

Policy Uncertainty and Manufacturing Investment: Evidence from U.S. State Elections

Cameron A. Shelton
Claremont McKenna College

Nathan Falk
NERA Economic Consulting

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Abstract

We estimate the effect of electorally induced policy uncertainty on investment in the manufacturing sector. Because state governors exercise considerable influence over legislation and considerable discretion over regulation and permitting, and because the policies relevant to business investment vary systematically by party, uncertainty over the partisan affiliation of the future governor is a source of political risk to firms considering business investment. More importantly, the lack of an incumbent in a race due to term limits raises uncertainty over the outcome, providing a convincing instrument that allows us to estimate causal effects. We find that in the calendar year of a gubernatorial election that was decided by fewer than four points, state investment in the manufacturing sector is 25% lower than in years with no such close gubernatorial election.

1. Introduction

In the years since the Great Recession, US corporate profits have soared but business fixed investment remains depressed.¹ Given the implications for both cyclic recovery and long-run growth, this divergence is a puzzle of some import. Several hypotheses have been put forth including capacity overhang, rising monopoly rents, and managerial incentives that deliver short-termism and risk-aversion.² Another influential line of reasoning focuses on the role of increased uncertainty. Greater uncertainty about energy prices, exchange rates, interest rates, environmental regulation, financial regulation, minimum wages, or any number of other political and economic variables increases uncertainty over the profitability of long-term investment projects raising the hurdle rate and reducing the number undertaken (Dixit 1992, among many others).

Some recent studies support this channel by demonstrating that at the firm-level, greater uncertainty over profits, as reflected in the exogenous component of stock-price volatility, is connected to lower rates of investment (Bloom, Bond, and van Reenen 2007; Stein and Stone 2011). Bloom (2009) shows that such firm-level uncertainty is correlated with geo-political events while Stein and Stone (2011) show that it is correlated with fluctuations in oil prices and exchange rates, each supporting the interpretation of the stock-price volatility as uncertainty relevant to the return on new projects.

Other studies argue that the effect is too small to be significant. Bachmann, Elstner, and Sims (2013) use survey data—cross-sectional disagreement in firm-level forecasts of business outlook, confirmed to be related to forecast error—to measure firm-level uncertainty which then becomes the shock in a two-variable SVAR of production and investment. They conclude that negative long-run shocks give rise to greater uncertainty but that uncertainty itself has little short-run “wait-and-see” effect on investment. Chugh (2009) likewise finds the effect to be small. Thus it remains in dispute whether firm-level uncertainty has economically significant effects on investment.

It is a related question as to whether a rise in economic policy uncertainty is responsible for the observed decline in aggregate investment. Baker, Bloom, and Davis (2012) have derived a measure of macro-economic uncertainty but despite widespread use, the construction has been criticized as both manipulable and endogenous.³ One alternate source of policy uncertainty is that which derives from the differences between party platforms and the uncertainty over electoral outcomes.

Using an annual panel of data from US states spanning 1968-2004⁴, we relate state-specific manufacturing investment to the electoral and policy uncertainty stemming from close elections for governor. We look at US states so as to have a macroeconomic panel with a good instrument. Election results, and thus pre- electoral uncertainty, are clearly dependent on pre-election economic

¹ *The Economist*, 10/15/13, The profits prophet

² Robin Harding, 7/24/13, Corporate investment: a mysterious divergence

³ Konczal, Mike “Whatever Happened to the Economic Policy Uncertainty Index?” August 6, 2013 guest post at *The Big Picture* and Konczal, Mike “What is the Economic Policy Uncertainty Index Really Telling Us?” August 8, 2012 post at *Rortybomb*

⁴ The end date of the panel is limited by the availability of the longest single panel of state-level party polarization scores.

circumstances. We address this by adding economic controls and by instrumenting for policy uncertainty using gubernatorial term limits. The (exogenous) lack of an incumbent removes the electoral advantages of incumbency, increasing uncertainty over the outcome of the election and thence subsequent policy. We discuss the instrument in detail below.

By focusing on US states rather than countries, we first and foremost greatly facilitate the search for a valid instrument. So doing also limits the extent of unobserved institutional heterogeneity, improves the comparability of the data, and enables a larger sample than would be available in a cross-country setting. Finally, we have the ability to scale the uncertainty over the electoral outcome by the policy distance between the two alternatives (state parties are not clones of the national party) so as to achieve a measure of electorally induced *policy*-uncertainty. This would be more difficult in a cross-country setting.⁵

The main potential drawback of using US states is that state policy may be less relevant for business investment decisions than federal policy. On the other hand, perhaps it is *more* relevant. US states do control a wide variety of relevant policies. State legislation bears on corporate profit taxes, environmental regulations, minimum wage laws, product and workplace safety regulations, labor union organization, the corporate share of benefits payments, job training and education of the local workforce, local infrastructure development, and more. Governors not only play a role in shaping legislation, they also exercise discretion in the implementation of regulations and negotiate special packages to attract certain star firms. Consider the following illustrative recent examples.

Governors have direct control over the identity and tenure of regulators, whose behavior can directly determine the pace of permitting and thence investment. In 2011, California Governor Jerry Brown pushed for state regulators to ease key requirements for oil and gas companies seeking permits to increase drilling. The top regulator, who had been hired by Brown's predecessor, Schwarzenegger, in response to allegations of corruption in the regulator's office, balked. A week later, Brown fired both this chief regulator and his top deputy, extracting an agreement from their replacements to streamline the permitting process.

Governors play a key role in wooing marquee investments from large firms which may in turn have spillover effects. In 2014, Volkswagen was considering whether to expand an existing plant in Chattanooga, Tennessee—which, it was suspected, would also lead to further investments by suppliers—or expand operations at a competing site in Mexico. At the same time, the United Autoworkers (UAW) sought to unionize the existing Chattanooga plant. While Volkswagen was careful to remain publically neutral on the issue of unionization, it was widely speculated that successful unionization in Chattanooga would lead Volkswagen to choose Mexico for expansion. Tennessee Governor Haslam not only organized a \$178 million package of grants from Tennessee to Volkswagen,⁶ he was an outspoken critic of the UAWs efforts, explicitly linking it to the prospects for this project and future investment by suppliers.⁷ Following the defeat of the unionization effort, Volkswagen

⁵ It is not impossible, see Canes-Wrone and Park (2012), but it does limit the available sample.

⁶ *Volkswagen picks Chattanooga for expansion despite labor strife*, Nathan Bomey, Detroit Free Press, 7/14/14

⁷ *Gov. Haslam tries to keep UAW out of Tennessee*, Joey Garrison, The Tennessean, 2/6/14

announced they had chosen to expand in Tennessee, with planned investment totaling \$900 million over the next two years.⁸ When conceding defeat, UAW president Bob King fingered Governor Haslam foremost in his list of opponents.⁹

Finally, changes in the identity of the Governor can result in abrupt changes in policy, indicating that the identity of the governor matters. On July 1 2012, Democratic governor of North Carolina, Bev Purdue, vetoed a Republican-sponsored bill to allow fracking, citing concerns about environmental protection. The Republican-controlled legislature was narrowly unable to override her veto. But Governor Purdue did not seek reelection and was replaced by Republican Pat McCrory who signed a similar fracking bill into law on June 4, 2014.¹⁰

Business advocacy groups certainly write and behave as though state policies are important to their membership. Several organizations construct business climate indices ranking the relative hospitality of each state to the interests of a hypothetical representative firm. These state business climate indices play a large role in the perceptions of the business environment, appearing frequently in debates over state policy.¹¹ To be sure, the organizations that create and promote these indices have political agendas and they construct and highlight selectively (Kolko, Neumark, and Mejia 2013). Nonetheless, in a study of how state policy environments predict state economic growth, Kolko, Neumark, and Mejia (2013) conclude that “business climate indices that emphasize taxes and costs predict economic growth, especially for the manufacturing sector” (p28). In sum, state level policy is important for firm-level investment decisions and the identity and partisan affiliation of the Governor is relevant to this policy.¹²

In our baseline specification, we find that in state-years in which a close gubernatorial election takes place—defined as an election that was decided by less than 4 percentage points of the vote—manufacturing investment is reduced by 25% relative to years without a close election.¹³ As we relax the threshold of what is considered a close election, the point estimate attenuates as expected, consistent with the hypothesis that the effect is strongest in the closest elections. Moreover, the result is heavily concentrated in states with professionalized legislatures. Because professionalized

⁸ *Volkswagen to Add S.U.V. Line to Chattanooga Plant*, Aaron Kessler, NYTimes online, 7/14/14; *Volkswagen picks Chattanooga for expansion despite labor strife*, Nathan Bomey, Detroit Free Press online, 7/14/14

⁹ King was quoted as saying “the unprecedented political interference by Governor Haslam, Senator Corker, and others was a distraction for Volkswagen employees and a detour from achieving Tennessee’s economic priorities.” (*United Autoworkers union drops lost vote appeal at VW Tennessee Plant*, Dominic Rushe, UK Guardian online 4/21/14)

¹⁰ Reuters, Wade Rollins, 7/1/12, *North Carolina governor rejects fracking law*; Reuters, Marti Maguire, 6/4/14, *North Carolina governor signs law paving way for fracking*

¹¹ As one of a potentially long list of examples, see *The Economist*, 5/19/11, “Beware of the Yogurt”

¹² Earlier versions of this paper simultaneously investigated uncertainty in control over the state legislature. We used both term limits on state legislators and redistricting, including measures of the magnitude of redistricting based on our own extension of Schaffner, Wagner, and Winburn (2004). Unfortunately, these instruments for legislative uncertainty were insufficiently strong to deliver informative results. Luckily, legislative uncertainty is largely orthogonal to gubernatorial uncertainty.

¹³ Our dependent variable is logged so the coefficients in our tables must be transformed to achieve the percentage decline using: $b = 100 * [\exp(\beta) - 1]$.

legislatures have been shown to enable rather than inhibit governors' implementation of their agendas (Dilger, Krauss, Moffett 1995), this constitutes further support.

We are not the first to investigate the connection between electoral uncertainty and investment. Canes-Wrone and Park (2012) look at ten OECD countries and find that uncertainty over electoral outcomes is associated with a decline in private fixed investment. Julio and Yook (2013) find that irreversible FDI flows tend to fall prior to elections, especially in countries with a history of policy reversals. In the US, Canes-Wrone and Park (2013) find a decline in the quantity of home sales in advance of closely-contested gubernatorial elections.

While each of these is supportive of the connection between uncertainty and investment on a macroeconomic scale, none is a direct test of the idea that policy uncertainty retards business fixed investment in the United States—the current focus of public debate. The first and second studies group countries with a diverse set of political institutions and policy issues. While this is necessary to assemble a large set of elections, the resulting institutional heterogeneity is a concern. The last focuses on residential investment in the housing market rather than business investment. While residential investment is also part of GDP, it is arguably subject to a different calculus and is not relevant to productivity growth. Most importantly, we believe none of these studies convincingly addresses the potential simultaneity that arises because voters respond to the state of the economy.

The next section reviews the sources of our data, including the new data set on gubernatorial turnover that we have assembled for this study. Section 3 lays out our methods including the construction of electoral and policy uncertainty, the econometric specification, an extensive discussion of the instrument, and a discussion of the choice of estimator. Section 4 presents both the baseline results and a look at the effects of legislative professionalism. Section 5 concludes with a note on the broader applicability of our results.

2. Data

Our dataset is an annual panel of US states spanning from 1968 to 2004. Our sample period begins in 1968 with the availability of data on legislative professionalism. Our sample period ends in 2004 with the end of the longest continuous panel of state party ideology scores from which we calculate distance between parties. In this section, we summarize the most important variables.

Gubernatorial Vote Shares

For elections from 1972-1996, we use data compiled by Claggett and David. These data needed to be adjusted for our analysis, however, because Claggett and David shifted vote totals for elections taking place in odd election years so that their totals would instead appear in the following even year alongside the majority of states. We have restored the proper election years. For elections in 1997 and 1998 we use vote counts from the *Book of the States*. Data for 1999-2010 come from the Statistical Abstract of the United States. In all cases, we record the percentage of the vote won by Democrats,

Republicans, and Independents from which we typically calculate two-party vote-shares for Democrats and Republicans.

Governor Turnover

We assembled a comprehensive dataset indicating, for each gubernatorial election, whether the incumbent was running and, if not, why not. From this data we derive our instrument of exogenous variation in the degree to which an electoral result is uncertain *ex-ante*. Our coding distinguishes between the following alternatives: death/incapacity, term-limited, appointed to a higher office (e.g. US Ambassador), resigned to run for higher office (e.g. US Senate) whether successful or not, resigned for other political or personal reasons, recalled, impeached/convicted, or incumbent simply chose not to seek reelection. This last category is quite common and covers a wide range of circumstances. Upon extensive case research, this would seem to include governors who retire because a two-term limit is the norm but not the law, governors who retire due to age, and governors who retire to pursue attractive opportunities outside politics. But it also clearly includes governors whose decision is influenced by poor prospects for reelection. Rather than attempt to sift the tea leaves of the historical record to separate these various reasons and run the risk of mistaking rhetorical justification for true rationale, we avoid such cases altogether and focus on term-limits. The instrument is discussed in the next section.

It was frequently the case that the incumbent at the time of election was not the winner of the previous election but rather a lieutenant governor who had taken charge upon the resignation of the prior incumbent. In such cases, we had to decide whether this newcomer had, in fact, accrued the benefits of incumbency and should thus be counted as the incumbent, or whether we should rule this as a case of no incumbent running and code based on the previous election winner's reason for leaving office. For simplicity and transparency, we decided to rule based on the length of time the new incumbent had been in office prior to the election. Studies of the economic vote suggest that voters typically respond to performance only within the last year (Nannestad and Paldam 1994) so we placed our cutoff at one year. If the Governor had been in office at least twelve months prior to the election, he was considered the incumbent. If not, his predecessor was considered the incumbent and the predecessor's reasons for leaving office early would be relevant.

Consider the following example to illustrate. Suppose that a Governor is appointed to an Ambassadorial post in 2015 and resigns the Governorship mid-term, to be succeeded by her Lieutenant Governor who chooses to run in the next gubernatorial election in November 2016. If the Lieutenant Governor assumed office in October of 2015, 13 months prior to the election, then he would be considered the incumbent and this election would be coded "incumbent running for reelection". But if he didn't assume office until December 2015, only 11 months prior to the election, then he would not be considered the incumbent and this would be coded "incumbent resigned to assume appointed higher post."

Polarization

To measure the policy distance between the local Democrats and Republicans in a particular state, we use data from Berry et al. (1998, 2010) which gives a score to each party for each state and year. The scores are on a common single-dimensional left-right scale capturing their attitude toward government involvement in the economy. We are essentially assuming that all Democrats in a state-year, including both those who win office and those who challenge unsuccessfully, are characterized by this state- and year-specific party score and likewise for Republicans. The data cover 1960 – 2004.

Legislative Professionalism

We use the Squire dataset of state legislative professionalism covering 1967-2010. It is comprised of three components: the level of salary and benefits awarded legislators, the time spent in session, and the staff and resources provided legislators. The Squire index normalizes each of these indices by the relevant score for the US Congress of the same year. There was a strong move to professionalism in a subset of states during the 1960s (King 2000) but during the bulk of our sample, scores are fairly stable over time, though they exhibit considerable variation in the cross-section. For more information, see Squire (2007).

Real State Manufacturing Investment

Our dependent variable is the log of real capital expenditure in manufacturing industries in a given state in a given year. We use data assembled by Chirinko and Wilson (2009) which cover the manufacturing sector (NAICS sectors 31-33) and span 1963-2006, with a break from 1979-1981. They are constructed from a representative sample of plants located in the state in question (the primary source is the ASM) and thus do not require assumptions about relative investment rates. Chirinko and Wilson construct and apply a deflator to achieve a series for real investment.¹⁴

Real State Manufacturing Output

We control for the size of the state's manufacturing sector using a measure of value added in the manufacturing sector. The raw data, assembled by Chirinko and Wilson, derive from the ASM and are deflated using producer prices.

Real State GDP

We use state-level gross domestic product (GDP) data from the Bureau of Economic Analysis (BEA). We deflate using a state-specific cost of living index constructed by Berry, Fording, and Hanson (2000).

Unemployment

State-level unemployment data come from the Bureau of Labor Statistics and are available starting in 1976.

3. Methods

¹⁴ For a summary of their methods, see Chirinko and Wilson (2009).

3.1 Measuring Ex-Ante Uncertainty

While the option value of waiting before investing depends on the perceived level of policy uncertainty in the period leading up to an election, we do not have good direct measures of this *ex-ante* uncertainty. The most direct method would be a real-time survey measure of firms' perceptions of policy uncertainty. Several regional Fed branches conduct firm-level confidence surveys to construct diffusion indices.¹⁵ By taking the standard deviation of the qualitative responses, one can construct a measure of the cross-sectional dispersion of views which has been shown to predict future forecast errors and can thus be interpreted as a measure of uncertainty (Bachmann, Elstner, and Simms 2013). However, the regional Fed surveys cover only their own district, hence only a state or two, and with the notable exception of the Philadelphia Fed, the time series are also quite short, spanning only a few elections. The second-best alternative might be to use pre-election polls to measure how close the election is perceived to be. Unfortunately, regular pre-election polls are only rarely available for gubernatorial elections in our period and thus cannot be used in our main analysis.

Instead, we use the *realized* two-party vote-share of the gubernatorial candidates, assuming that elections which were close *ex-post* were perceived to be uncertain *ex-ante*. We create an indicator of whether the two leading candidate vote shares were within d percentage points of each other.¹⁶ Such an election is said to be a close election and this indicator variable is our main independent variable of interest. We then vary this threshold, d , from 4 to 10 points to determine whether any effect is concentrated in the closest (and thus presumably most uncertain) elections. Table 1 summarizes the number of elections of each type that meet each of these thresholds.¹⁷

We have attempted to validate our *ex-post* measure using an *ex-ante* measure. By raiding the political news website *Real Clear Politics*, we have compiled pre-election polling for 96 gubernatorial elections between 2004 and 2012. The number of polls varies a great deal between elections, with some receiving a single poll and others as many as 60. Figure 1 plots the relationship between our *ex-post* measure and the average polling margin. The vertical and horizontal lines are placed at ± 4 points to correspond to our preferred definition of a close election. We note that the majority of the elections designated as close by our *ex-post* measure would also have been so designated by an *ex-ante* measure and vice-versa. Moreover, errors seem roughly evenly distributed on both sides. We take this as

¹⁵ The Philadelphia Fed data series begins in 1968 while several others have started much more recently (New York 2001, Dallas 2004, Richmond 2008 though the latter do not release their underlying data).

¹⁶ When one of the two leading candidates is a political independent, we mark the uncertainty as missing, effectively dropping the state-year from the regression, because we are less able to systematically characterize independent candidates' likely policy stances. This occurs in 15 of 361 elections (4%).

¹⁷ We have also constructed analogous continuous measures of uncertainty. To do so, we first assume that there is a distribution of potential outcomes for democratic two-party vote share, and that this distribution is normal and centered on the actual realized democratic two-party vote share, $v_{i,t}$. We then estimate the standard deviation of this distribution from the entire history of two-party vote share in the race in question, $\sigma_{i,t} \equiv Std(v_{i,t})$. One can thus determine how many standard deviations from 50-50 was the realized vote share and thus, by comparing to the cumulative standard normal distribution, how likely it was that each party would win. This method clearly requires a number of assumptions but delivers a probability for each election. The weakness is that it requires one to assume that the *ex-ante* uncertainty in the distribution of vote-shares is stationary over time. We believe this is why such a measure performs poorly and why we have used our discrete measure.

confirmation that, as a proxy for ex-ante uncertainty, our ex-post measure is neither overly noisy nor systematically biased.

3.2 Polarization and Legislative Professionalism

Because there is a great deal of variation between states in the philosophy of government espoused by the average voter, both major parties adjust their platforms and legislative behaviors to accommodate local preferences. As a result, the policy-relevant difference between the two major parties varies a great deal from state to state. In states where there is very little difference between the parties, a given degree of electoral uncertainty would nonetheless translate into very little policy uncertainty. To control for this, we scale the measure of electoral uncertainty by a state-and-year-specific measure of the distance between the two parties. We then normalize this number by dividing by the sample-average value. Thus our coefficients represent the effect of a close election in a state with average partisan polarization.

State legislatures vary a great deal in their remit. Some legislatures meet frequently, constituting full-time jobs for their members who are well-paid and equipped with professional staffs (Squire 2007). Others are a part-time gig performed by members who concurrently hold other jobs. States with larger government tend to have more professionalized legislatures (Malhotra 2006, 2008). Both because they have greater resources at their disposal and because there is a greater existing body of law, it is reasonable to suspect that more professionalized legislatures are more likely to intervene in the economy by changing the laws on minimum wages, collective bargaining, corporate taxation, pollution, and permitting. Professionalized, active legislatures also change the governor's power. Contrary to a view of a zero-sum game where a professionalized legislature competes for leadership with the governor, it appears that professionalized legislatures *increase* gubernatorial effectiveness (Dilger, Krauss, and Moffett 1995). Thus we hypothesize that a given degree of gubernatorial electoral uncertainty should be more consequential in states with professionalized legislatures.

3.3 Specification

Equation (1) describes our main specification, where the panel indices i and t reference the US state and calendar year, respectively. Our vector of economic controls, \mathbf{X} , includes the level of GDP, the unemployment rate, the yield on the 10-year government T-note, the rate of inflation, the value added in the manufacturing sector, and an indicator of whether there was a close race for the US Presidency in that year.¹⁸¹⁹ We also include a single lag of the dependent variable, with the lag length chosen to minimize Schwarz' Bayesian information criterion. Finally, we include year fixed effects which may capture changes in the federal tax treatment of investment among other relevant factors.

¹⁸ Because it requires the development of separate instruments, and because these instruments are quite weak, we have looked into state legislative electoral uncertainty separately and do not include it in this paper. Interestingly, uncertainty over the partisan control of the state legislature is nearly orthogonal to gubernatorial electoral uncertainty, with correlations ranging from 0.05 to 0.1 depending on the threshold for uncertainty. Thus we feel comfortable omitting legislative uncertainty from our gubernatorial specifications.

¹⁹ In response to requests, we have also included the growth rate of real state GDP and the one-year change in the state unemployment rate. Neither are significant so we have opted to report the baseline estimates only.

$$I_{i,t} = \rho I_{i,t-1} + \gamma * ElectoralUncertainty_{i,t} * Polarization_{i,t} + \beta_x X_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$\varepsilon_{i,t} = \mu_i + \mu_t + v_{i,t}$$

The variable of interest is our measure of uncertainty surrounding the partisan affiliation of the victor, which was described in the previous sections. Our data are annual, and we relate the investment in a calendar year with the presence or absence of a close election in that same calendar year. The vast majority of our elections take place in early November, suggesting that the concurrent calendar year is predominantly the proximate pre-election period and thus the proper window in which to observe effects on investment.

3.4 The Instrument: Gubernatorial Term Limits

Work on economic voting has made clear that voters respond to economic conditions and thus we face a potential simultaneity problem. An exogenous change in manufacturing investment in a state may well affect the broader economy and thence voter intentions, leading an election to be more or less closely fought, thereby affecting electoral uncertainty. Our basic controls for the state of the local economy (the level in both unemployment and income) should account for the most obvious scenarios, but a variety of potential shocks remain. Thus we develop an exogenous instrument for electoral uncertainty.

Our instrument for electoral uncertainty in gubernatorial elections is the presence of a term-limited incumbent. Incumbents enjoy a large electoral advantage and are reelected at a high rate (Carey, Niemi, Powell 2000 among many others), thus an election in which there is no incumbent running is generally an election whose outcome is less certain. We have collected data on the actions of the incumbent governor during all gubernatorial elections during our sample period (see figure 2). Naturally, many incumbents voluntarily choose not to run. In many cases, the decision not to run could be the result of poor prospects of reelection springing from policy choices in office or the state of the local economy. At a casual reading of electoral histories, many of the reasons cited—poor health, advanced age, or attractive private sector opportunities—seem plausibly exogenous. However, surface-level justifications may hide a deeper truth and we do not wish to wade into these waters. On the flip side, there are many instances where an incumbent resigned the governorship to pursue higher office (e.g. US Senator or US President). These are likely cases where the incumbent’s political fortunes are riding high. To the extent that their political fortune is due to the state of the local economy, or policy choices while in office, one may worry that such incumbent exits are not exogenous to the system we are estimating. Thus we focus solely on those reasons that seem plausibly exogenous: death or incapacity while in office, appointment to higher office (e.g. US Ambassador or member of the President’s cabinet), or ineligibility to run due to term-limits. Of these three, the last makes up the vast majority of our cases (see figure 3).

As of this writing, governors of 36 states are subject to term limits. One third of these states impose a lifetime limit of two terms. Two thirds of these states limit the governor to two successive terms, with no lifetime limit. These numbers have changed over our sample period as there has been a slow trend toward adoption of term limits. Currently, most governors serve four-year terms of office, with Vermont and New Hampshire constituting exceptions. However, this too has changed during our sample period; two-year terms were more common at the beginning of the sample. As a result of the variety in term lengths, term limits, the election year cycle, and the electoral fortune of incumbents, the incidence of term-limited incumbents is extremely diffuse (see figure 3). In other words, it is not the case that term-limited governors appear in a fixed collection of states with a regular periodicity.

Gubernatorial term limits are an extremely strong instrument. In our baseline specifications, first stage F-statistics on the excluded instrument are in excess of 30. Even when the sample is split by legislative professionalism, the first-stage F statistics are sufficient to clear Stock-Yogo critical values at the 10% level.

For the incumbent governor to be term limited and ineligible to run in year t , she must have won reelection in the previous election of year $t-4$. The exclusion restriction would not be met if incumbent electoral success in year $t-4$ is related to manufacturing investment in year t . One possibility for this is that high investment in year $t-4$ leads to both successful reelection of the incumbent in $t-4$ (and thus her ineligibility due to term limits in year t) as well as lower investment in year t (perhaps due to lingering overcapacity). A variation on this channel would be if the governor took actions to stimulate investment in year $t-4$ which then prevent similar actions in year t (perhaps due to an inter-temporal budget constraint).

Given the four year time-span involved, we don't believe these are convincing stories. Nonetheless, to strengthen our argument that the instrument satisfied the exclusion restriction, we have run specification (1) including the instrument as a standard explanatory variable on the right-hand side. As expected, the instrument (term limits) is not statistically significant while the uncertainty measure remains significant, suggesting that the confounding channels hypothesized above are, if they do exist, not strong.

3.5 Estimators

Because current investment likely depends on past investment, we are in the position of estimating a dynamic panel. Because of the dimensions of our panel ($T=33$, $N=50$), the choice of proper estimator is not clear-cut.

In a dynamic panel, the least-squares dummy variable (LSDV) estimator is biased for small T , *regardless of the cross-sectional size of the panel*, N (Nickel 1981). This is essentially because any innovation in period $t-1$ will contribute to both the lagged dependent variable and to the fixed effect, thus ensuring that they are correlated. However, $\varepsilon_{i,t-1}$ is only one of T terms in the fixed effect, thus as $T \rightarrow \infty$, the correlation and thus the bias decline to zero. The natural question then, is "how big must T be before the bias can be ignored?" Judson and Owen (1999) find that for $T=30$, the bias for β when estimated

using the LSDV estimator is between 1 and 3%.²⁰ While this seems small, we try to employ system GMM (Blundell and Bond 1998) as well.

However, difference and system GMM estimators are designed to address dynamic panel bias in short panels. They result in a number of instruments which grows quadratically with T . As a result, “instruments can over-fit instrumented variables, failing to expunge their endogenous components and biasing coefficient estimates towards those from non-instrumenting estimators.” (Roodman 2009b, p139) Over-fitting occurs when the number of instruments, j , is large compared to the number of panels, N . But Roodman (2009b) argues that there is relatively little practical guidance on the size of the bias for a given sample size and number of instruments. While the magnitude of the bias is not yet clear, there is a strong sense that one can mitigate it by reducing the number of instruments. The current solution is to use a subset of the available lags to produce a smaller set of instruments. Roodman (2009b) describes procedures for collapsing instruments and further work on finding the best combination continues. Roodman (2009b) shows that collapsed instruments cause less bias and increase the ability of the Hansen test to detect violations, albeit at the cost of increased variance.²¹

We estimate equation (1) using both 2SLS panel fixed effects and two-step system GMM with collapsed instruments so that there is just one instrument for each variable and lag length, rather than one for each time period, variable, and lag length.²² In each case we use the strictly exogenous instrument for political uncertainty described in the previous subsection.

After collapsing, we are left with $j= 51$ instruments and $N= 50$ panels (states). Hansen’s test of over-identifying restrictions cannot reject the null of valid instruments. In later specifications, we split the sample in two according to whether a state’s legislature is relatively more or less professional. This results in $j = 49$, $N = 25$. At this point, the p-value for Hansen’s test soars and it seems likely that Hansen’s test has lost power (Roodman 2009b) which may concurrently suggest bias from over-fitting. Unfortunately, this means we are unable to use system GMM on that part of the sample in which the effect is concentrated. As a result, we rely on FE IV for the bulk of the paper. A few results from system GMM are shown in table 5 to confirm that system GMM delivers similar results but is unreliable in our long panel.

4. Results

²⁰ The bias depends on the magnitude of the true parameter estimate. See Judson and Owen (1999) Table 1.

²¹ Roodman (2009b) Table 1 gives Monte Carlo estimates of bias only for the parameter, ρ . Estimates of bias for the parameters of interest, β , are not reported.

²² We use the two-step estimator with robust standard errors (Roodman’s `xtabond2` in Stata).

4.1 Baseline Specification

Table 2 shows the results of our baseline regression of manufacturing investment on an indicator of whether there was a close gubernatorial election that year plus economic controls and state and year fixed effects. As we gradually add controls the effect remains marginally significant and of stable magnitude until we add unemployment (table 2, columns 1-4). As unemployment is not available until 1976, in column 5 we limit the sample period to match so as to confirm that it is the specification rather than the sample that results in the decline in the coefficient of interest. For the moment, a close election is defined by a 4 percent threshold.²³ In each of these regressions, the measure of exogenous gubernatorial turnover is used to instrument for a close election.

4.2 Varying the Threshold for a Close Election

Next we vary the threshold from 4 percent of the vote (i.e. 48-44, with 8 percent going to third parties) to 10 percent of the vote, with a higher threshold indicating a more permissive definition of close elections. Table 1 shows the total number of elections in the sample satisfying various threshold criteria. Rather than report the full regressions, the effect on the point estimate and standard error is illustrated in figure 4. As we dilute the indicator of close elections to include elections which are less in doubt, we can see the point estimate decline (figure 3). It is consistent with the notion that it is generally the closest elections that result in the largest declines in investment.

Because the dependent variable is in logs, we must convert the point estimate to achieve the percentage decline in investment during years with close gubernatorial elections.²⁴ For example, from column 1, the estimate is that an election closer than 4 points will result in a 25% decline in manufacturing investment, *ceteris paribus*. Controlling for unemployment (column 4) softens the effect to an 18% decline.

From the first-stage F statistics in columns 3 and 4, we can see the instrument is quite strong, validating the idea that the incumbent enjoys a significant electoral advantage which serves to reduce competition.

4.3 Legislative Professionalism

Table 2 and Figure 3 display an effect that remains on the edge of statistical significance. We have argued that the stakes are likely to be greater where the legislature is professionalized and thus both governor and legislature are more capable of intervention. Table 3 shows the effects of splitting the sample at the median value of legislative professionalism. It is clear that it is in states with high legislative professionalism that we see the greater effect of uncertainty in gubernatorial elections.

²³ The 4 percent threshold was chosen to match the standard error of a typical Gallup pre-election opinion poll. It is thus the threshold at which an election outcome is often described as “within the margin of error” and thus an important cognitive threshold for observers. Table 1 indicates that roughly 20% of elections meet this threshold. Restricting the threshold of uncertainty below 4 points delivers ever-larger point estimates, consistent with the pattern we show in figures 3 and 4.

²⁴ The formula is $b = \exp(\beta) - 1$ where b is the percentage decline and β is the point estimate.

Indeed, the effect is sufficiently strong as to be statistically significant whether or not we control for unemployment (columns 1 and 3)

4.4 The Next Two Years

The simple theory of “wait-and-see” investment implies that as the uncertainty is resolved, investment will recover. In our case, we might expect uncertainty to resolve at the election date. Thus we repeat the baseline regression for each of the two years following the election. The results are displayed in table 4. Curiously, we find no such post-electoral rebound in manufacturing investment. Investment in subsequent years is unaffected by the prior close election. If the fault is not with our empirical method, then perhaps the close election is taken as a sign of continued partisan battles over legislation and thus continued policy uncertainty in the state, or perhaps the firms have diverted the investment to alternate locations. At present we do not know why the pre-electoral decline is not reversed in subsequent years.

5. Discussion

We have estimated the effect of electorally induced policy uncertainty on investment in the manufacturing sector. We have chosen US states because they afford a large sample with high quality comparable data and relatively homogeneous political institutions. More importantly, term limits provide a convincing instrument allowing us to estimate causal effects. Because state governors exercise considerable power over legislation and considerable discretion over regulation and permitting, and because the policies relevant to business investment vary systematically by party, uncertainty over the partisan affiliation of the future governor is a source of political risk to firms considering investing in-state. Thus we have used electoral uncertainty, scaled by the policy distance between parties, as a measure of policy uncertainty. We find that in the calendar year of a gubernatorial election that was decided by fewer than four points, state investment in the manufacturing sector is 25% lower than in years with no such close gubernatorial election. As expected, the magnitude of this average effect declines as we relax our standard for what constitutes a close election. And the effect is concentrated in states with professionalized legislatures (which have been shown to enhance gubernatorial effectiveness and correlate with larger state governments.)

This is a large and robust effect. But at least four caveats are in order when considering the applicability of our results to other venues. First, compared to counterparts in other sectors (with the clear exceptions of mining and agriculture), firms in the manufacturing sector are more likely to be impacted by environmental regulations while remaining just as sensitive to corporate tax and human resources law. Thus manufacturing firms may be more sensitive than average to the policy environment, in which case our specification may overestimate the effect of uncertainty on aggregate investment.

Second, it is not clear whether it is state or federal regulations that are more burdensome to firms. Likewise, it is not clear whether state or federal law is the more amenable to partisan political control. Both are subject to intense lobbying from the corporate sector. Polarization at the state level depends

a great deal on the state in question. Shor and McCarty (2011) find that half the state legislatures are more polarized than the US Congress. While state governments clearly vary a great deal in their use of super-majoritarian requirements and other institutional details, whether state governments generally have more or fewer veto points than the federal government is an open question.

Third, manufacturing investment is probably more elastic across state borders than across the national border. The effect of this elasticity probably depends on the extent to which the investment can be delayed without a loss in expected return. For investments that expire quickly, firms may readily eschew state-level uncertainty by locating in a different state and yet be unwilling to escape federal policy uncertainty by locating offshore. Because we do not consider spillovers, we would see this as a decline in investment and thus overestimate the total effect of state-policy uncertainty on investment. This may be what is driving the lack of a post-election rebound.

Finally, policy uncertainty arising from an election is necessarily resolved by a certain date (albeit only to arise, phoenix-like, in the subsequent electoral cycle). This makes it fundamentally different from the ongoing uncertainty that accompanies partisan battles over the current legislative agenda. Our estimates are of the concurrent decline in investment in a single calendar year. Whether firms respond differently to these two types of uncertainty is an open and relevant question.

These caveats suggest that the elasticity of aggregate investment to policy uncertainty is unlikely to be captured entirely by a single research design. Nonetheless, we believe our estimates constitute firm causal evidence that manufacturing investment is highly responsive to policy uncertainty in the short run.

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Table 1: Threshold summaries

Sample Years	1976-2004	1968-2004
Total Number of Gubernatorial Elections in Sample	361	479
Of which...		
Two-party vote-share closer than 4 points	72	98
Two-party vote-share closer than 5 points	86	120
Two-party vote-share closer than 6 points	107	146
Two-party vote-share closer than 7 points	121	164
Two-party vote-share closer than 8 points	132	183
Two-party vote-share closer than 9 points	146	201
Two-party vote-share closer than 10 points	160	221

Table 2: Electoral Uncertainty Depresses Investment

	[1]	[2]	[3]	[4]	[5]
estimator	fixed effects IV with robust std errors				
instrument for close elections	no incumbent governor due to death, term-limits, or appointment				
dependent variable	log(manufacturing investment)				
sample	1968 - 2004			1976-2004	
gubernatorial election within 4 points * polarization	-0.287*	-0.287*	-0.287*	-0.195	-0.184
	(0.150)	(0.150)	(0.150)	(0.129)	(0.129)
presidential election within 4 points			0.0455	-0.0218	-0.0335
			(0.0703)	(0.0635)	(0.0636)
lag of log(manufacturing investment)	0.567***	0.567***	0.567***	0.426***	0.435***
	(0.0206)	(0.0206)	(0.0206)	(0.0245)	(0.0245)
log(manufacturing GDP)	0.142***	0.142***	0.142***	0.415***	0.423***
	(0.0183)	(0.0183)	(0.0183)	(0.0362)	(0.0363)
log (real GDP)	0.146***	0.146***	0.146***	-0.0183	0.00863
	(0.0451)	(0.0451)	(0.0451)	(0.0592)	(0.0591)
10-year T-bond yield		0.175*	0.133***	0.147***	0.169***
		(0.0940)	(0.0447)	(0.0414)	(0.0413)
inflation		0.0600	0.0104	0.0306	0.0525
		(0.0396)	(0.0724)	(0.0650)	(0.0648)
log(unemployment rate)				-0.135***	
				(0.0330)	
Observations	1,666	1,666	1,666	1,274	1,274
R-squared	0.834	0.834	0.834	0.769	0.767
Number of panels (US states)	49	49	49	49	49
First Stage F Statistic	31.81	31.81	31.81	35.82	35.96

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3: The Effect is Concentrated in States with Professionalized Legislatures

	[1]	[2]	[3]	[4]
estimator	fixed effects IV with robust std errors			
instrument for close elections	no incumbent governor due to death, term-limits, or appointment			
dependent variable	log(manufacturing investment)			
sample	1968-2004		1976-2004	
professionalism of the state legislature	more	less	more	less
gubernatorial election within 4 points * polarization	-0.375** (0.177)	-0.157 (0.252)	-0.290** (0.121)	-0.0659 (0.289)
presidential election within 4 points	0.0874** (0.0430)	0.0739 (0.103)	-0.0805 (0.0740)	0.0431 (0.104)
lag of log(manufacturing investment)	0.664*** (0.0307)	0.447*** (0.0303)	0.544*** (0.0354)	0.386*** (0.0384)
log(manufacturing GDP)	0.0637*** (0.0176)	0.417*** (0.0467)	0.325*** (0.0568)	0.444*** (0.0528)
log (real GDP)	0.0991* (0.0540)	0.0560 (0.0724)	0.0371 (0.0794)	-0.0145 (0.0912)
10-year T-bond yield	0.00450 (0.0280)	0.176*** (0.0684)	0.110** (0.0494)	0.169** (0.0666)
inflation	0.242 (0.204)	-0.0252 (0.108)	0.0828 (0.0725)	-0.00539 (0.115)
log(unemployment rate)			-0.131*** (0.0413)	-0.0861 (0.0640)
Observations	850	816	650	624
R-squared	0.834	0.849	0.790	0.760
Number of panels (US states)	25	24	25	24
First Stage F Statistic	13.04	19.26	23.49	13.35

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 4: The Puzzling Lack of a Post-Electoral Rebound

	[1]	[2]	[3]	[4]
estimator	fixed effects IV with robust std errors			
instrument for close elections	no incumbent governor due to death, term-limits, or appointment			
dependent variable	log(manufacturing investment)			
professionalism of the state legislature	all states		more professional	
gubernatorial election within 4 points * polarization (last year)	-0.00905 (0.126)		-0.0655 (0.125)	
gubernatorial election within 4 points * polarization (2 years ago)		0.0356 (0.127)		-0.0120 (0.124)
presidential election within 4 points	-0.0208 (0.0363)	-0.0273 (0.0434)	-0.183** (0.0733)	-0.159** (0.0707)
lag of log(manufacturing investment)	0.573*** (0.0204)	0.575*** (0.0202)	0.642*** (0.0281)	0.636*** (0.0258)
log(manufacturing GDP)	0.145*** (0.0173)	0.149*** (0.0171)	0.0653*** (0.0159)	0.0693*** (0.0156)
log (real GDP)	0.165*** (0.0419)	0.161*** (0.0414)	0.140*** (0.0467)	0.131*** (0.0461)
10-year T-bond yield	0.0888 (0.0856)	0.0885 (0.0711)	0.0503 (0.0546)	0.0694 (0.0457)
inflation	0.0899*** (0.0248)	0.0908*** (0.0245)	0.226*** (0.0614)	0.212*** (0.0574)
Observations	1,715	1,763	875	900
R-squared	0.848	0.849	0.867	0.868
Number of panels (US states)	49	49	25	25
First Stage F Statistic	46.32	44.77	22.81	23.15

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 5: GMM Estimates of Key Subsample Suffers From Too Many Instruments

	[1]	[2]	[3]	[4]
estimator	two-step system GMM with collapsed instruments and robust standard errors			
instrument for close elections	no incumbent governor due to death, term-limits, or appointment			
dependent variable	log(manufacturing investment)			
professionalism of the state legislature	all states	all states	more professional	less professional
gubernatorial election within 4 points	0.0384 (0.112)	-0.00678 (0.134)	-0.172*** (0.0634)	0.172 (0.191)
presidential election within 4 points	0.0471 (0.0337)	0.0438 (0.0373)	-0.0480 (0.0395)	0.0807 (0.0560)
lag of log(manufacturing investment)	0.508*** (0.0381)	0.513*** (0.0422)	0.563*** (0.0647)	0.452*** (0.0705)
log(manufacturing GDP)	0.360*** (0.0860)	0.427*** (0.0393)	0.387*** (0.0882)	0.509*** (0.0913)
log (real GDP)	0.119 (0.107)	0.0430 (0.0365)	0.0676 (0.139)	-0.0108 (0.152)
10-year T-bond yield	0.00714** (0.00342)	0.0139*** (0.00403)	0.0209*** (0.00571)	0.0102 (0.00688)
inflation	0.00420 (0.00411)	-0.000610 (0.00437)	0.00497 (0.00588)	-0.00503 (0.00736)
log(unemployment rate)		-0.0609* (0.0347)	-0.143*** (0.0366)	0.0117 (0.0630)
Observations	1,799	1,399	700	699
Number of statecode	50	50	25	25
Number of instruments	49	50	50	50
Hansen's test of overid restrictions: p-value	0.463	0.304	0.998	0.999
Test for AR(1) in first differences: p-value	0.000	0.000	0.00397	0.00125
Test for AR(2) in first differences: p-value	0.533	0.583	0.144	0.841

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Figure 1: Ex-Post and Ex-Ante measures of Electoral Uncertainty

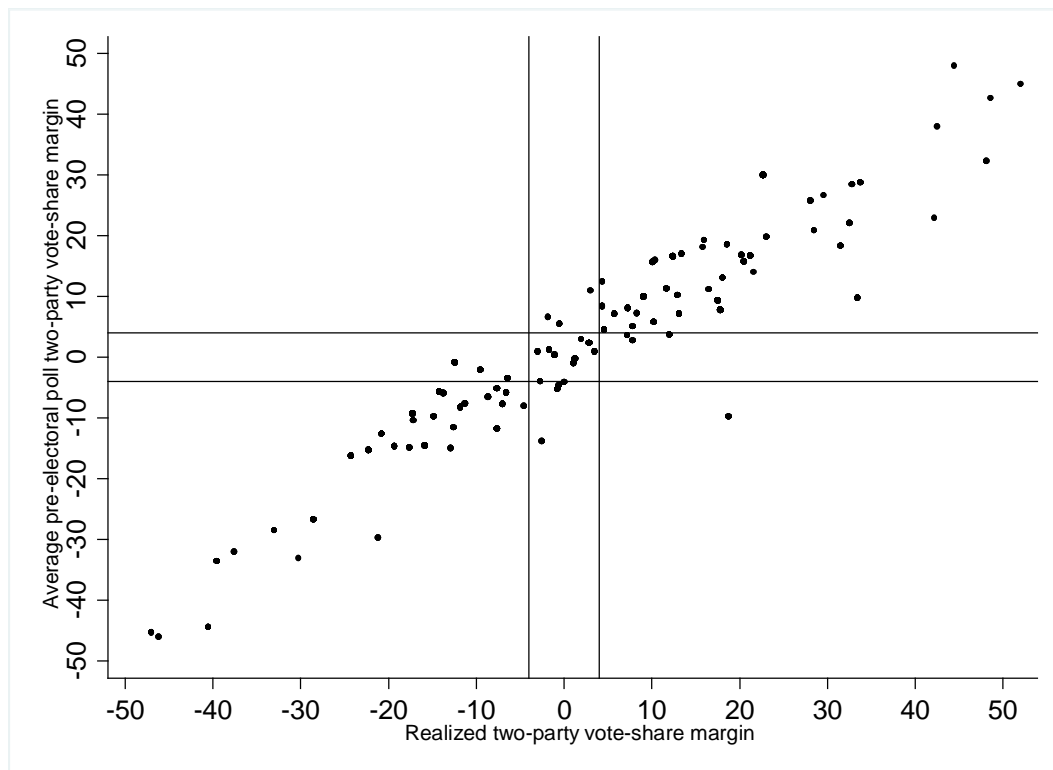


Figure 2: Sources of Gubernatorial Turnover: The Full Spectrum of Reasons Incumbents Do Not Run For Reelection

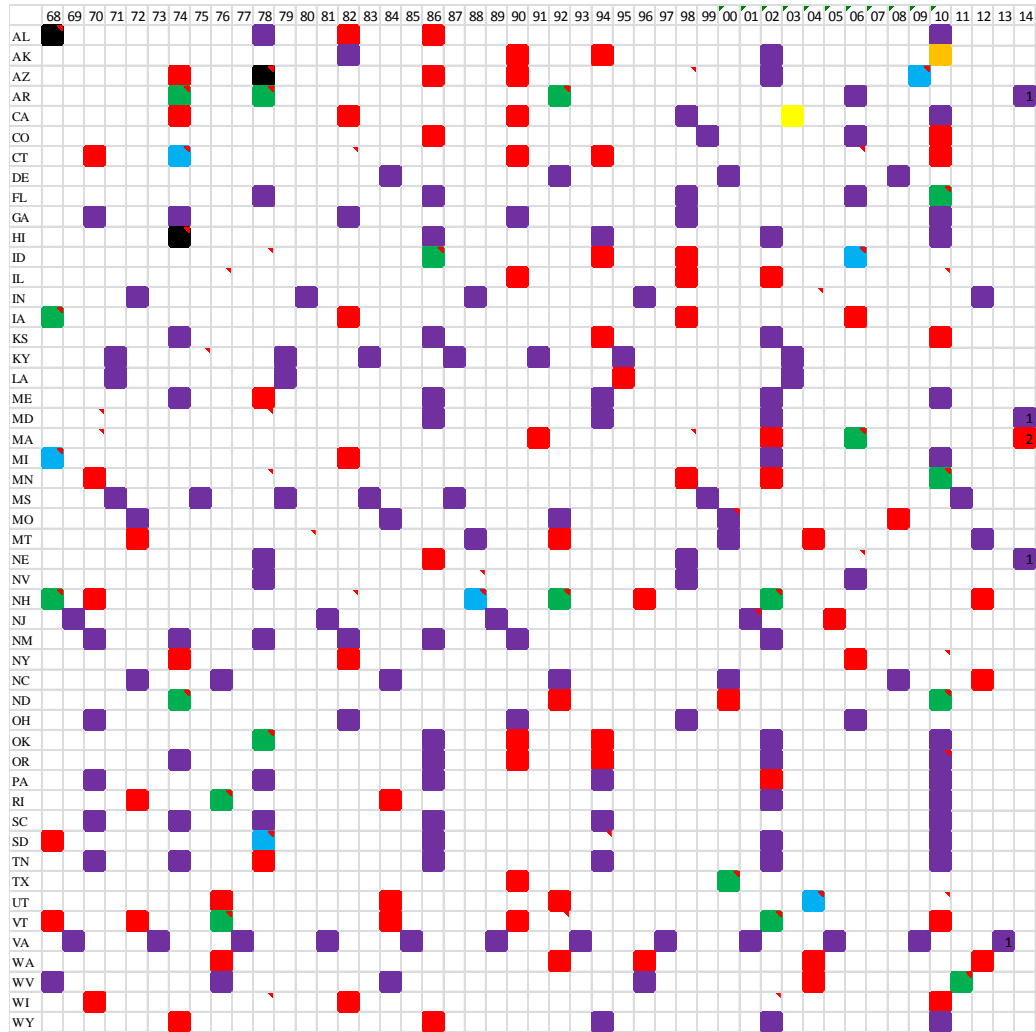
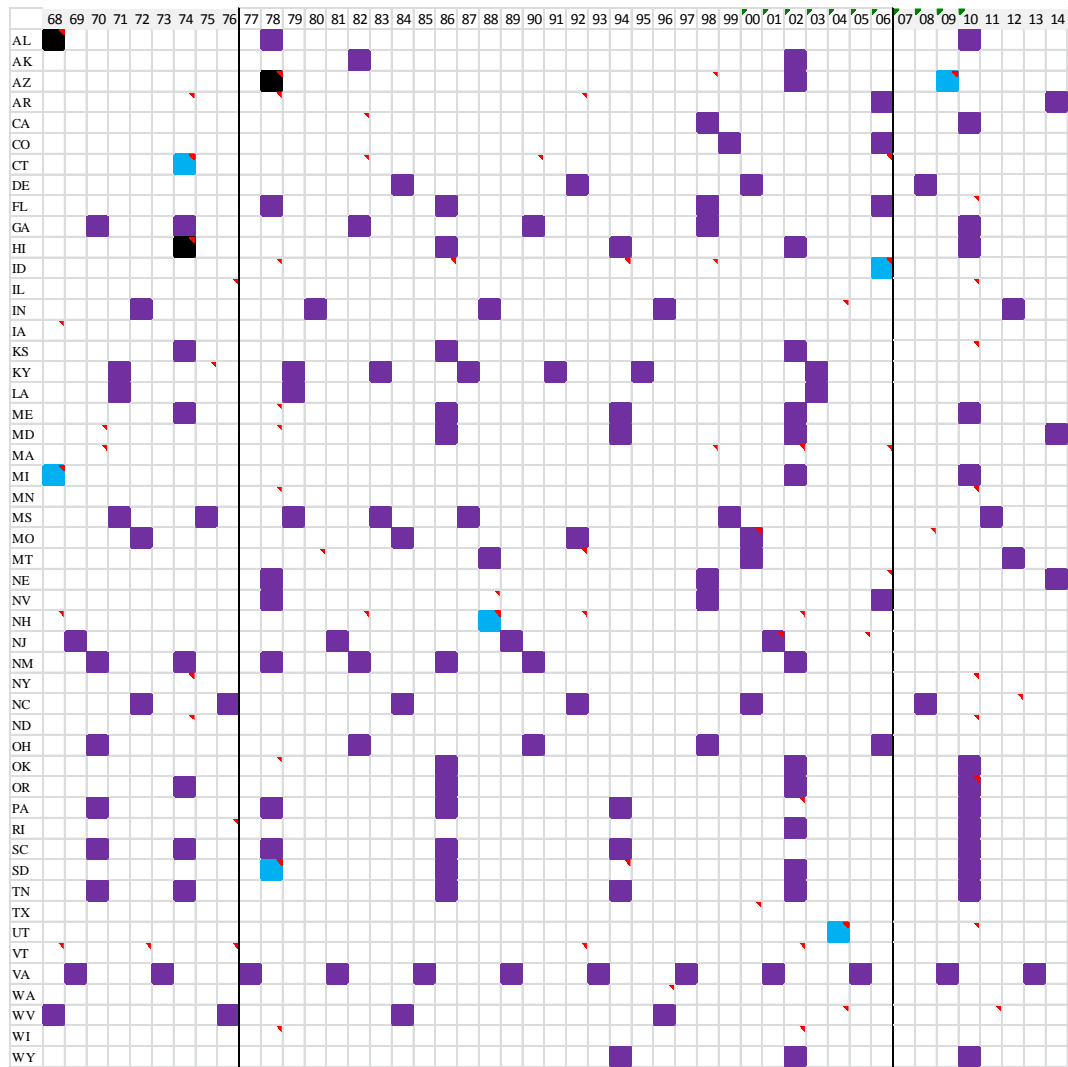


Figure 3: Sources of Gubernatorial Turnover: Term Limits, Deaths, and Appointments Only



- death/incapacitated
- term limited
- resigned to assume appointed office

Figure 4: Varying the Definition of a Close Election

