. The first identification strategy uses partisan bias in legislative redistricting as an instrument for state-level political polarization. The second strategy is a quasi-natural experiment tied to the staggered adoption of term limits across state legislatures.

3.6.1. Partisan Bias in Legislative Redistricting

Our first instrument relies on a methodology commonly used in the political science literature to quantify the degree of partisan bias in legislative redistricting (or gerrymandering), which is the process of periodically drawing boundary lines of electoral districts in a way to favor an in-

cumbent or a party over the other within state legislative bodies, often resulting in an imbalance in the number of votes cast for each side.[43] In most U.S. states, redistricting is handled by self-interested politicians and it is often blamed for the political system's current polarization. Prior literature finds that partisan redistricting skews the ideological composition of state legislatures by producing extremist legislators (Caughey, Tausanovitch, and Warshaw (2017)) and impedes numerous party functions at both the congressional and state house levels (Stephanopoulos and Warshaw (2019)). It increasingly produces districts that are homogeneous with respect to partisan composition and voter ideology (Carson et al. (2007), Theriault (2008) and Grainger (2010)). Consequently only conservative Republicans can win in districts designed to elect Republicans, just as liberal Democrats usually dominate Democratic districts. Because redistricting no longer produces moderate, bipartisan, or heterogeneous districts, moderate candidates cannot win state legislature elections, leading to the selection of ideologically extreme legislators.[44] Hence, holding everything else constant, we expect that the partisan bias in a redistricting plan contributes to

[43]Electoral outcomes depend on how the redistricting maps are drawn. In practice, this partisan redistricting of electoral districts is typically carried out by either "cracking" or "packing" voters into different districts that benefit one party and disadvantage the opposing party. Cracking entails drawing lines to ensure the opposing party's voters are spread across as many districts as possible, in which their preferred candidates are likely to lose by relatively narrow margins. Packing refers to cramming as many voters from the opposing party into as few districts as possible, in which the preferred candidates win by enormous margins than they actually need. Consequently the opposing party has little to no chance of winning in other districts. Both cracked and packed districts waste more votes of the opposing party than of the incumbent one. The opposing party either narrowly loses, wasting a large number of votes without winning a seat, or wins overwhelmingly, wasting a large number of votes above the 50%+1 threshold needed to win. In either case, the wasted votes do not meaningfully contribute to the opposing party's election and could have been deployed in other districts. Through disproportionate cracking and packing, the incumbent party is more able than the opposing party to convert its statewide support among voters into legislative representation. There is a wide body of literature in political science establishing that partisan control of the districting process consistently enables incumbent parties to gain a large partisan advantage in subsequent elections (Cox and Katz (2002), McGhee (2014) and Stephanopoulos (2018)).

[44]The median voter theorem provides a theoretical basis to expect that partisan gerrymandering is a possible factor in elected representatives' ideologies. Downs (1957) formally shows how in a single-member district electoral system, a candidate who wishes to win office will, in equilibrium, position his or her ideology at the median voter of the electoral district, which is related to the proportion of voters on the left and right. Through manipulating district lines, partisan gerrymandering increasingly produce ideologically homogeneous and uncompetitive districts where voters are heavily titled toward one party over the other, moving the ideology of the median voter (and thus the elected legislator) of the district further to the extreme left or right, respectively. Putting these facts together leads to the clear expectation that changes in the electoral district boundaries caused by partisan gerrymandering should lead to changes in the ideological position of the median voter, and therefore contribute to the rising partisan polarization in state legislatures. Results reported in Panel A of Table 9 lend empirical support to these predictions.

state legislative polarization and therefore our proposed instrument satisfies the relevance condition. On the other hand, it is not immediately apparent how the process of setting boundaries of electoral districts should affect firm investment in a way other than through its effect on political polarization. After all, the primary goals of partisan gerrymandering are to maximize the effect of supporters' votes and to minimize the effect of opponents' votes in state legislative elections. We thus feel fairly confident that our instrument satisfies the exclusion restriction as well and is a valid instrument for political polarization.

To quantify the severity of partisan bias in a redistricting plan, we follow McDonald and Best (2015) and construct the *mean-median difference* (MMD), which measures how efficient a party is able to translate its votes into seats relative to its opponent. This metric can be easily calculated from a state's district-level election results using the formula: $MMD = V^O - M$, where V^O is a party's average vote share across all districts and M is its vote share in the median district. The MMD is measured at each state house election, with a given districting plan typically generating up to five elections between decennial censuses and hence five MMD measures. MMD measures will change from election to election as the distribution of district-level vote shares varies over elections. Fairness according to this measure is when $MMD = 0$.[45] When the mean and the median diverge significantly, the district distribution is skewed in favor of one party and against its opponent. In particular, when the focal party (in our case, Republicans) wins more votes in the median district than in the average district, it generally has an advantage in turning votes into seats (Wang (2016), Best et al. (2018) and Krasno et al. (2019)).[46] The idea is simple. Partisan gerrymanders attempt to skew election results in favor of one party by ensuring that a majority

[45]The mean vote share provides a better view of the ideal two-party seat share, whereas the median vote share better demonstrates how seats are actually allocated under a map. A fair map with perfect proportional vote-seat representation would produce a mean-median difference of close to zero.

[46]For example, if the Republican party has a mean statewide vote share of 40% but a median vote share of 60%, they will have won over half of the districts (or seats) with much less than half of the vote. The plan has a mean-median difference of -20% in a direction that favors Republicans but works against Democrats, indicating that the extreme skew is likely resulting from partisan gerrymandering. The difference between the mean and median is a common analysis long used by statisticians in many academic fields to measure skew. Katz, King and Rosenblatt (2020) further show that this metric can reliably assess partisan asymmetry in state-level districting schemes.

of its districts perform above the statewide average, in order to give the favored party more seats. Although gerrymandering cannot change the statewide mean vote share, which will be the same regardless of how the districts are divided, it creates a few extremely skewed districts that have been packed and cracked to shift the median upward considerably. The MMD captures in a single number which party is benefiting from the redistricting process and how large of an advantage it has, with a negative (positive) value indicating the district configuration favors the Republican (Democratic) party.

[Insert Figure 3 about here]

We estimate the MMD's effect on state legislative medians and polarization in a dataset covering all but seven U.S. states between 1993 and 2016. Our data on the MMD in each state-year are taken from Stephanopoulos and Warshaw (2019), who estimated the metric for 896 of the 1123 state house election years in partisan legislatures between 1972 and 2016.[47] We exclude states with missing vote data in more than four election cycles. The final dataset consists of data on 573 state legislature elections across 43 states between 1990 and 2016. Figure 3 plots the MMD estimates across states and over time, with linearly interpolated values for non-election years. Each plus sign represents an annual level of the MMD estimate for each state legislature. We observe considerable variation in the MMD estimates both between and within redistricting plans. The figure also shows graphically how dramatically the MMD moved from a Democratic to a Republican bias. While the distribution of MMD estimates appeared to slightly favor Democrats in the 1990s and early 2000s, it trends in a pro-Republican direction more recently, when the estimates are more likely to be negative, indicative of a Republican advantage in the underlying redistricting plans.

We now proceed with our instrumental variable approach as follows. To pin down the causal effect of political polarization on corporate investment, we use the above mean-median difference (MMD) measure as an instrumental variable in two-stage least squares (2SLS) regressions that

[47] Many state legislative races are uncontested. For these races, Stephanopoulos and Warshaw (2019) impute the Republican share of the vote based on presidential election results and other state legislative results in a given district.

control for the possible endogenous nature of political polarization. Since both the polarization variable and its instrument are measured at the state level, their values are repeated for all firms within each state and year. This suggests that the traditional 2SLS estimation is inappropriate in this context, since it would mechanically overstate the correlation between the endogenous variable and its instrument. To circumvent this problem, we estimate a state-level panel regression in the first stage and a firm-level panel regression in the second stage separately. In particular, we estimate the following first-stage regression:

$$\begin{aligned} Polar_{jt} &= \alpha_j + \gamma_t + \beta_1 \text{MMD}_{jt} + \beta_2 TQ_{j,t-1} + \beta_3 CF_{jt} + \beta_4 Republican\ Governor_{jt} \\ &\quad + \beta_5 Split\ Legislature_{jt} + \beta_6 Unemployment_{jt} + \beta_7 \%\Delta GDP_{jt} + \varepsilon_{jt} \end{aligned} \quad (7)$$

where j indexes states and t indexes years. *Polar* is the polarization of state legislatures that we measure as the distance in ideal point estimates between Democratic and Republican medians (averaged across chambers) as in Equation (1). MMD is our preferred measure of partisan bias in the redistricting process, with negative (positive) values indicating an advantage for Republicans (Democrats). We linearly interpolate the MMD data to obtain the intermediate values between election years. To obtain consistent and unbiased estimates, we instrument *Polar* with MMD in Equation (7) while controlling for firm and state-level variables that may also influence legislative polarization. $TQ_{j,t-1}$ and CF_{jt} stand for the average levels of Tobin's Q and operating cash flows measured at the state level. To account for structural features of state governance, we include indicators for the presence of *split legislature* and whether the state has a *Republican governor*.[48] We also account for attributes of state economic conditions, including unemployment rate and GDP growth rate. State and year fixed effects are included in all specifications with standard errors also clustered by state and year. We expect to see our measure of legislative polarization

[48] As a robustness check, we also include the difference between the share of seats held by the majority and minority parties to proxy for party competitiveness in state legislatures. In unreported tests, we show that the inclusion of party competitiveness as an additional control has no material impact on our results.

correlate strongly with the variation of partisan redistricting bias within each state in the first-stage regression.

[Insert Table 9 about here]

Panel A of Table 9 reports the first-stage estimation results of the 2SLS regressions. In column (1), using the ideal points estimated by Shor and McCarty (2011), we assess the MMD's effect on the median ideal point of state legislators in lower chambers. Central to the idea that redistricting affects polarization, and consistent with Caughey, Tausanovitch, and Warshaw (2017), the MMD measure has a negative and significant coefficient, indicating that partisan gerrymandering of state legislative districts can affect legislative representation. Specifically, we find that a pro-Republican MMD (< 0) shifts the median state legislator markedly to the right (more conservative) along the ideological spectrum, whereas a pro-Democratic MMD (> 0) shifts the median further to the left (more liberal). For the rest of analysis, we take the absolute value of the MMD (i.e., |MMD|) as a party-free measure of the magnitude of partisan bias in redistricting plans and continue to assess its effect on state legislative polarization. By definition, a larger absolute |MMD| corresponds to a greater amount of partisan bias, regardless of which party is advantaged. Column (2) further shows that partisan gerrymandering undermines electoral competition by increasingly producing safe, uncompetitive and ideologically homogeneous districts with a clear partisan advantage, which leads to the selection of more extreme, polarized legislators.[49]

In columns (3) and (4) of Panel A, Table 9, we continue to assess the effect of redistricting on legislative polarization, estimated separately for the state House ($Polar^H$) and Senate ($Polar^S$).

[49]The dependent variable in column (2) is *Uncompetitive District*, defined as the proportion of uncompetitive electoral districts relative to total districts in state j in year t. An electoral district is defined as uncompetitive if the vote margin between the first and second place candidates is greater than 5%. To construct this variable, we rely primarily on a large dataset on district-level candidacies and results in state legislative elections from 1972 to 2016 compiled and maintained by the Princeton Gerrymandering Project. More information about the data is available at: `http://gerrymander.princeton.edu/resources/`. We obtain virtually identical results if we use a 10% threshold in place of a 5% threshold in measuring electoral competitiveness. The result also holds when we do not linearly interpolate the MMD and only use the election year data.

We find that on average, partisan bias as a result of redistricting is associated with increased political polarization in state legislatures. However, this effect is concentrated disproportionately in state lower chambers, despite a correlation of 88% between the polarization measures of the two chambers. This is not surprising, given that our measure of partisan bias, MMD, is computed entirely based on the district-level voting patterns from state House redistricting plans. Finally, in column (5), we aggregate the state House polarization and Senate polarization to derive our preferred measure of polarization, *Polar*, which reflects the overall polarization in the bicameral state legislatures. Again, the coefficient estimate on |MMD| shows a strong positive relationship between partisan bias in redistricting and the overall polarization measure.[50] Taken together, the results reported in Panel A of Table 9 support our intuition that partisan redistricting exacerbates the problem of polarization in state legislatures. In terms of magnitudes, the coefficient on |MMD| in column (5) is 1.595, implying that a 1% increase in the partisan advantage metric translates into an economically significant 1.10% ($= 1.595 \times 1\% / 1.449 \times 100\%$) increase in state legislative polarization relative to the average polarization across all states and chambers. In addition, column (5) shows that the first-stage F-statistic for the null that $\beta_1 = 0$ in Equation (7) is 24.75, which well exceeds the "rule of thumb" for strong instruments ($F \geq 10$) proposed by Staiger and Stock (1997) as well as the 10% critical threshold value in Table 5.2 of Stock and Yogo (2005). Thus, weak identification is unlikely to be a major concern. We also find that some of our control variables are significantly associated with polarization. For example, a fall in state GDP growth rate is associated with greater polarization, suggesting that the estimated effect of political polarization on firm investment is likely to be confounded by economic weakness. Consistent with Olson and Rogowski (2020), we also find no significant differences in polarization based on the partisanship of the governor or the split control of state legislative chambers.

[50] Recall that we have $Polar = \frac{1}{2}(Polar^H + Polar^S)$ by definition. Because state House normally have more members than the Senate, this estimation will produce aggregate estimates of redistricting's effects on polarization that more closely reflect its effects on the state House.

Panel B of Table 9 reports the corresponding second-stage results. We repeat the estimation of our baseline results in Table 3, but replace the key independent variable *Polar* in Equation (1) with $\widehat{Polar}$, a measure of legislative polarization fitted from the first-stage regression of *Polar* on the instrument |MMD| and controls, based on the estimates in columns (5) of Panel A, Table 9. When the baseline specification is estimated without controls or firm and year fixed effects in column (1), the coefficient on the fitted polarization variable is positive and significant. However, when firm and year fixed effects are included in columns (2) to (4), we find that the fitted polarization still has a significantly negative effect on corporate investment regardless of whether control variables are included. This suggest that without fixed effects to control for unobserved group heterogeneity, the OLS estimator produces an inconsistent estimate with the incorrect sign, while the fixed effects estimators have the correct sign and should be used in this case (Gormley and Matsa (2014)). In economic terms, the estimated effect is also significant. The point estimates in column (4) suggest that a one standard deviation increase in legislative polarization is associated with a reduction in investment of -0.0065 $(= -0.0424 \times 0.1530)$. Given that the sample mean investment rate is 0.0618, this figure corresponds to a reduction in investment of about 10.5%, compared to 4.5% in the OLS specification in column (4) of Table 3. This suggests that, without proper instrumental variable procedure to correct for measurement error in political polarization, its effect could be understated by more than half, which is likely due to some of the decline in investment caused by higher political polarization being misattributed to a weak economy.

Our results are not inconsistent with Denes, Schulz and Vig (2019) who use changes in firms' political boundaries induced by congressional redistricting as a source of exogenous variation to examine the valuation effects of shocks to political connections. They focus on a short period of time before and after redistricting and show that firms temporarily losing their political connections during the 2010 redistricting cycle face higher political uncertainty and subsequently experience a decline in capital expenditures. Intuitively, this finding explains why firm investment decreases in the short run following redistricting, after all it takes time to rebuild political connections or

relationships. In our context, however, we take a broader view of the long-term impact of partisan redistricting that attenuates state legislative political polarization, but is not limited to short-term uncertainty. Indeed, we utilize a measure of partisan bias inherent in the state House redistricting plans and show that it positively contributes to heightened political polarization in state legislatures. This in turn undermines government efficiency and impairs economic development in the long run.

In unreported robustness tests, we show that the results are substantively similar when we employ an alternative instrument, MMD^P, a measure of partisan redistricting bias calculated using district-level results from presidential elections. This measure has the advantage of being less affected by district-level candidate competition that may influence local firms' investment. Compared to state legislative races, presidential elections are arguably more exogenous from the outcome variable we focus on in the paper. In addition, the results still hold when state legislative polarization is instrumented using five-year lagged weighted average polarization of geographically neighboring states (weighted by state population). The literature provides empirical evidence that a state is more likely to adopt particular laws or policies if its neighboring states have already done so (Berry and Berry (1990), Mooney (2001), and Seljan and Weller (2011)). These results are available upon request.

3.6.2. State Legislative Term Limits

Our second instrument exploits quasi-experimental variation in political polarization due to staggered adoption of state legislative term limits over time, which prevents state legislators from running for office for more than set number of times. A term limit is a legal restriction, passed on a state-by-state basis, that aims to reduce the level of partisan conflict and special interest group capture, encourage compromise and cooperation, and improve the quality of representation.[51] For term limits to be considered a valid instrument, the variable must cause some kind of exogenous

[51]For example, in early 2018, Maryland's Republican Governor Larry Hogan proposed an eight-year term limit for the state's legislators, in order to reduce partisanship, gerrymandering and corruption. See `https://www.baltimoresun.com/politics/bs-md-hogan-term-limits-20180109-story.html`.

variation in political polarization that does not have an independent effect on corporate investment. Contrary to the goals of their supporters, prior literature demonstrates that term limits produced systematically higher levels of polarization in state legislatures by changing legislators' electoral and career incentives, in turn increasing the role of parties in legislative processes (Olson and Rogowski (2020)).[52] We thus expect that term limit reforms increase political polarization in the first-stage regression. We also do not have any theoretical argument or empirical evidence that the mere adoption of legislative term limits at the state level will affect firm investment, except through the legislative dysfunction caused by increased partisan conflict in state legislatures. Since term limit reform does not capture aspects of the firm's investment, it is therefore likely exogenous in our second-stage regression.

One possible challenge to instrument validity is the alternate explanations for changes in firm investment around the adoption of state legislative term limits. In particular, firms or politicians can try to manipulate firm investment to influence the passage of the reform. However, in unreported tests, we find no evidence of changes in either firm investment or economic activity before the enactment of term limits. It is also unlikely that lobbying activities could influence adoption of term limits, because most term limits requirements were passed via referendum voted by the people rather than legislation made by political elites. In the absence of a link between investment and term limits unrelated to political polarization, it is reasonable to conclude that term limits satisfy both the relevance and exclusion conditions and is a valid instrument for political polarization.

Term limits were implemented in 15 states (including Nebraska) during the period of study from 1993 to 2016.[53] They took effect first in California and Maine in 1996 and most recently in Nevada in 2010. Figure 4 displays the share of states using term limits for their lower chambers over the period under study and indicates the timing of their adoption. While most states that have

[52]Relatedly, Fouirnaies and Hall (2018) show that state lawmakers who can no longer seek reelection sponsor fewer bills, are less productive on committees, and are absent for more floor votes, on average.

[53]We include Nebraska and its officially nonpartisan legislature in our analysis, although in unreported tests we demonstrate that our results are robust to its exclusion.

implemented term limits did so in the late 1990s or early 2000s, we have substantial variation in the timing of implementation across treatment states over the period of study.

[Insert Figure 4 about here]

To address potential endogeneity in measuring political polarization, we use term limits as an instrumental variable in 2SLS regressions. For the first stage, we adopt a difference-in-differences research design that leverages within-state changes in the presence of term limits over time to identify their effects on polarization. We do this by running the following panel regression model:

$$\begin{aligned} Polar_{jt} &= \alpha_j + \gamma_t + \beta_1 \text{Term Limits}_{jt} + \beta_2 TQ_{j,t-1} + \beta_3 CF_{jt} + \beta_4 Republican\ Governor_{jt} \\ &\quad + \beta_5 Split\ Legislature_{jt} + \beta_6 Unemployment_{jt} + \beta_7 \%\Delta GDP_{jt} + \varepsilon_{jt} \end{aligned} \tag{8}$$

where j indexes states and t indexes years. The dependent variable, $Polar_{jt}$ is the level of legislative polarization in state j in year t. The key independent variable, $Term\ limits_{jt}$, is an indicator that equals one if term limits were in effect in state j in year t. We use the same set of firm and state level time-varying controls as in Equation (7) in the previous section, which includes the state average levels of Tobin's Q and operating cash flows, indicators for the presence of split legislature and whether the state has a Republican governor, and state-level economic conditions that could be associated with legislative polarization. State and year fixed effects are included in all specifications. Standard error continues to be clustered at the state-year level.

[Insert Table 10 about here]

Panel A of Table 10 presents the first-stage regression results. In particular, the first two columns report results from Equation (8) estimated separately for states' lower ($Polar^H$) and upper ($Polar^S$) chambers. Our results show that term limits contribute to greater legislative polarization,

with the effect concentrated disproportionately in state lower chambers. In column (3), the dependent variable is the overall level of legislative polarization (*Polar*) that averages the polarization measures from the two chambers in each state. The coefficient for *term limits* remains similar in magnitude and is statistically significant, providing strong evidence that term limits increase the overall level of political polarization in state legislatures. In economic terms, a state with the most stringent term limit law is associated with a 0.109 increase in legislative polarization, compared to states without term limits. This corresponds to a 7.60% increase in legislative polarization, given that the mean level of polarization is 1.437 over the sample period. Moreover, the F-statistic is 36.4 and the R^2 of the regression is 51.1%, alleviating concerns that the instrument may be weak.

Panel B of Table 10 reports the second-stage regression results, where we reestimate the effect of political polarization on firm investment using the fitted values from Equation (8) to capture the exogenous variation in political polarization. In particular, we repeat the main tests from Table 3, only this time using the fitted polarization variable, $\widehat{Polar}$, that we instrumented in the first stage. Our results show that the relationship between political polarization and firm investment remains significantly negative under this alternative IV specification based on term limits. Comparing results between Table 3 and Panel B of Table 10, we observe that the estimates of polarization variables are substantially larger in magnitudes when the polarization variable is instrumented. For example, the point estimates in column (4) suggest that a one standard deviation increase in legislative polarization causes investment to drop by 0.007 ($= 0.0479 \times 0.1560$). Relative to the sample mean of 0.0616, this change corresponds to an 11.4% decrease in investment rate. The magnitude of 2SLS results is comparable for that based on the partisan bias of redistricting plans in Table 9. We also note that when using term limits as an instrument, the decline in investment caused by the higher political polarization associated with adoption of term limit laws is more than twice the decline predicted with ordinary least squares. One explanation for this result is that the instrument solves attenuation bias due to measurement error in political polarization. Overall,

these results suggest a causal relationship from increased political polarization to the reduction of firm investment.

3.7. Robustness Checks

In this subsection, we perform a series of empirical tests to ensure that the preceding results are robust to various subsample and subperiod analyses, different measures of polarization and corporate investment, additional control variables, and alternative model specifications. Overall, we find that our results are still statistically and economically significant and similar to the baseline results.

3.7.1. Different Measures and Samples

We first present robustness results with a number of alternative measures. Our main specification uses polarization simply measured by the ideological distance between the Democratic and Republican party medians, averaged across both chambers in the state legislature. However, a third party, other than the two major parties, may also hold a small number of seats in the legislature. We therefore test the robustness of our results using an alternative, party-free, measure of polarization also proposed by Shor and McCarty (2011) that averages, across the two chambers, the average distance between any two state legislators. Column (1) of Table 11 considers this alternative polarization measure. Our results remain robust. Given the serious measurement concerns in Tobin's Q induced by potential stock market misvaluations (Erickson and Whited (2000)), in column (2) of Table 11, we reestimate the baseline specification in Equation (1) using sales growth instead of Tobin's Q as our proxy for the incentive to invest. Our conclusions are not sensitive to this alternative measure of investment opportunities.[54]

[54]Sales growth is defined as the percentage change in sales over the previous year for each firm. In unreported tests, we further verify that our results hold up to a number of alternative proxies for investment opportunities including the market-to-book ratio, the industry mean Tobin's Q, the industry median Tobin's Q, and return on equity.

[Insert Table 11 about here]

We also conduct robustness tests using an alternative measure of firms' headquarter state locations based on Garcia and Norli (2012)'s dataset on the state-level operations of individual firms. Garcia and Norli (2012) measure the state exposure of a firm's business operations to each U.S. state by conducting a textual analysis to record instances where state names occur in its annual 10-K filings. The dataset of Garcia and Norli (2012) enables us to examine the effect of political polarization on the operations of individual firms across states. In our sample, we find that about two-thirds of firms' Compustat headquarters state is identical to the main state of firms' operations as reported in Garcia and Norli (2012). Therefore, we control for the fact that sometimes the state of firm headquarters maybe different from the state where the firm conducts most of its business. It also allows us to consider multiple states of business. Finally, since it is time varying, using this dataset also allows us to control for firms that may be changing states over time. Column (3) of Table 11 shows that our results are robust to this alternative definition of the relevant state.[55]

We next perform several robustness tests on the sample selection. One concern with our main result is that it may fail to account for significant heterogeneity across the states. For example, the result could be driven by a particular state like California, which is by far the most polarized state also with disproportionate representation of firms in our sample. To alleviate this concern, in column (4), we reestimate the baseline specification on a subsample excluding firms headquartered in California and find that it has little effect on the results. Another concern is about the inclusion of OTC traded firms in our final sample, which tend to be small technology stocks. The small size of these firms may result in ratios that are highly variable and very large (in absolute value), and this could give them disproportionate impact on the results. To account for this potential issue, column (5) repeats the analysis omitting OTC traded firms. We find qualitatively similar results,

[55]The reduction in sample size is because Garcia and Norli (2012) data are available only before 2012 (inclusive). In unreported tests, we also show that our results are robust to using firms' historical headquarters locations from the Notre Dame Software Repository for Accounting and Finance (SRAF) database. See Section 3.5 for a description of the database.

suggesting that our results are not driven by the presence of OTC firms. A third potential concern with our results is that the effect of polarization may not be uniform over time. As shown in Figure 2, partisan polarization in state legislatures on average has increased more rapidly over the past decade than at any other time in our sample period. The trend is also confirmed by increasing public attention on polarization measured by the monthly Google Search Volume Index (SVI) for "political polarization" during the same period in Figure 1. As such, it is possible that the recent trend in polarization itself could be generating the results. To address this possibility, in the last two columns of Table 11, we decompose the impact of polarization in two shorter subperiods 1993 to 2009, and 2010 to 2016 respectively. We find that the impact of polarization is negative and significant in both subperiods, with the estimated impact being larger in the more recent subperiod. This is consistent with the general pattern of polarization documented by Figure 1. Overall, these robustness checks help mitigate the concerns that our results might be driven by a dominant state or a particular subperiod.

3.7.2. Additional Macroeconomic Variables

In this subsection, we test the robustness of our results by explicitly controlling for additional macroeconomic variables that may also affect firms' investment decisions. A common problem in interpreting the causal effect of political polarization on corporate investment arises when our preferred polarization measure may be capturing the effect of general economic uncertainty and not just the effect of partisan conflict within state legislatures. For example, intense disagreement between policymakers can lead to the inability of state legislatures to reach an agreement or pass a law, which may at the same time heighten policy-related uncertainty.[56] To address this concern, we augment the baseline specification to include the news-based index of economic policy uncertainty (EPU) as proposed by Baker et al. (2016). We also explicitly control for congressional polarization

[56] Azzimonti and Talbert (2014) suggest that political disagreement affects economic decisions. They develop a polarized business cycle model to show that increases in polarization induce policy uncertainty, causing long run investment to decline.

derived from the DW-NOMINATE scores of congressional ideology (Poole and Rosenthal (1997)) and the news-based partisan conflict index (PCI) developed by Azzimonti (2018) to ensure that the effect we are estimating can be attributed to the partisan polarization within state legislatures and not to some other confounding source of political conflict in the Congress or media coverage. We find that the explanatory power of our polarization measure is not absorbed by any of these additional macroeconomic variables.[57]

Baker et al. (2016) compute a news-based EPU index and document that it is negatively and significantly associated with aggregate investment. Using the EPU index, Gulen and Ion (2016) find that policy-related economic uncertainty depresses firm investment. Azzimonti (2018) argues that this uncertainty can be originated from political discord. Using a semantic search method to measure the frequency of newspaper articles reporting disagreement about government policy, Azzimonti (2018) constructs the PCI to show a strong negative correlation between firm investment and the PCI. By construction, our roll call-based measure of state legislative polarization captures a rise in the actual ideological conflict between politicians, rather than an increase in the media coverage of policy uncertainty or partisan conflict. It is possible that rising partisanship or uncertainty in the media is merely a reflection of the fact that economic agents, such as voters or investors have increasingly distinct views about economic conditions. Nevertheless, it is important to verify that the roll call-based measure of state legislative polarization used in this paper captures variation in investment that is independent of that in existing news-based measures of economic policy uncertainty or partisan conflict.

[Insert Table 12 about here]

Table 12 reports the estimation results form this analysis. We use the baseline specification in Equation (1) but do not include time fixed effects here as these country-level indices are the

[57] Congressional polarization captures the ideological distance between the two major political parties in the U.S. Congress. The method used to compute congressional polarization $Polar^C$ is similar to the one employed by Shor and McCarty (2011) to measure state legislative polarization *Polar*, but using roll-call votes in the U.S. Congress instead of state legislatures. See Poole and Rosenthal (1997) for more details.

same for all the firms in a given year. Thus, inclusion of time fixed effects would automatically absorb the explanatory power of these indices. Specifically, the first three columns of Table 12 present the results considering exclusively congressional polarization (column (1)), PCI (column (2)) and EPU (column (3)) respectively, while ignoring the state legislative polarization measure. Congressional polarization $Polar^C$ is measured as the ideological distance between the two major political parties in the U.S. Congress. PCI is the natural logarithm of the annual average partisan conflict index, ln PCI whereas EPU is the natural logarithm of the EPU index, ln EPU. The results are consistent with existing evidence (e.g., Gulen and Ion (2016) and Azzimonti (2018)) that high levels of political polarization or policy uncertainty depress firm investment. Columns (4) to (6) replicate the analysis in the first three columns by adding to the baseline specification our preferred measure of state legislative polarization, $Polar$ as an additional regressor. Across all specifications, we find that state legislative polarization remains a significant predictor of capital investment. In column (4), the coefficient estimates on both $Polar^C$ and $Polar$ variables are statistically significant and negative, indicating that political polarization in both the U.S. Congress and state legislatures has independent explanatory power in the model by exerting negative effects on capital investment, even though the coefficients of both variables are slightly lower when included simultaneously. The results thus help identify and separate the effect of political polarization on investment at the various levels of government.

An interesting case emerges when both $Polar$ and PCI are included as regressors in column (5). Once we take into account state legislative polarization measure, the estimated coefficient on PCI remains statistically significant, but switches sign from negative to positive, suggesting a possible endogeneity problem associated with the PCI, as discussed earlier. This also implies that the roll call-based measure of state legislative polarization used in this paper is potentially a more suitable proxy for the actual degree of political disagreement among politicians, compared with the news-based index of partisan conflict developed by Azzimonti (2018), which can be confounded by other sources of disagreement about government policies among economic agents other than

policymakers. Column (6) further shows that the effect of political polarization remains after EPU is included, implying that political polarization is not merely a reflection of policy-related economic uncertainty. The fact is that while polarization may rise under policy uncertainty, it can also reduce policy uncertainty in the short run by imparting a status quo bias to economic policy. This result suggests that polarization in state legislatures may adversely affect firms' investment through a first moment effect rather than only through a second moment (e.g., uncertainty effect).

Finally, in column (7), we include all these three control variables in our baseline specification in Equation (1) simultaneously, along with a macroeconomic proxy for consumers' expectations about future economic conditions, the natural logarithm of the Michigan consumer sentiment index (CSI), ln *CSI*, constructed by the University of Michigan. This is done to further alleviate the potential omitted variable bias if our current control set does not perfectly capture firms' investment opportunities (Baker et al. (2016) and Gulen and Ion (2016)). Our results remain robust, though the effect of polarization is slightly tamed when additional variables are included. In unreported tests, we also include a measure of the cost of capital based on the Baa-Aaa corporate spread and the conclusion still holds. Overall, the results of these tests not only strengthen the robustness of the polarization effect on investment but also suggest that our measure of state legislative polarization contains information about actual political disagreement not captured by any of the other measures of partisan conflict or policy uncertainty commonly used in the literature.

3.7.3. Alternative Investment Policy Function

There is some concern that the coefficients of our previous results could be biased due to misspecifiation in the standard investment-Q equation that determines the rate of investment. We deal with this concern in three ways. First, we employ the proxy-quality threshold test of Erickson and Whited (2005) to show that measurement error in the proxy for Tobin's Q is unlikely to affect the sign of our coefficients. Second, as suggested by Wooldridge (2002) and Roodman (2008), a fixed effects OLS regression may be biased if there is a dynamic relation between current values

of an explanatory variable and past realizations of the dependent variable. To account for this simultaneity, we apply a dynamic panel generalized method of moments (GMM) estimator to examine how political polarization affects firm investment. Our results survive again.[58] Third, we follow Gala and Gomes (2016) to estimate an alternative specification of the investment policy function that uses firm size and sales instead of Tobin's Q as regressors. Unlike Q theory, the investment policy function does not rely on Tobin's Q, and appears superior to standard Q-type regressions both in theory and in the data. In this subsection, we analyze the robustness of our previous results to the alternative investment policy function of Gala and Gomes (2016) that avoids the use of Q entirely. The rate of investment can be written as:

$$\frac{I_{i,t+1}}{K_{it}} = \alpha_i + \gamma_t + \beta_1 Polar_{jt} + \beta_2 \ln\left(\frac{Y_{it}}{K_{i,t-1}}\right) + \beta_3 \ln K_{it} + \beta_4 \ln\left(\frac{N_{it}}{K_{i,t-1}}\right) + \beta_5 \%\Delta GDP_{jt} + \varepsilon_{ij,t+1} \tag{9}$$

where i indexes firms, j indexes states and t indexes years. The investment rate, $\frac{I}{K}$, is capital expenditures in property, plant and equipment scaled by the beginning-of-year capital stock. The capital stock, K, is defined as net property, plant and equipment. The state legislative polarization, $Polar$, is measured by the ideological distance between the Democratic and Republican party medians, averaged across both chambers in the state legislature. Firm size, $\ln(K)$, is the natural logarithm of the beginning-of-year capital stock. The sales-to-capital ratio, $\ln\left(\frac{Y}{K}\right)$, is computed as the natural logarithm of net sales revenues scaled by the beginning-of-year capital stock. The employment-to-capital ratio, $\ln\left(\frac{N}{K}\right)$, is defined as the natural logarithm of the number of employees scaled by the beginning-of-year capital stock. $\%\Delta GDP$ is the year-on-year percentage change in state GDP. α_i is a firm fixed effect, γ_t is a year fixed effect, and standard errors are clustered at the firm level and corrected for heteroskedasticity. Following Gala and Gomes (2016), the sample contains Compustat annual files for the period 1993 to 2016 with at least three years of available accounting data. We keep only firm-year observations that have non-missing information required

[58] For brevity, the results on the proxy-quality threshold test and the GMM estimation are not reported but are available upon request.

to construct the relevant variables used in the analysis. To reduce the influence of extreme outliers, all variables have been winsorized at the 1% and 99% level. These procedures yield a final sample of 75,121 firm-year observations.

[Insert Table 13 about here]

Table 13 reports estimation results from the alternative investment policy function without Q. The first column only includes the subsample of manufacturing firms (SIC codes between 2000 and 3999), as in Gala and Gomes (2016), whereas the second column uses all firms in the sample. We further augment the alternative investment regression specification by adding quadratic terms for sales, firm size and employment, which proves to fit the investment data even better than the specification in Equation (9) that only contains linear terms (Gala and Gomes (2016)). In both columns, the estimated coefficients on *Polar* are negative and significant, suggesting that our main results are unlikely to be driven by the misspecification of investment models. In terms of economic magnitudes, a one standard deviation increase in state legislative polarization is associated with a 0.98 percentage points $(= |-0.0627| \times 0.1560)$ decline in the investment rate of the average manufacturing firm, which is about 2.9% $(= 0.98\%/0.3345)$ of its mean. We also find that both the linear and quadratic terms for firm size and sales-to-capital ratio are all strongly statistically significant, consistent with the findings of Gala and Gomes (2016) and Gala and Julio (2016) that firm size and sales, and not Q, are the primary determinants of investment. Overall, the results yielded from the more structural policy function of Equation (9) confirm the existence of a solid negative relation between state legislative polarization and firm investment rates.

4. Conclusion

This study investigates the effect of political polarization on corporate investment. We utilize the roll call-based measure of polarization based on estimates of state legislative ideology devel-

oped by Shor and McCarty (2011), which reflects a rise in actual ideological conflict between policymakers in state legislatures, to measure polarization. We find a strong negative relation between state legislative polarization and firm investment. An increase of one standard deviation in the average within-state legislative polarization leads to a 4.5% reduction in the investment rates of the average firm, after controlling for growth opportunities and economic conditions. To mitigate endogeneity concerns, we use partisan bias arising from the practice of redrawing state legislative district boundaries after each national census, as an instrumental variable in 2SLS regressions that control for the possible endogenous nature of political polarization.

We then examine two possible mechanisms through which corporate investment is affected by polarization. First, political polarization causes legislative stalemate and inaction that undermines the ability of the government to pass major legislation that deals with real issues facing the economy. This makes government policies less effective in reducing investment risk, and thereby firms have less incentive to invest. Second, political polarization increases the probability of sharp policy swings from one administration to another of the opposite party. Our results suggest that polarization affects firm decisions broadly through a reduction in the quality of state governance.

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Appendix: Variable Definitions and Data Sources

Variable	Definition	Source
Investment and Firm Characteristics		
Investment	$\frac{CAPX}{TA}$, defined as capital expenditures (CAPX) scaled by beginning-of-year book value of total assets (TA, corresponding to Compustat annual item AT).	Compustat
Tobin's Q	TQ, the ratio of the market value of assets to the book value of assets, measured as the market value of equity (PRCC_F $\times$ CSHO) plus the book value of assets (TA) minus book value of equity (CEQ) minus balance sheet deferred taxes (TXDB), all divided by beginning-of-year book value of total assets (TA).	Compustat
Cash Flow	$\frac{CF}{TA}$, operating cash flows (CF) as a percentage of book value of assets (TA), computed as net income before extraordinary items (IB) plus depreciation and amortization (DP), all divided by beginning-of-year book value of total assets (TA).	Compustat
Political Variables		
Polar	Our preferred measure of state legislative polarization, defined as the ideological distance between the Democratic and Republican party medians, averaged across both lower and upper chambers in the state legislature. Intuitively, the larger the distance between the two party medians, the more polarized the state legislature is.	Shor and McCarty (2011)
Divided Government	Dummy variable takes a value of one if one party controls the executive branch of state government while another party controls one or both chambers of the legislative branch, and zero otherwise.	Ballotpedia
Legislative Productivity	The percentage of all introduced energy bills that eventually become enacted into law by a state legislature during a legislative cycle.	NCSL
Policy Instability	Four-year rolling volatility of aggregate state tax revenue as a percentage of output, where aggregate tax revenue is the sum of income, sales, and corporate tax revenues.	Census Bureau
Uncompetitive District	Proportion of uncompetitive electoral districts relative to total districts in state j in year t. An electoral district is defined as uncompetitive if the vote margin between the first and second place candidates is greater than 5%.	PGP Project
Republican Governor	Dummy variable takes a value of one if the incumbent governor is a Republican in state j in year t, and zero otherwise.	PGP Project
PCI	The partisan conflict index (PCI) is computed monthly using a semantic search approach to measure the frequency of newspaper coverage of articles reporting political disagreement about government policy. The methodology used to compute the PCI is similar to the one used by Baker, Bloom and Davis (2016) to measure EPU. We take the annual averages of the monthly PCI in the analysis.	Azzimonti (2018)
EPU Index	An monthly index of economic policy uncertainty (EPU) based on the weighted average of three types of underlying components, namely, the frequency of news coverage containing key terms related to policy uncertainty, uncertainty about future changes in the federal tax code, and uncertainty about future fiscal and monetary policy.	Baker, Bloom and Davis (2016)
Macroeconomic Control Variables		
%Δ GDP	Year-on-year percentage change in state GDP, obtained from the U.S. Bureau of Economic Analysis via `https://www.bea.gov`.	BEA
CSI	The consumer sentiment index (CSI) is a monthly survey of U.S. consumer confidence levels issued by the University of Michigan. It is based on telephone surveys that gather information on consumer expectations regarding the overall economy. We take the annual averages of the monthly CSI, which is available at `https://fred.stlouisfed.org/series/UMCSENT/`.	St. Louis Fed

Table 1
Summary Statistics

Panel A of Table 1 demonstrates the process how we aggregate across upper and lower chambers to arrive at a single measure for ideological polarization within each state, using data from California in 2000 as an example. We use Shor and McCarty (2011) measures of state legislative polarization, *Polar*, as measured by the ideological distance between Democratic and Republican party medians, averaged across both lower and upper chambers in the state legislature. Panel B reports summary statistics for the state legislative polarization measure. Panel C further reports summary statistics for the main firm and state characteristics considered in the analysis. Investment is capital expenditures (CAPX) scaled by beginning-of-year total assets (TA). Tobin's Q (TQ) is measured as the ratio of the market value of assets to the book value of assets. Cash flow (CF) is defined as net income before extraordinary items plus depreciation and amortization. Tobin's Q is measured at the beginning of the year and cash flow is scaled by beginning-of-year total assets for each firm. %Δ GDP is the year-on-year growth in state GDP. See the Appendix for detailed variable descriptions as well as the variable sources. Data is for the period 1993 to 2016.

Panel A: Aggregating Polarization across Chambers

California, 2000	Lower Chamber	Upper Chamber	State Average
Republican Median	1.23	1.34	1.29
Democratic Median	-1.34	-1.38	-1.36
Polarization (*Polar*)	2.57	2.72	2.65

Panel B: Polarization Characteristics

	N	Min	Median	Mean	Max	SD
Polar	1,038	0.1965	1.384	1.4373	3.435	0.4985

Panel C: Firm and State Variables

	N	Min	Median	Mean	Max	SD
$\frac{CAPX}{TA}$	85,008	0	0.0337	0.0616	0.5012	0.0838
TQ	85,008	0.3925	1.7462	4.7142	96.3638	11.9039
$\frac{CF}{TA}$	85,008	-9.0716	0.0607	-0.2077	0.5332	1.14956
%Δ GDP	1,200	-13.4	4.6	4.7493	24.5	3.3019

Table 2
Average State Legislative Polarization

This table summarizes legislative polarization at the state level, which is measured as the absolute distance between party ideological medians, averaged across both lower and upper chambers. The 50 states are arranged from most to least polarized based on the mean level of polarization, averaging across all years of our sample from 1993 to 2016. The level of polarization of each state in 2016 is also compared with its level in 1996. The "Change" column shows the amount and direction of percentage change that each state has experienced over those 20 years.

State	Mean	Median	1996	2016	Change	State	Mean	Median	1996	2016	Change
CA	2.828	2.888	2.581	3.050	18.2%	AK	1.342	1.332	1.329	1.419	6.7%
CO	2.377	2.081	1.679	3.435	104.6%	CT	1.325	1.322	1.307	1.312	0.4%
WA	2.169	2.186	2.201	2.191	-0.5%	VT	1.306	1.322	1.322	1.326	0.3%
AZ	2.045	2.091	1.489	2.657	78.4%	TN	1.303	1.298	1.032	1.610	56.1%
MI	2.006	1.993	1.992	2.055	3.2%	AL	1.277	1.192	1.082	1.639	51.5%
TX	1.958	1.921	1.619	2.446	51.1%	IN	1.267	1.259	1.150	1.386	20.5%
NM	1.909	1.919	1.792	2.014	12.4%	PA	1.260	1.254	1.254	1.352	7.9%
MN	1.906	1.851	1.734	2.019	16.4%	WY	1.214	1.151	1.095	1.460	33.3%
WI	1.870	1.873	1.713	2.045	19.4%	KY	1.212	1.181	1.222	1.196	-2.1%
NH	1.840	1.809	1.817	1.883	3.6%	NV	1.204	1.163	0.926	1.447	56.3%
MT	1.792	1.759	1.544	2.149	39.2%	IL	1.189	1.163	1.158	1.348	16.4%
MD	1.764	1.743	1.492	2.058	37.9%	OK	1.180	1.187	1.121	1.244	11.0%
MO	1.725	1.747	1.178	2.233	89.5%	SC	1.148	1.095	0.953	1.489	56.3%
OH	1.699	1.714	1.581	1.792	13.3%	MS	1.119	1.187	0.854	1.452	70.1%
ID	1.618	1.728	1.042	1.919	84.2%	ND	1.092	1.082	1.130	1.102	-2.5%
OR	1.603	1.638	1.297	1.838	41.7%	SD	1.075	1.067	1.117	1.162	4.0%
ME	1.579	1.564	1.332	1.801	35.2%	NJ	0.980	0.980	0.953	0.994	4.3%
IA	1.553	1.581	1.356	1.730	27.6%	HI	0.979	1.115	0.369	1.390	277.2%
UT	1.535	1.544	1.210	2.117	75.0%	MA	0.947	0.951	0.964	0.945	-2.0%
VA	1.534	1.539	1.373	1.696	23.5%	WV	0.933	0.888	0.888	1.031	16.1%
FL	1.501	1.429	1.315	1.727	31.3%	DE	0.882	0.845	0.716	1.173	63.9%
NC	1.478	1.477	1.150	1.631	41.8%	NE	0.803	0.705	0.409	1.301	218.1%
NY	1.458	1.424	1.448	1.584	9.4%	LA	0.649	0.575	0.571	1.000	75.0%
GA	1.448	1.496	1.184	1.780	50.4%	RI	0.561	0.520	0.605	0.780	28.8%
KS	1.345	1.269	1.235	1.707	38.2%	AR	0.552	0.503	0.302	0.942	212.3%

Table 3
State Legislative Polarization and Investment: Baseline Results

This table presents estimates from investment regressions of the following form:

$$\frac{CAPX_{it}}{TA_{i,t-1}} = \alpha_i + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 TQ_{i,t-1} + \beta_3 \frac{CF_{it}}{TA_{i,t-1}} + \beta_4 \%\Delta GDP_{j,t-1} + \varepsilon_{ijt} \quad (1)$$

where i indexes firms, j indexes states and t indexes years. We use the investment-Q framework as the baseline specification, augmented by controls for changing firm characteristics and growth opportunities. The left-hand-side variable is capital expenditures (CAPX) scaled by beginning-of-year book value of total assets (TA). The explanatory variable of interest is the amount of political polarization in state j in year t, $Polar_{jt}$, defined as the ideological distance between the Democratic and Republican party medians, averaged across both lower and upper chambers in the state legislature. The larger the difference between the two party medians, the more polarized the state legislature is. $TQ_{i,t-1}$ is the proxy for Tobin's Q, measured as the ratio of the market value of assets to the book value of assets. CF_{it} is cash flow, defined as net income before extraordinary items plus depreciation and amortization. Tobin's Q is measured at the beginning of the year and cash flow is scaled by beginning-of-year total assets for each firm. $\%\Delta GDP_{j,t-1}$ is the year-on-year growth in state GDP. See the Appendix for detailed variable descriptions as well as the variable sources. Firm α_i and year γ_t fixed effects are included in the specification. Standard errors are clustered at the firm level and corrected for heteroskedasticity. The sample consists of firm-year observations from 1993 to 2016. T-statistics are reported in square brackets below coefficient estimates. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: $\frac{CAPX}{TA}$			
	(1)	(2)	(3)	(4)
Polar	-0.0023***	-0.0199***	-0.0191***	-0.0177***
	[-5.42]	[-5.25]	[-5.08]	[-4.73]
TQ			0.0006***	0.0006***
			[12.90]	[12.85]
$\frac{CF}{TA}$			-0.0049***	-0.0049***
			[-7.79]	[-7.83]
%ΔGDP				0.0012***
				[7.56]
Constant	0.0656***	0.1135***	0.1085***	0.1017***
	[83.09]	[18.22]	[17.52]	[16.41]
N	85,008	85,008	85,008	85,008
R^2	0.000	0.057	0.069	0.070
Firm FE	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes

Table 4
Partisan Control of State Government

This table examines the sensitivity of investment to political polarization conditional on the partisan control of state government. To do so, we set a *Divided Government* dummy to one if one party controls the executive branch while another party controls one or both chambers of the legislative branch. In the first two columns, we split the sample of firms into two subsamples according to whether the government is divided or unified in that state in that year, and then reestimate the baseline specification in Equation (1) separately for the subsample of firms with divided vs. unified party control of government. In column (3), we add to the baseline specification an interaction term between the *Divided Government* dummy and our measure of political polarization to directly assess the differential effects of partisan alignment. As a robustness check, in column (4), we also include interactions of the *Divided Government* dummy with all the control variables in the baseline model to ensure that the estimated interaction effect of interest is not confounded by other firm- or state-level variables. Each column is based on such a subsample, indicated by the column heading. We use the same set of independent variables and controls as in our baseline OLS specification, except that we additionally include both the *Divided Government* dummy and its interaction with political polarization. See the Appendix for detailed variable descriptions as well as the variable sources. Firm and year fixed effects are included in all specifications. Standard errors are clustered at the firm level and corrected for heteroskedasticity. The sample consists of firm-year observations from 1993 to 2016. T-statistics are reported in square brackets below coefficient estimates. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: $\frac{CAPX}{TA}$			
	Divided	Unified	Interacted	
	(1)	(2)	(3)	(4)
Polar	-0.0156***	-0.0205***	-0.0174***	-0.0175***
	[-3.16]	[-3.33]	[-4.35]	[-4.37]
Polar × Divided Government			-0.0020**	-0.0021**
			[-2.02]	[-2.08]
Divided Government			0.0040**	0.0040**
			[1.98]	[1.96]
TQ	0.0006***	0.0005***	0.0006***	0.0005***
	[9.24]	[8.16]	[12.63]	[9.35]
$\frac{CF}{TA}$	-0.0068***	-0.0049***	-0.0051***	-0.0052***
	[-6.64]	[-5.89]	[-7.88]	[-6.98]
%ΔGDP	0.0009***	0.0014***	0.0013***	0.0013***
	[3.55]	[6.82]	[7.76]	[7.79]
Constant	0.0952***	0.1198***	0.1026***	0.1025***
	[12.43]	[9.70]	[15.62]	[15.60]
N	43,009	39,324	82,333	82,333
R^2	0.068	0.069	0.071	0.071
Interacted Controls	No	No	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 5
Ideological Distance vs. Ideological Asymmetry

This table examines whether the documented effect of political polarization is driven by the asymmetry in party ideologies (i.e., the extent to which one party is more extreme than the other). To do so, we reestimate the baseline OLS specification in Equation (1) while controlling for several measures of asymmetric polarization, independent of the overall level of polarization. In particular, we construct four measures of ideological asymmetry drawn from Shor and McCarty's (2011) dataset of state legislator ideology to capture possible asymmetric polarization effect. The first measure is the median ideology of the Republican party (I_R) or the Democratic party (I_D), averaged across both legislative chambers. By construction, positive values on the ideological spectrum reflect right-of-center Republican positions (i.e., $I_R \geq 0$) and negative values indicate Democratic positions that are left of center (i.e., $I_D \leq 0$). The second measure I_W is based on the median idealogy of the whole state legislature. The third measure, $I_R - |I_D|$, captures the extent to which the Republican party has moved to the ideological right further than the Democratic party has shifted to the left. The final measure of ideological asymmetry, $\frac{I_R}{I_R - I_D}$, is computed as the Republicans' contribution to the ideological distance between the two parties. While the first measure captures the overall conservatism or liberalism of one party, the other three captures the relative conservativeness of a state's Republican legislators compared to the state's Democrats. Table 5 present the estimation results of the above tests, where we estimate the baseline specification separately for each of the four ideological asymmetry measures. The dependent variable in all columns is firm investment, and the key independent variables include the overall level of polarization as well as measures of ideological asymmetry. Data is for the period 1993 to 2016. T-statistics are reported in square brackets below coefficient estimates. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: $\frac{CAPX}{TA}$			
	(1)	(2)	(3)	(4)
Polar ($= I_R - I_D$)	-0.0194***	-0.0182***	-0.0181***	-0.0176***
	[-3.70]	[-4.56]	[-4.46]	[-4.41]
Republican Ideology (I_R)	0.0026			
	[0.30]			
Whole Legislature Ideology (I_W)		-0.0003		
		[-0.19]		
$I_R - \|I_D\|$			0.0010	
			[0.22]	
$I_R/(I_R + \|I_D\|)$				0.0152
				[1.53]
TQ	0.0006***	0.0006***	0.0006***	0.0006***
	[12.62]	[12.63]	[12.62]	[12.63]
$\frac{CF}{TA}$	-0.0051***	-0.0051***	-0.0051***	-0.0051***
	[-7.94]	[-7.94]	[-7.94]	[-7.94]
%ΔGDP	0.0013***	0.0013***	0.0013***	0.0013***
	[7.80]	[7.76]	[7.80]	[7.74]
N	81,966	81,966	81,966	81,966
R^2	0.071	0.071	0.071	0.071
Constant	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 6
Possible Mechanism: Legislative Gridlock

This table tests legislative gridlock as a potential underlying economic mechanism through which political polarization impedes firm investment. To do so, we conduct two sets of tests: in the first test, we investigate the impact of polarization on legislative gridlock by regressing measures of state legislative gridlock on our polarization measure and control variables, whereas in the second test, we assess whether measures of legislative gridlock have a significant effect on the relationship between political polarization and firm investment. Specifically, we estimate the following regression model for the first test:

$$\begin{aligned} Productivity_{jt} = \alpha_j + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 Republican\ Governor_{jt} + \beta_3 Split\ Legislature_{jt} \\ + \beta_4 Unemployment_{jt} + \beta_5 \%\Delta GDP_{jt} + \varepsilon_{jt} \end{aligned} \tag{2}$$

where j indexes states and t indexes years. The dependent variable, $Productivity_{jt}$, captures the degree of legislative gridlock for state j in year t and can be measured by either the natural logarithm of bill introduction counts or enactment counts, or the percentage of introduced bills that become enacted (bill passage rate). The main independent variable, $Polar_{jt}$, measures the ideological gap between the two parties drawn from Shor and McCarty (2011). We include a small set of control variables, including Republican governor dummy, split legislature dummy, and state economic conditions that may also affect legislative productivity. We also include state and year fixed effects and cluster standard errors by both state and year levels. Panel A of Table 6 reports the regression results for the first test examining the impact of political polarization on state legislative productivity. The dependent variable in columns (1) to (3) is one of the three overall productivity measures based on aggregate counts of all introduced and enacted bills, as indicated by the column heading. Columns (4) to (6) repeat the analyses in the first three columns by focusing on the production of important legislation on energy issues. In the second test, we continue to investigate how legislative gridlock affects the sensitivity of investment to polarization. To do so, we focus on the production of important legislation in the energy policy area as the relevant measure of legislative gridlock and create an indicator, *Low Productivity*, equal to one for firms in states with below-median level of legislative productivity. We then estimate a specification in which *Low Productivity* is interacted with political polarization to directly assess the role of legislative gridlock. In particular, we consider the regression model of the following form:

$$\begin{aligned} \frac{CAPX_{it}}{TA_{i,t-1}} = \alpha_i + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 \text{Polar}_{jt} \times \text{Low Productivity}_{jt} + \beta_3 \text{Low Productivity}_{jt} \\ + \beta_4 TQ_{i,t-1} + \beta_5 \frac{CF_{it}}{TA_{i,t-1}} + \beta_6 \%\Delta GDP_{j,t-1} + \varepsilon_{ijt} \end{aligned} \tag{3}$$

where i indexes firms, j indexes states and t indexes years. We use the same set of independent variables and controls as in our baseline OLS specification, except that we additionally include the indicator, *Low Productivity* and its interaction with political polarization. The interaction term picks up the added effects of legislative gridlock on investment sensitivity to polarization. We include firm and year fixed effects in our regressions and cluster standard errors at the firm level as suggested by Petersen (2009). Panel B of Table 6 reports the regression results from the above tests. The dependent variable in all columns is firm investment, measured as capital expenditures scaled by lagged book value of total assets. In columns (1) and (2), we sort firms into terciles each year based on the median level of legislative productivity in the state to which each firm belongs, allowing for intuitive interpretation of polarization's effects between the two subgroups (i.e., low vs. high legislative productivity, as indicated by the column heading). In column (3), we interact the indicator, *Low Productivity*, with the polarization measure to directly test whether legislative gridlock amplifies the effect of polarization on firm investment. In column (4), we further include interactions of *Low Productivity* with all the control variables in the baseline model to ensure that the estimated interaction effect of interest is not confounded by other firm- or state-level variables. The sample period is restricted to 2008-2016 in this analysis due to lack of energy legislation data prior to the start date. T-statistics are reported in square brackets below coefficient estimates. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Panel A: Impact of Political Polarization on Legislative Productivity					
	All Bills			Energy Bills		
	Introduction	Enactment	Passage Rate	Introduction	Enactment	Passage Rate
	(1)	(2)	(3)	(4)	(5)	(6)
Polar	-0.1195	-0.0545	0.0049	-0.6271**	-0.8971**	-0.1633**
	[-1.23]	[-0.41]	[0.25]	[-2.01]	[-2.09]	[-2.32]
Republican Governor	-0.0569***	-0.0212	0.0050	0.0806	-0.0588	-0.0136
	[-3.02]	[-0.72]	[0.96]	[1.17]	[-0.52]	[-0.65]
Split Legislature	-0.0382	-0.1923**	-0.0216**	-0.1164	-0.1341	-0.0246
	[-0.88]	[-2.42]	[-2.12]	[-1.25]	[-1.04]	[-0.90]
Unemployment	0.0106	-0.0097	-0.0032	-0.0991**	-0.0072	-0.0023
	[0.69]	[-0.39]	[-0.70]	[-2.30]	[-0.28]	[-0.24]
%ΔGDP	0.0091	0.0058	-0.0009	-0.0173*	0.0035	0.0010
	[1.60]	[1.24]	[-0.78]	[-1.83]	[0.47]	[0.32]
N	903	905	797	400	370	361
R^2	0.090	0.022	0.013	0.374	0.151	0.023
Constant	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

	Panel B: Impact of Gridlock on Investment Sensitivity to Polarization			
	Dependent variable: $\frac{CAPX}{TA}$			
	High Productivity	Low Productivity	Interacted	
	(1)	(2)	(3)	(4)
Polar	-0.0302***	-0.0493***	-0.0318***	-0.0311***
	[-3.42]	[-4.15]	[-4.45]	[-4.33]
Polar × Low Productivity			-0.0105***	-0.0115***
			[-2.94]	[-3.12]
Low Productivity			0.0138**	0.0142**
			[2.11]	[2.18]
TQ	0.0003***	0.0002**	0.0003***	0.0003***
	[3.27]	[2.13]	[4.64]	[3.70]
$\frac{CF}{TA}$	-0.0033***	-0.0052***	-0.0036***	-0.0032***
	[-3.09]	[-3.66]	[-4.40]	[-3.22]
%ΔGDP	0.0003	0.0014***	0.0012***	0.0009***
	[0.91]	[4.93]	[5.09]	[3.46]
Constant	0.1195***	0.1257***	0.1116***	0.1112***
	[6.57]	[6.23]	[8.39]	[8.36]
N	15,413	11,189	26,602	26,602
R^2	0.028	0.044	0.039	0.039
Interacted Controls	No	No	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 7
Possible Mechanism: Policy Instability

This table tests policy instability as another underlying economic mechanism through which political polarization impedes firm investment. To do so, we perform two sets of tests: in the first test, we investigate the impact of polarization on policy instability by regressing measures of state policy instability on our polarization measure and control variables, whereas in the second test, we examine whether the effect of political polarization on firm investment is sensitive to measures of policy instability. Specifically, we estimate the following specification for the first test:

$$\begin{aligned} Instability_{jt} = \alpha_j + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 Republican\ Governor_{jt} + \beta_3 Split\ Legislature_{jt} + \beta_4 Tax\ Change_{jt} \\ + \beta_5 Unemployment_{jt} + \beta_6 \%\Delta GDP_{jt} + \varepsilon_{jt} \end{aligned} \tag{4}$$

where j indexes states and t indexes years. The dependent variable, $Instability_{jt}$, is policy-based measure of economic policy instability, which is measured by either the four-year rolling volatility of state tax revenue to output ratio or year-over-year changes in tax revenue. The key independent variable is polarization and all other control variables are the same as those used in Equation (2). We additionally control for changes in state tax rates to isolate the effect of tax rates on revenue volatility. State and year fixed effects are included in the estimation. To control for serial correlation, we cluster the standard errors at the state and year levels. Panel A of Table 7 reports the results of estimating the effect of political polarization on state policy instability using Equation (4). Column (1) reports volatility as the rolling standard deviation of revenue to output ratio, using a four-year window. Column (2) reports volatility as year-over-year changes in revenue. In the second test, we continue to examine whether policy instability amplifies the impact of political polarization on firm investment. We focus on the volatility of revenue to output ratio as the relevant indicator of policy instability and use a specification that interacts the policy-based measure of economic policy instability with political polarization in the baseline regression model. In particular, we estimate the following specification:

$$\begin{aligned} \frac{CAPX_{it}}{TA_{i,t-1}} = \alpha_i + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 \text{Polar}_{jt} \times \text{High Instability}_{jt} + \beta_3 \text{High Instability}_{jt} \\ + \beta_4 TQ_{i,t-1} + \beta_5 \frac{CF_{it}}{TA_{i,t-1}} + \beta_6 \%\Delta GDP_{j,t-1} + \varepsilon_{ijt} \end{aligned} \tag{5}$$

where i indexes firms, j indexes states and t indexes years. We use the same set of independent variables and controls as those used in our baseline OLS specification, except that we additionally include an indicator, *High Instability*, that equals one for firms in states with above-median level of policy instability, and its interaction with the polarization measure. The coefficient of interest is the interaction term, which picks up only the added effect of a higher exposure to policy instability on investment sensitivity to political polarization. We include firm and year fixed effects in our regressions and cluster standard errors at the firm level as suggested by Petersen (2009). Panel B of Table 7 reports the regression results estimating Equation (5). The dependent variable in all columns is firm investment, measured as capital expenditures scaled by lagged book value of total assets. In the first two columns, we conduct separate tests for the subgroups of firms in states with high vs. low policy instability, in order to observe variation in the magnitude of changes in investment rates. Column (3) reports the results of the specification in which the polarization measure is interacted with the indicator for firms exposed to more volatile economic policy to directly assess the additional detrimental effects that policy instability may have on firm investment. Column (4) further interact the *High Instability* indicator with all the control variables in the baseline specification to ensure that the estimated interaction effect is not confounded by other variables. Data is for the period 1993 to 2016. T-statistics are reported in square brackets below coefficient estimates. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Panel A: Impact of Political Polarization on Policy Instability	
	Dependent variable: State Tax Revenue Volatility	
	4-Year Rolling Standard Deviation	Year-Over-Year Change
	(1)	(2)
Polar	0.8097**	0.0231**
	[2.23]	[2.48]
Republican Governor	-0.1315	-0.0071
	[-1.03]	[-1.48]
Split Legislature	-0.0737	-0.0147
	[-0.58]	[-1.59]
Tax Change	0.0545	0.0025
	[0.37]	[0.59]
Unemployment	-0.0729	0.0048*
	[-1.16]	[1.66]
%ΔGDP	-0.0189	0.0059***
	[-1.22]	[2.71]
N	1,005	1,005
R^2	0.220	0.206
Constant	Yes	Yes
State FE	Yes	Yes
Year FE	Yes	Yes

	Panel B: Impact of Instability on Investment Sensitivity to Polarization			
	Dependent variable: $\frac{CAPX}{TA}$			
	High instability	Low Instability	Interacted	
	(1)	(2)	(3)	(4)
Polar	-0.0196***	-0.0058	-0.0154***	-0.0154***
	[-4.40]	[-1.05]	[-3.97]	[-3.96]
Polar × High Instability			-0.0020**	-0.0021**
			[-2.15]	[-2.23]
High Instability			0.0029*	0.0048**
			[1.68]	[2.49]
TQ	0.0005***	0.0006***	0.0006***	0.0006***
	[9.24]	[8.87]	[12.86]	[9.46]
$\frac{CF}{TA}$	-0.0051***	-0.0047***	-0.0049***	-0.0044***
	[-6.46]	[-4.27]	[-7.84]	[-5.06]
%ΔGDP	0.0012***	0.0012***	0.0012***	0.0014***
	[5.44]	[4.73]	[7.70]	[6.93]
Constant	0.1064***	0.0872***	0.0977***	0.0969***
	[10.81]	[10.41]	[15.03]	[14.94]
N	41,781	43,227	85,008	85,008
R^2	0.076	0.062	0.070	0.070
Interacted Controls	No	No	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Table 8
Firm Responses to Increased Political Polarization

This table examines whether changes in state legislative polarization affect firm relocation decisions. We employ an augmented version of the baseline investment specification that includes state tax incentives as an additional regressor. In particular, we estimate regression models of the following form:

$$Relocation_{ijt} = \alpha_i + \gamma_t + \beta_1 \text{Polar}_{jt} + \beta_2 Tax\ Change_{jt} + \beta_3 TQ_{i,t-1} + \beta_4 \frac{CF_{it}}{TA_{i,t-1}} + \beta_5 \%\Delta GDP_{j,t-1} + \varepsilon_{ijt} \quad (6)$$

where i indexes firms, j indexes states and t indexes years. The dependent variable, $Relocation_{ijt}$, is a dummy variable equal to one if firm i relocates its corporate headquarters from state j to another state between years t and $t+1$, and zero otherwise. The independent variable of interest, $Polar_{jt}$, is measured as the distance between the Republican and Democratic party ideological medians, averaged across the two chambers. The larger the distance, the higher the polarization. The coefficient β_1 thus tests the hypothesis and measures the effect of changes in state legislative polarization on the likelihood of relocation. We use the same set of control variables as in our baseline specification in Equation (1), except that we additionally include state corporate income tax rate changes to capture the possible effect of state tax incentives on corporate relocations (Voget (2011)). $Tax\ Change_{jt}$ is a dummy variable equal to one (negative one) if state j raises (cuts) its corporate income tax rate in year t relative to year $t-1$, and zero otherwise. See the Appendix for detailed variable descriptions as well as the variable sources. We use a linear probability model to accommodate higher dimensional fixed effects that account for heterogeneity in corporate relocation decisions across firms and over time. We cluster standard errors at the state level to account for serial correlation and correlation within states. The sample consists of firm-year observations from 1994 to 2016. T-statistics are reported in square brackets below coefficient estimates. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Relocation	Relocation$^-$	Relocation$^+$
	(1)	(2)	(3)
Polar	-0.0109	0.0902**	-0.1011***
	[-0.16]	[2.16]	[-3.31]
Tax Change	0.0017	-0.0007	0.0025
	[0.63]	[-0.28]	[0.93]
TQ	0.0004***	0.0001	0.0003***
	[3.29]	[1.19]	[4.93]
$\frac{CF}{TA}$	-0.0024*	-0.0027**	0.0002
	[-1.89]	[-2.23]	[0.22]
%ΔGDP	-0.0001	-0.0004	0.0003
	[-0.18]	[-1.23]	[1.05]
Constant	0.0365	-0.1488**	0.1853***
	[0.30]	[-2.07]	[3.31]
N	74,318	74,318	74,318
R^2	0.060	0.062	0.072
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

Table 9
Instrumental Variable Analysis: Partisan Redistricting

This table reports the results of two-stage least squares (2SLS) regressions where polarization is instrumented with the mean-median difference (MMD), a measure of partisan advantage calculated using district-level voting patterns from state lower house redistricting plans. In particular, we estimate the following first-stage regression:

$$\begin{aligned} Polar_{jt} = \alpha_j + \gamma_t + \beta_1 \text{MMD}_{jt} + \beta_2 TQ_{j,t-1} + \beta_3 CF_{jt} + \beta_4 Republican\ Governor_{jt} + \beta_5 Split\ Legislature_{jt} \\ + \beta_6 Unemployment_{jt} + \beta_7 \%\Delta GDP_{jt} + \varepsilon_{jt} \end{aligned} \tag{7}$$

where j indexes states and t indexes years. *Polar* is the polarization of legislatures that we measure as the ideological distance between political parties. MMD is our preferred measure of partisan bias in the redistricting process, measured as the difference between the Republican party's vote share in the average district and its median vote share across all districts in state house elections. A negative (positive) MMD indicates an advantage for Republicans (Democrats). $TQ_{j,t-1}$ and CF_{jt} stand for state average levels of Tobin's Q and operating cash flows used as controls in the second-stage regression, which are not reported to preserve space. We include indicators for the presence of split legislature and whether the state has a Republican governor to account for state governance, as well as variables measuring the economic conditions within a state. State α_j and year γ_t fixed effects are included, with standard errors clustered by state and year. Panel A of Table 9 reports the first-stage results. Column (1) examines the MMD's effect on the median ideal point of state legislators in lower chambers (Shor and McCarty (2011)), whereas column (2) investigates its effect on electoral competition measured by the proportion of uncompetitive electoral districts relative to total districts. Columns (3) to (5) of Panel A, Table 9 continue to assess the MMD's effect on partisan polarization in the state House ($Polar^H$) and Senate ($Polar^S$), as well as the overall polarization in the state legislature (*Polar*). Columns (2) to (5) use the absolute |MMD| as a party-free measure of the magnitude of partisan advantage in districting plans. Panel B of Table 9 reports the second-stage results. We repeat the estimation of our baseline results in Table 3, but replace *Polar* in Equation (1) with $\widehat{Polar}$, a measure of legislative polarization fitted from the first-stage regression of *Polar* on the instrument |MMD| and controls, based on estimates in columns (5) of Panel A, Table 9.

	Panel A: First-Stage Regression				
	Median Ideology	Uncompetitive District	Polar^{H}	Polar^{S}	Polar
	(1)	(2)	(3)	(4)	(5)
MMD	-8.8421***				
	[-9.66]				
|MMD|		0.3649***	1.6763**	1.2746	1.5952**
		[4.27]	[2.43]	[1.33]	[2.05]
Republican Governor	0.0815***	-0.0061**	-0.0103	0.0185	0.0003
	[3.30]	[-2.00]	[-0.35]	[0.68]	[0.01]
Split Legislature	0.0471	0.0003	0.0459	0.0059	0.0208
	[1.20]	[0.08]	[1.42]	[0.23]	[0.75]
Unemployment	0.0112	-0.0021	0.0042	-0.0490*	-0.0199
	[0.74]	[-0.96]	[0.35]	[-1.81]	[-1.32]
%ΔGDP	-0.0032	-0.0001	-0.0051***	-0.0029	-0.0039**
	[-1.34]	[-0.30]	[-2.73]	[-1.20]	[-2.27]
N	860	695	860	851	870
R^2	0.460	0.095	0.481	0.342	0.491
Firm Controls	Yes	Yes	Yes	Yes	Yes
State FE/Year FE	Yes	Yes	Yes	Yes	Yes

	Panel B: Second-Stage Regression			
	Dependent variable: $\frac{CAPX}{TA}$			
	(1)	(2)	(3)	(4)
$\widehat{\text{Polar}}$	0.0395***	-0.0325***	-0.0311***	-0.0424***
	[7.58]	[-2.81]	[-2.71]	[-3.65]
TQ			0.0006***	0.0006***
			[12.61]	[12.55]
$\frac{CF}{TA}$			-0.0050***	-0.0051***
			[-7.84]	[-7.87]
%ΔGDP				0.0014***
				[8.06]
Constant	0.0039	0.1310***	0.1252***	0.1358***
	[0.50]	[7.92]	[7.62]	[8.22]
N	81,928	81,928	81,928	81,928
R^2	0.001	0.056	0.069	0.070
Firm FE	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes

Table 10
Instrumental Variable Analysis: Term limits

This table reports the results of two-stage least squares (2SLS) regressions where polarization is instrumented with the staggered adoption of legislative term limits across states and over time. A term limit is a legal restriction that limits the number of terms a legislator may serve in the state legislature. In particular, we estimate the following first-stage regression:

$$\begin{aligned} Polar_{jt} = \alpha_j + \gamma_t + \beta_1 \text{Term Limits}_{jt} + \beta_2 TQ_{j,t-1} + \beta_3 CF_{jt} + \beta_4 Republican\ Governor_{jt} + \beta_5 Split\ Legislature_{jt} \\ + \beta_6 Unemployment_{jt} + \beta_7 \%\Delta GDP_{jt} + \varepsilon_{jt} \end{aligned} \quad (8)$$

where j indexes states and t indexes years. $Polar_{jt}$ is the level of legislative polarization in state j in year t that we measure as the distance in ideal point estimates between state legislative Democratic and Republican medians drawn from Shor and McCarty (2011). $Term\ limits_{jt}$, is an indicator that equals one if term limits were in effect in state j in year t. We use the same set of firm and state level time-varying controls as in Equation (7) in the previous section, which includes the state average levels of Tobin's Q and operating cash flows, indicators for the presence of split legislature and whether the state has a Republican governor, and state-level economic conditions that could be associated with legislative polarization. See the Appendix for detailed variable descriptions including control variables. State α_j and year γ_t fixed effects are included in all specifications. Standard error continues to be clustered at the state-year level. Panel A of Table 10 reports the first-stage results. In particular, the first two columns report results from Equation (8) estimated separately for states' lower ($Polar^H$) and upper ($Polar^S$) chambers. In column (3), We continue to assess term limits' effects on the overall level of legislative polarization (*Polar*) that averages the polarization measures from the two chambers in each state. Panel B of Table 10 reports the second-stage results. We repeat the estimation of our baseline results in Table 3, but replace *Polar* in Equation (1) with $\widehat{Polar}$, a measure of legislative polarization fitted from the first-stage regression of *Polar* on the instrument *term limits* and controls, based on estimates in columns (3) of Panel A, Table 10.

	Panel A: First-Stage Regression		
	Polar^{H}	Polar^{S}	Polar
	(1)	(2)	(3)
Term Limits	0.1445***	0.0625	0.1092**
	[3.22]	[0.78]	[2.02]
Republican Governor	0.0011	0.0263	0.0148
	[0.04]	[1.08]	[0.65]
Split Legislature	0.0295	-0.0052	0.0121
	[1.18]	[-0.23]	[0.54]
Unemployment	0.0065	-0.0353	-0.0159
	[0.61]	[-1.53]	[-1.20]
%ΔGDP	-0.0029*	-0.0021	-0.0024*
	[-1.85]	[-1.23]	[-1.93]
N	979	998	998
R^2	0.515	0.334	0.511
Firm Controls	Yes	Yes	Yes
State FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

	Panel B: Second-Stage Regression			
	Dependent variable: $\frac{CAPX}{TA}$			
	(1)	(2)	(3)	(4)
$\widehat{\text{Polar}}$	0.0187***	-0.0299**	-0.0323**	-0.0479***
	[3.16]	[-2.05]	[-2.22]	[-3.26]
TQ			0.0006***	0.0006***
			[12.76]	[12.69]
$\frac{CF}{TA}$			-0.0051***	-0.0051***
			[-7.87]	[-7.92]
%ΔGDP				0.0014***
				[8.59]
Constant	0.0346***	0.1276***	0.1269***	0.1429***
	[4.06]	[6.36]	[6.35]	[7.09]
N	82,333	82,333	82,333	82,333
R^2	0.000	0.055	0.068	0.070
Firm FE	No	Yes	Yes	Yes
Year FE	No	Yes	Yes	Yes

Table 11
Robustness Tests: Different Measures and Samples

This table presents robustness tests for the baseline results shown in Table 3. Columns (1) to (3) of Table 11 first present robustness results with a number of alternative measures. Specifically, column (1) considers an alternative, party-free, measure of polarization also proposed by Shor and McCarty (2011) that averages, across the two chambers, the average distance between any two state legislators. To mitigate measurement concerns in Tobin's Q, in column (2), we reestimate the baseline specification in Equation (1) using sales growth instead of Tobin's Q as our proxy for the incentive to invest. In column (3), we further conduct robustness tests using an alternative measure of a firm's headquarters state based on Garcia and Norli (2012)'s dataset on the state-level operations of individual firms. Garcia and Norli (2012) measure the state exposure of a firm's business operations to each U.S. state by conducting a textual analysis to record instances where state names occur in its annual 10-K filings. In columns (4) to (7) of Table 11, we continue to perform several robustness tests on the sample selection. These tests help mitigate the concerns that our results might be driven by a dominant state or a particular subperiod. Specifically, columns (4) and (5) present two additional regressions, one excluding firms headquartered in California and the other one omitting OTC traded firms. Columns (6) to (7) finally decompose the whole sample period into two shorter subperiods 1993 to 2009, and 2010 to 2016 and explore the impact of polarization for each subperiod respectively. We employ the baseline regression specification in Equation (1) across all columns. The unit of observation is at firm-year level. The dependent variable in all regressions is capital expenditures (CAPX) scaled by beginning-of-year book value of total assets (TA). The independent variable of interest is the amount of political polarization in state j in year t, $Polar_{jt}$, defined as the ideological distance between the Democratic and Republican party medians, averaged across both lower and upper chambers in the state legislature. The larger the difference between the two party medians, the more polarized the state legislature is. Tobin's Q, cash flow, and state GDP growth are included as control variables to proxy for growth opportunities and the incentive to invest. See the Appendix for detailed variable descriptions as well as the variable sources. Firm and year fixed effects are included in all specifications. Standard errors are clustered at the firm level and corrected for heteroskedasticity. The sample consists of firm-year observations from 1993 to 2016. To save space, we suppress the estimates of firm specific and state economic control variables. T-statistics are reported in square brackets below coefficient estimates. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: $\frac{CAPX}{TA}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Polar	-0.0296***	-0.0150***	-0.0120***	-0.0154***	-0.0211***	-0.0148***	-0.0414***
	[-4.52]	[-4.13]	[-2.63]	[-3.74]	[-4.83]	[-3.10]	[-5.39]
N	85,008	81,753	64,095	69,053	56,275	64,892	20,116
R^2	0.070	0.097	0.077	0.065	0.094	0.071	0.032
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 12
Robustness Tests: Additional Macroeconomic Variables

In this table, we control for a number of additional macroeconomic variables to investigate a possible omitted variable bias. These variables include the news-based index of economic policy uncertainty (EPU) as proposed by Baker et al. (2016), the news-based partisan conflict index (PCI) developed by Azzimonti (2018), and congressional polarization derived from the DW-NOMINATE measures of congressional ideology from Poole and Rosenthal (1997). EPU and PCI are used in logarithmic form, ln EPU and ln PCI, whereas congressional polarization, $Polar^C$ is measured as the ideological distance between the two major parties in the U.S. Congress. See the Appendix for detailed variable descriptions as well as the variable sources. The first three columns of Table 12 present the estimation results considering exclusively congressional polarization (column (1)), PCI (column (2)) and EPU (column (3)) respectively, while ignoring the state legislative polarization variable. Columns (4) to (6) replicate the analysis in the first three columns by adding to the baseline specification our preferred measure of state legislative polarization, *Polar* as an additional regressor. In column (7), we include all these three control variables in our baseline specification simultaneously, along with a macroeconomic proxy for consumers' expectations about future economic conditions, the natural logarithm of the Michigan consumer sentiment index (CSI), ln CSI. The unit of observation is at firm-year level. In all columns, we use the baseline specification in Equation (1) but do not include time fixed effects as these country-level indices are the same for all the firms in a given year. That is, inclusion of time fixed effects would mechanically absorb all the explanatory power of these indices. Standard errors are clustered at the firm level and corrected for heteroskedasticity. The sample consists of firm-year observations from 1993 to 2016. T-statistics are reported in square brackets below coefficient estimates. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: $\frac{CAPX}{TA}$						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Polar				-0.0385***	-0.0613***	-0.0520***	-0.0323***
				[-10.64]	[-18.18]	[-17.34]	[-9.11]
$Polar^C$	-0.2225***			-0.1174***			-0.2522***
	[-24.20]			[-10.89]			[-16.62]
ln PCI		-0.0144***			0.0060***		0.0358***
		[-10.19]			[3.76]		[15.46]
ln EPU			-0.0241***			-0.0167***	-0.0140***
			[-21.07]			[-15.01]	[-9.59]
ln CSI							0.0105***
							[3.42]
TQ	0.0006***	0.0007***	0.0007***	0.0006***	0.0006***	0.0006***	0.0006***
	[14.35]	[14.73]	[14.43]	[14.10]	[14.06]	[13.94]	[13.65]
$\frac{CF}{TA}$	-0.0043***	-0.0040***	-0.0041***	-0.0044***	-0.0043***	-0.0044***	-0.0046***
	[-6.84]	[-6.21]	[-6.42]	[-6.94]	[-6.76]	[-6.92]	[-7.32]
%ΔGDP	0.0027***	0.0025***	0.0018***	0.0023***	0.0023***	0.0015***	0.0024***
	[24.59]	[22.62]	[15.37]	[21.18]	[21.18]	[13.48]	[18.51]
N	85,008	85,008	85,008	85,008	85,008	85,008	85,008
R^2	0.045	0.031	0.037	0.050	0.047	0.051	0.058
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	No	No	No	No	No	No	No

Table 13
Robustness Tests: Alternative Investment Policy Function

This table shows the robustness of our previous results to an alternative investment policy function of Gala and Gomes (2016) that does not rely on Tobin's Q. The rate of investment can be written as:

$$\frac{I_{i,t+1}}{K_{it}} = \alpha_i + \gamma_t + \beta_1 Polar_{jt} + \beta_2 \ln\left(\frac{Y_{it}}{K_{i,t-1}}\right) + \beta_3 \ln K_{it} + \beta_4 \ln\left(\frac{N_{it}}{K_{i,t-1}}\right) + \beta_5 \%\Delta GDP_{jt} + \varepsilon_{ij,t+1} \tag{9}$$

where i indexes firms, j indexes states and t indexes years. The investment rate, $\frac{I}{K}$, is capital expenditures in property, plant and equipment scaled by the beginning-of-year capital stock. The capital stock, K, is defined as net property, plant and equipment. The state legislative polarization, *Polar*, is measured by the ideological distance between the Democratic and Republican party medians, averaged across both chambers in the state legislature. Firm size, $\ln(K)$, is the natural logarithm of the beginning-of-year capital stock. The sales-to-capital ratio, $\ln\left(\frac{Y}{K}\right)$, is computed as the natural logarithm of net sales revenues scaled by the beginning-of-year capital stock. The employment-to-capital ratio, $\ln\left(\frac{N}{K}\right)$, is defined as the natural logarithm of the number of employees scaled by the beginning-of-year capital stock. $\%\Delta GDP$ is the year-on-year percentage change in state GDP. We further augment the alternative investment regression specification by adding quadratic terms for sales, firm size and employment, which proves to fit the investment data even better than the specification in Equation (9) that only contains linear terms (Gala and Gomes (2016)). Firm α_i and year γ_t fixed effects are included in all specifications. Standard errors are clustered at the firm level and corrected for heteroskedasticity. The first column of Table 13 only includes the subsample of manufacturing firms (SIC codes between 2000 and 3999), as in Gala and Gomes (2016), whereas the second column uses all firms in the sample. Data is for the period 1993 to 2016. T-statistics are reported in square brackets below coefficient estimates. ***, **, * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: $\frac{I}{K}$	
	Manufacturing firms	All firms
	(1)	(2)
Polar	-0.0627**	-0.0521***
	[-2.01]	[-2.71]
$\ln \frac{Y}{K}$	0.0054***	0.0044***
	[5.93]	[7.81]
$\ln K$	-0.2881***	-0.2962***
	[-20.59]	[-29.91]
$\ln \frac{N}{K}$	0.9660***	0.8412***
	[6.13]	[9.25]
$\left(\ln \frac{Y}{K}\right)^2$	-0.0000***	-0.0000***
	[-4.31]	[-5.45]
$(\ln K)^2$	0.0204***	0.0201***
	[12.48]	[18.97]
$\left(\ln \frac{N}{K}\right)^2$	-0.4547***	-0.4190***
	[-4.41]	[-7.55]
%ΔGDP	-0.0000	0.0001
	[-0.01]	[0.07]
Constant	0.9634***	1.0077***
	[16.29]	[26.45]
N	38,684	75,121
R^2	0.156	0.161
Firm FE	Yes	Yes
Year FE	Yes	Yes

Figure 1. Google Trends on Search Terms "political polarization" vs. "political uncertainty"

The figure below represents the graphical output for a Google Trends search of "political polarization" vs. "political uncertainty" performed in the U.S. for January 2004 to December 2019. In particular, the figure plots monthly aggregate Search Volume Index (SVI) for both search terms. The SVI for "political polarization" (blue line) is the monthly search volume for "political polarization" scaled by the time-series average search volume of "political polarization," while the SVI for "political uncertainty" (red line) is the monthly search volume for "political uncertainty" scaled by the time-series average search volume of "political uncertainty." Since 2004, Google makes the Search Volume Index (SVI) of search terms public via the product Google Trends (`https://trends.google.com/trends/`).

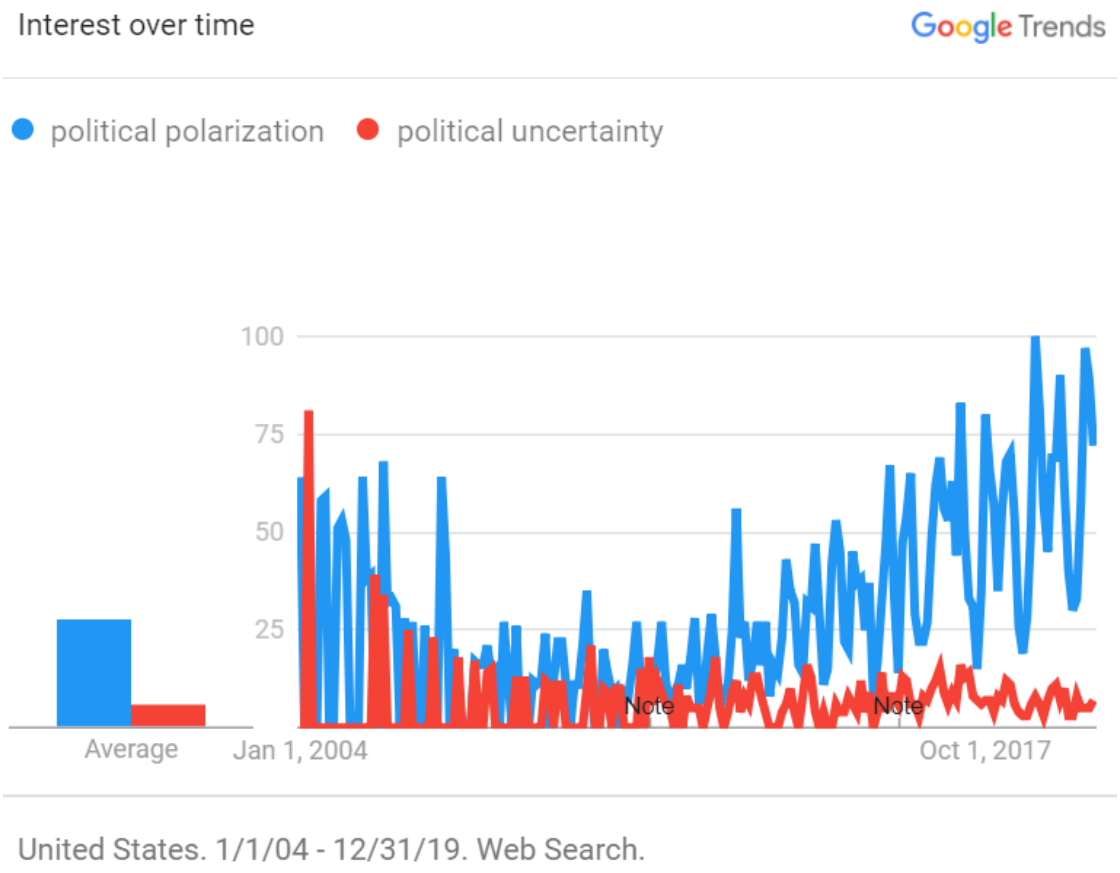

Figure 2. Average Party Medians between 1993 and 2016

This figure describes the trends in the ideology of Democrats and Republicans across time for each state. We use the average, across the two chambers, of the party median ideology to measure the ideological position of the party. In each plot, the red line shows Republican median and the blue line represents Democratic median. Polarization is defined as the ideological distance between the median Democrat and Republican in the state legislature.

Figure 3. Mean-Median Difference (MMD) by State and Year

This figure depicts the mean-median difference (MMD) estimates on the 573 state legislature elections across 43 states between 1990 and 2016, with linearly interpolated values for non-election years. Each plus sign represents an annual level of the MMD estimate for each state legislature. The MMD measures the difference between the Republican party's vote share in the average district and its median vote share across all districts. A negative (positive) MMD indicates a Republican (Democratic) advantage in the underlying districting plans.

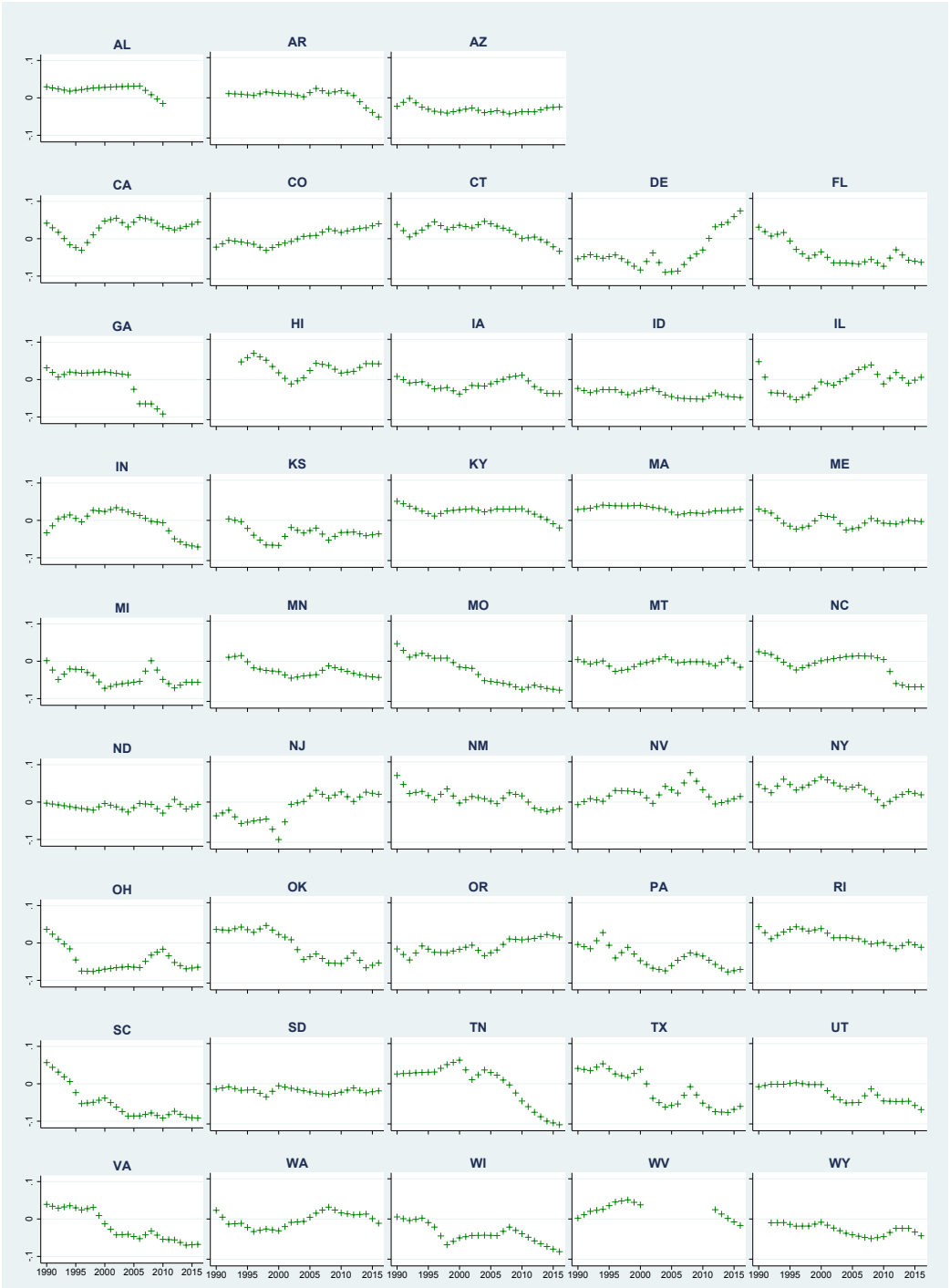

Figure 4. Share of State Lower Houses with Term Limits

Figure 4 displays the share of state lower houses using term limits over the period of study and indicates the timing of their adoption. Term limits were implemented in 15 states (including Nebraska) during the period under study. They took effect first in California and Maine in 1996 and most recently in Nevada in 2010.