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Essays on the Political Economy of Intergovernmental Grants

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ESSAYS ON THE POLITICAL ECONOMY OF INTERGOVERNMENTAL GRANTS

DISSERTATION

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the College of Business and Economics at the University of Kentucky

By
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ABSTRACT OF DISSERTATION

ESSAYS ON THE POLITICAL ECONOMY OF INTERGOVERNMENTAL GRANTS

This dissertation focuses on how distributive politics influences the geographic allocation of federal grants to state and local governments. A secondary focus is the role of social trust in the growth of government. In the first essay, I test the degree to which the earmark ban of 2011 prevented legislators from directing federal competitive grants to their home congressional districts and whether earmarking distorted equality in the distribution of federal grants across demographic groups. I find that earmarking skewed the distribution of federal grants toward wealthy congressional districts and away from poor congressional districts. This is a groundbreaking finding, considering that no literature has addressed the impact of earmarking on economic inequality. In the second essay, I estimate the returns to lobbying for local governments in terms of federal earmarked grants, and I find that local governments in counties with higher levels of income per capita were more likely to engage in lobbying. I also find evidence of a causal link between lobbying and federal earmarks to local governments. Given that local governments in wealthy areas tend to have larger tax bases, which allows them to more easily fund public infrastructure projects, my findings imply that lobbying and earmarking hampered the ability of federal grant programs to promote equality in the distribution of federal funds. The third essay utilizes time series econometrics to examine the relationship between government regulation, spending, interest group activity, and social trust in government.

KEYWORDS: Intergovernmental Grants; Earmarks; Lobbying; Social Trust; Political Economy

Steven Gordon

May 5, 2017

Date

ESSAYS ON THE POLITICAL ECONOMY OF INTERGOVERNMENTAL GRANTS

By
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Director of Dissertation: Dr. John Garen

Director of Graduate Studies: Dr. Jenny Minier

Date: May 5, 2017

To my beautiful wife, of course.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1: Introduction

The research presented in this dissertation analyzes the ways that government institutions, specifically earmarking and public sector lobbying, are both impacted by and impact public participation and trust in government. In a "micro" sense, the first two essays speak to the tendency for legislators to respond to the public's demands for more transparency. The rules reforming earmarking and lobbying are both examples of the significant elasticity of government institutions with respect to voter demands. In a "macro" sense, the third essay directly studies the impact of public opinion or trust on the efficacy of government institutions. A consistent theme throughout all three essays, however, is an exposition of the tendency for government activity to incentivize the formation of interest groups.

In the first essay, I study the impact of the 2011 congressional earmark ban on the distribution of intergovernmental grants. Critics of the 2011 congressional earmark ban argue that legislators have simply replaced earmarking with other means of directing federal funds to their home districts. I estimate the impact of the ban using data on federal competitive grants to state and local governments. Because several earmark reforms predated the 2011 ban, I test for a break in the relative trends between regions receiving more earmarks versus those receiving fewer earmarks. My results indicate that for grants to local governments, the 2011 ban had no effect. For grants to state governments, I find that the earmark ban of 2011 did have an impact; I find statistically and economically significant negative effects, indicating that the earmark ban effectively altered the distribution of intergovernmental grants to state governments. I also show that a large bias in earmarks existed between high and low income districts, suggesting that the earmark ban potentially improved equality in the distribution of federal grants across high and low income groups.

In the second essay, I measure the returns to lobbying for local governments in terms of federal earmarks. Because a local government's decision to lobby may be endogenous to receiving an earmark, I instrument for lobbying with local housing prices. Since the time period of my analysis covers the Housing Crisis, I argue that the variation in housing prices over this time was largely exogenous to federal earmark distributions. The strong correlation that I find between housing price growth rates and lobbying provides evidence that local governments lobbied to buffer against impending property tax losses. I find that the rate of return on lobbying is large in terms of increasing the size of an earmark conditional on receiving at least some positive amount of earmarks, but that the return is economically small in terms of improving the unconditional likelihood of receiving an earmark. This suggests that lobbying is effective in securing larger earmarks given that a local government receives an earmark, but ineffective in increasing the probability of a local government receiving an earmark overall. I also find that wealthier local governments in terms of personal income per capita tended to lobby more than poorer local governments, which corroborates the result found in the first essay, that earmarks as a share of total federal grants were disproportionately awarded to local governments in the wealthiest congressional districts relative to the poorest congressional districts.

In the third and final essay, I test whether the growth of government that took place in the United States over the latter half of the 20th and early 21st centuries is more consistent with the "public interest" or "public choice" views of political economy. In doing so, I adopt a novel approach to test whether government policy tends toward equilibrium in the long run and, if such an equilibrium exists, to characterize it. I utilize an extensive time series on public trust in government in order to test whether the public interest or public choice model better explains the data. I specify an empirical model that allows me to examine the dynamics of the relationship between public trust in government and government growth in a flexible way that minimizes prior structure. Using a vector error correction model (VECM), I test for and characterize a long run relationship between trust, government activity, and two other variables that I hypothesize play a role in the dynamic adjustment process: rent seeking, and labor productivity. When measuring government activity with federal transfer spending and pages in the Code of Federal Regulations, my estimates imply the existence of a long run equilibrium between trust and government activity where higher levels of government growth lead to lower trust, higher rent seeking, lower productivity growth, and finally higher government activity. This result supports the public choice model of government over the public interest model of government.

Chapter 2: What Did the Earmark Ban Do? The Impact of Earmark Reforms on the Distribution of Intergovernmental Grants

I. Introduction

"*I will do everything I can to protect my district.*"

–Peter T. King, (R-NY)

"I'll be making more phone calls, writing more letters, arranging more meetings and doing whatever I possibly can. That's the way it's going to be done...now that they have eliminated these earmarks."

–Maurice Hinchey, (D-NY) [1]

Earmarking is the process by which members of Congress redirect funds already allocated to federal agencies. Most frequently inserted into the report language accompanying appropriations bills, earmarks alter the way projects are funded by agency grant programs and, until recently, have seen rapid growth. Totaling less than $3 billion in 1991, by 2006, earmarks had increased to a historic high of nearly $30 billion (CAGW, 2016).

Legislators in favor of earmarking often argue that they are better equipped to attend to local needs than agency officials, framing earmarks as welfare enhancing rather than an exercise of political power.[2] Regardless, earmarking represents a quantifiable budgetary tension between the legislative and executive branches.

In a 2007 report, the U.S. Department of Transportation (DOT) Office of Inspector General found that 9 out of 10 projects earmarked in a Federal Aviation Administration (FAA) grant program for airport facility improvements would not have been funded without being earmarked and that the inclusion of these projects caused higher priority projects to be delayed by 3 years or more (DOT, 2007).[3]

The DOT report, in addition to political pressure, led to a 2008 Bush Administration executive order that directed the Office of Management and Budget (OMB) to collect information on earmarks including individual amounts, sponsors, and the locations of recipients (Brass et al., 2007). In their examination of appropriations legislation, the OMB defined an earmark as:

> "...funds provided by the Congress for projects, programs, or grants where the purported congressional direction (whether in statutory text, report

[1] See Hernandez (2011).

[2] Consider Senator Richard Durbin's (D-Ill.) comment: "*I think that what we need to do is have the Obama administration say, 'We are looking for local impact, local input on projects and we will give great weight or at least weight to these recommendations.' And I think that only makes sense. Because, to think that somebody sitting at a desk in Washington, D.C., can appreciate that opportunity down in the Metro East area- I'm not sure they could*," See: Stein (2014).

[3] Additionally, agencies have sometimes refused to fund earmark requests altogether. Evidence of

language, or other communication) circumvents otherwise applicable merit-based or competitive allocation processes, or specifies the location or recipient, or otherwise curtails the ability of the executive branch to manage its statutory and constitutional responsibilities pertaining to the funds allocation process" (OMB, 2009).

In addition to the Bush administration executive order, Congress enacted a series of reforms including earmark disclosure rules added in late 2006, a 1-year moratorium in 2007, and additional transparency requirements in 2009.[4]

Despite the reforms, lawmakers continued to request earmarks at significant levels up until 2011, when Congress finally imposed an all encompassing ban on earmarking. Figure 2.1 displays data from government watchdog group Citizens Against Government Waste (CAGW) that show earmarks falling to zero in 2011 and remaining at low levels afterward.[5]

There are several reasons, however, why the earmark ban might not have had an impact on the distribution of federal funds. Legislators who used earmarking before the ban may have found alternative ways to allocate funding to their home districts after the ban. Congressional members may request that agencies fund specific projects by contacting them directly, a practice known as "lettermarking."[6] Additionally, the earmark ban may have had a heterogeneous impact across legislators. Members of the House and Senate Appropriations Committees who control the appropriations (and thus the earmarking) process may have been able to use their influence to get around the ban. It is also possible that legislators on other committees might have altered authorizations bills to disproportionately fund programs that benefit their home districts at the expense of others.

Statements made by legislators shortly after the 2011 ban implied a sense of skepticism regarding its impact.[7] Moreover, critics in the media and elsewhere have since argued that the 2011 earmark ban has merely exacerbated the lack of budgetary transparency in Washington by allowing members of Congress to direct federal funds to their home districts in ways that are impossible to track (Lipton and Nixon, 2010), (Nixon, 2012), (Cuellar, 2012), (Gold, 2015), (Dawson and Kleiner, 2015), (Strand

this can be found in the recently released report on unobligated balances of earmarks for Department of Transportation funds to states. See: AASHTO, 2012 and AASHTO, 2016.

[4]See Section II. below for a description of the earmark reforms leading up to the 2011 ban.

[5]CAGW uses a different definition in classifying earmarks than the OMB. Also, the CAGW earmark data do not allow for earmarks to be traced to their actual recipients and thus cannot be included in the analysis below. They do, however, provide a way to observe the general trend in earmarks over a longer time period considering that the OMB data were collected only for 2005, 2008-2010.

[6]Lettermarking operates in much the same spirit as earmarking; it is a threat to agencies to fund particular projects by a legislator. Since earmarks were generally not written into law but in the accompanying appropriations conference reports, they were technically not legally binding. However, agencies who would deny funding them risked having their budgets cut the following fiscal year. See: Dawson and Kleiner (2015).

[7]For example: "*The appropriators are going to be okay...[W]e know people in agencies.*" -Jim

and Butcaru, 2016).

While a recent survey shows that public opinion continues to support the ban (Egger, 2016), a proposal to exclude Army Corps of Engineers projects from the earmark ban enjoyed bi-partisan support in a September 2016 hearing by the House Rules Subcommittee (C-SPAN, 2016).[8] If the 2011 earmark ban prevented legislators from directing spending to their home districts, then the outcome of the current debate may have a non-trivial impact on the overall distribution of federal funds.

To date, there has been no work documenting whether the earmark ban of 2011 actually restricted the ability of legislators to allocate funds to their home districts. In an analysis of earmarks in intergovernmental grant programs, I find no evidence that the 2011 earmark ban impacted the distribution of federal competitive grants to local governments. My results suggest that for local governments, federal grants began falling in more heavily earmarked congressional districts relative to less heavily earmarked congressional districts before the ban of 2011 took effect.[9] A separate analysis of federal grants to state governments, however, suggests that the 2011 ban was effective and resulted in a decline of between 1.9 and 3.9 percent in grants for each percentage point in grants earmarked. These results are robust to using alternative measures of the percent of grants earmarked.

As a stylized fact, earmarks haved frequently distributed large sums to individual recipients. I document that the average earmark awarded to a local government in 2009 was $517,000. This is a significant amount considering that own-source revenues of the typical local government were $17.2 million around the same time.[10]

Given that earmarks represent geographically concentrated benefits, an additional question is: Does earmarking create inequalities across demographic groups? While research on earmarks documents strong correlations between legislator attributes and earmarks (Knight, 2008), (Boyle and Matheson, 2009), (Crespin et al., 2009), (Engstrom and Vanberg, 2010), (Clemens et al., 2015), no existing literature addresses the question of whether earmarking benefits certain demographic groups at the expense of others. I find that in 2009, the top 5th percentile of congressional districts in terms of personal income per capita received 6.1 percentage points more in earmarks as a percent of total federal grants relative to the bottom 5th percentile of congressional districts, and that this difference is statistically significant at the 99 percent level. Interestingly, this difference is far larger than the difference between districts

Moran (D-VA). See also: Strauss (2011), Hernandez (2011).

[8]The proposal was put forth by Tom Rooney (R-FL) who stated: "*...we can't do anything for our own constituents that pay federal tax dollars and expect us to get things done for them.*" (C-SPAN, 2016).

[9]As explained in more detail below, I focus on competitive grants as opposed to formula grants because these programs were most commonly earmarked. I analyze intergovernmental grants because governments can be pinpointed to a fairly precise geographic area, while firms and non-profits often have operations in locations remote from their headquarters. I also include federal contract awards.

[10]Data on earmarks come from the Office of Management and Budget (OMB) earmark database. As discussed below, these numbers exclude earmarks that were part of the American Recovery and Reinvestment Act (ARRA). Data on local government revenues come from the 2007 Census of Governments. For comparison, average own-source revenues were just under $18 million as of the

represented by more powerful legislators relative to those represented by less powerful legislators. Because wealthier districts have larger tax bases with which to fund public infrastructure projects, this evidence suggests that the earmark ban helped to increase equality in the distribution of federal funds.

The remainder of the essay is structured as follows: Section II. describes the background on the earmark reforms and ban, and the data, Section III. presents the empirical model, including results, and Section IV. concludes.

II. The Impact of the 2011 Earmark Ban

II.A. Background

Before the 2011 ban, earmarks were used by legislators in both the House and the Senate to override the geographic allocation of federal funds made by agencies. Figure 2.1 displays data from CAGW that document a rapid decline of earmarks to zero in 2011, and consistently low levels thereafter.

Over the period of 2006 to 2010, both the House and the Senate enacted a series of reforms aimed at providing a greater degree of transparency to the earmarking process. Most notable were the 2009 committee-led transparency reforms of the House Appropriations Committee (HAC) and Senate Appropriations Committee (SAC) that required all earmark requests, not just those funded, to be posted on members' websites as opposed to committees' websites. The HAC reforms were more stringent than the SAC reforms because they mandated that all requested earmark information be tabulated by subcommittee bill. The HAC also imposed an additional requirement that agencies be given 20 days to review earmark requests in order to "check that the proposed earmark is eligible for funding and meets goals established in law."[11,12] Following the GOP victories in the 2010 mid-term elections, Republican-led efforts to ban earmarks ultimately resulted in both chambers adopting moratoriums.[13]

While it is clear that some politicians used banning earmarks as a campaign platform, an obvious question is to ask why legislators would give up their earmarking power in the first place, especially in light of the fact that this ability allowed the legislative branch an advantage over the executive branch.[14] Given that the ban and the transparency reforms leading up to it were self-imposed, the 2011 earmark ban presents a conundrum for the theoretical and empirical literature on distributive politics.[15] A plausible explanation is that the ban was a move to placate public unrest

2012 Census of Governments.

[11]See: U.S. House Committee on Appropriations (2009).

[12]See (Doyle, 2011a) for an encyclopedic description of the earmark reforms over the 2006-2010 period.

[13]See White (2014) for a complete description of the proceedings around the 2011 earmark ban.

[14]Earmarking has been practiced by both the legislative and executive branches, thus the earmark ban can be seen as a shift in the balance of power towards the executive branch.

[15]For example, Senator McCain. See: Doyle (2011a).

fomented by increased budget deficits (White, 2014).[16,17]

II.B. Relevant Literature

Despite the pervasiveness of earmarking from the early '90s up until the time of the ban, little is known about their distribution. The exception is a literature on the distributional implications of legislator bargaining that predicts that legislators with seniority, affiliation with the majority party, or appointment to important committees will enjoy an advantage over their peers in terms of increased budgetary shares (Weingast, 1979), (Baron and Ferejohn, 1989), (Knight, 2005), (Albouy, 2013).

Knight (2005) finds that members of the House transportation authorization committee were able to successfully earmark projects to their home districts to a greater extent than non-members. His work specifically utilizes the practice of earmarking to identify measurable benefits accrued to powerful legislators. Other work has shown correlations in the size and number of earmarks and legislator characteristics such as party affiliation and seniority, electoral vulnerability, and committee appointments (Balla et al., 2002), (Knight, 2005), (De Figueiredo and Silverman, 2006), (Knight, 2008), (Boyle and Matheson, 2009), (Crespin et al., 2009), (Engstrom and Vanberg, 2010), (Clemens et al., 2015). Although a large number of members often receive at least one earmark, members of the House Appropriations Committee (HAC) and Senate Appropriations Committee (SAC) have direct control over the process and exercise increased influence (De Figueiredo and Silverman, 2006), (Clemens et al., 2015).[18]

Additional literature finds benefits other than earmarks to regions represented by powerful legislators, such as additional vote shares (Levitt and Snyder, 1995), (Evans, 2006), increased personal income growth rates (Levitt and Poterba, 1999), larger PAC contributions (Loucks and Bennett, 2011), and increased total federal grants (Ansolabehere and Snyder, 2006), (Berry et al., 2010), (Albouy, 2013), (Alexander et al., 2016), as well as non-budgetary outcomes, such as longer operating times before closure for failing banks (Bennett and Loucks, 1996), increased access to swine flu vaccines (Ryan, 2014), and decreased approval times for Medicaid waivers (Helland, 1999).[19]

A large literature also documents the role political institutions play in economic

[16]In a theoretical model (see Theoretical Appendix below), I show how a shift in "constituent preferences" can lead legislators to optimize by self-imposing an institutional constraint limiting the proposer's ability to allocate shares of the federal budget across districts.

[17]Put another way, legislators can be thought of as behaving in a way to maximize expected utility over their entire career, not just over a single appropriations cycle (Weingast, 1979), (Diermeier et al., 2005).

[18]For example, Knight (2005), in an examination of transportation authorization bills from 1991 and 1998, found that 46 percent of districts received earmarks in 1991, while 337 members of the House voted against stripping the 1998 bill of earmarks. He uses both the number of districts that received earmarks and the number of representatives who voted against stripping the earmarks from the bill as measures of the "size of the coalition."

[19]In a similar vein, Washington (2008) finds that legislators with daughters tend to vote more

policy more generally, including the impact of gubernatorial term limits and party affiliations (Besley and Case, 1995), (Fredriksson et al., 2013), voter preferences for government size (Crowley et al., 2016), voter religious preferences and interest group pressure (Halcoussis and Lowenberg, 2015), and the electoral mechanism by which voters choose economic policies (Lee et al., 2004).[20]

II.C. Data

There has been no empirical test of the impact of the earmark ban on the distribution of federal grants. This essay intends to fill that gap in the literature by analyzing federal grants to state and local governments over the 2007 to 2014 fiscal year period.

In order to test the impact of the earmark ban, I use data on federal project (competitive) grants and contracts to state and local governments. I exclude grant types other than project grants, such as formula grants, since these are generally not earmarked (Kirk et al., 2011). The website USAspending.gov is a clearinghouse that records the transfer of grants, contracts, and other assistance between the Federal Government and recipients as categorized by type, including for-profit, nonprofit, and governmental.

A roadblock to studying the impact of the earmark ban is the difficulty of matching earmarks to geographic areas.[21] I focus on state and local governments because they can be located to a particular geographic area. Including for-profit and nonprofit firms would be misleading as they are often headquartered in different areas than where their operations are carried out. I also exclude grants and contracts that were part of the American Recovery and Reinvestment Act of 2009 (ARRA).[22] The inclusion of these funds might lead to a mechanical drop in funding after 2010 that would bias the effect of the ban. For state government grants, I also exclude grants to state controlled institutions of higher education. It is unclear whether these grants would be targeted by legislators attempting to benefit the state as a whole, or the specific district where the institution is located.[23]

I use data on earmarked grants and contracts from the Office of Management and Budget's (OMB) earmark database. These data are available for 2005 and 2008-2010, but recipient geographic information is not available for 2010. The OMB data are advantageous over nonprofit groups' earmark databases since the OMB data rely on agency reports regarding the location of the actual recipients of the funds rather than relying on project descriptions in bill texts.[24] As shown in Figure 2.1, the OMB and

progressively.

[20]For an overview of this literature, see: Besley and Case (2003).

[21]Knight (2005) matches earmarks to congressional districts by the project descriptions in transportation authorization bills.

[22]This act funded approximately 13 percent of competitive grants to local governments in 2009.

[23]De Figueiredo and Silverman (2006) show strong correlations between earmarks to academic institutions and membership on the HAC.

[24]See: OMB, 2007.

CAGW earmark definitions vary.[25] Unfortunately, the OMB database was never updated to reflect the recipient information for fiscal year 2010 earmarks. Also, while the OMB earmark data provide the agency, bureau, and account information for each earmark, along with a short description, they do not provide the specific grant program that the earmark came from. Unless the account title happens to be similar enough to the program title, such as the Federal Transit Administration's (FTA) "Capital Investment Grants" program, then there is no systematic way to determine the earmarked program. However, virtually all earmarked grants are for competitive grant programs, since formula grant programs generally do not deviate from the formulas prescribed in the authorization bill.[26] For this reason, I matched the earmarked grants with only competitive grants and contracts from the USAspending.gov data by the listed recipient's city before finally matching them to congressional districts.[27]

Earmarks awarded to governments in cities split by multiple congressional districts pose an additional challenge. Since the political reality is that earmarks are intended by their sponsors to benefit their own congressional districts in particular, at first glance, an attractive approach would be to simply allocate 100 percent of such earmarks to the district of the earmark's sponsor. However, in order to calculate the percent of federal grants earmarked for each district, I would then need to arbitrarily allocate 100 percent of some federal grants to single congressional districts. Because I do not observe which individual grant transactions were earmarked, there would be no way to allocate these federal grants in a systematic way. Thus, where cities were split between more than one district, I weighted the grants and earmarks by population and split them into the different districts.[28] As a robustness check (discussed below), I estimated an alternative model where all earmarks and grants split by multiple congressional districts were dropped.

For the local (state) analysis, I disaggregated the data into district-agency (state-agency) observations. I used the top 16 agencies in terms of funding to local (state) governments in the year 2009 which captured over 90 percent of the grants to local (state) governments. I then matched each subcommittee of the HAC (SAC) with the agencies under its jurisdiction and split each district (state) observation into district-agency (state-agency) observations. Finally, I computed the percentage of each district or state-agency funding amount that was earmarked in 2009 in the following

[25]The CAGW definition requires that a request be categorized as an earmark if it is "Requested by only one chamber of Congress; Not specifically authorized; Not competitively awarded; Not requested by the President; Greatly exceeds the President's budget request or the previous year's funding; Not the subject of congressional hearings; or Serves only a local or special interest." (CAGW, 2016). The OMB defines an earmark as: "funds provided by the Congress for projects, programs, or grants where the purported congressional direction (whether in statutory text, report language, or other communication) circumvents otherwise applicable merit-based or competitive allocation processes, or specifies the location or recipient, or otherwise curtails the ability of the executive branch to manage its statutory and constitutional responsibilities pertaining to the funds allocation process."(OMB, 2009). For a thorough description of various datasets on earmarks, see: Doyle (2011a).

[26]For examples of this, see: Kirk et al. (2011).

[27]See the Data Description for more information on how I do this.

[28]Since the provided congressional district codes were generated by zip codes, relying on the pro-

way:

$$\%earmarked_{ia} = \frac{earmarks_{ia,t=2009}}{grants_{ia,t=2009}} \times 100\%$$

The letter i indicates either the district (d) or the state (s) depending on whether the data are for local or state governments, while a denotes the agency. This variable measures the impact of the earmark reforms across geographic areas. As a robustness check, I estimated alternative specifications with $\%earmarked_{ia}$ defined using earmark and grant data from 2005 and 2008.

Table 2.1 displays the wide variation in earmarks for local governments by district-agency observation. A majority of districts received earmarks from the Department of Justice (DOJ), with the average earmark representing 43.8 percent of total DOJ funding to that district. Earmarks in Department of Housing and Urban Development (HUD) and Department of Transportation (DOT) programs were also widely distributed, with over 1 in 4 districts receiving an earmark from those agencies, but they represented smaller proportions of the total grants to each district. By contrast, only 4 districts received earmarks in Department of Commerce (DOC) programs. However, all but 61 districts received earmarks from at least 1 agency.[29]

Table 2.2 displays the agency breakdown for the state data.[30] The DOT had the highest average for the percent of grants earmarked at 48.2 percent of grants on average and its earmarks were spread among 31 states. This is not surprising, considering the highly political process of allocating transportation funding (Knight, 2002), (Knight, 2005), (Kirk et al., 2011).

For the local government data, 223 observations had earmark percentages in excess of 100 percent, while for the state government data, 79 observations had earmark percentages greater than 100 percent. I attribute this to the earmark being either never or only partially funded. Due to the late passage of the 2009 appropriations act, some delay might be expected in terms of the timing of 2009 earmarks being funded. I thus drop observations that had earmark percentages greater than 100 percent because I cannot be sure that they were funded at all.[31] Additionally, some degree of under or unfunded earmarks would be expected considering that earmarks often override agency preferences.[32]

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vided congressional district code alone would be inappropriate given that the recipient's location may spill over into multiple congressional districts. See the Data Description below for more information.

[29]Most Department of Homeland Security (DHS) earmarks appeared to be funded by the ARRA, the majority of which were administered by the Federal Emergency Management Agency (FEMA) to local governments for port and transit security and for fire station construction. Including these earmarks in the analysis would bias the results toward the ban having an effect, as virtually all of the ARRA funding had been obligated by the end of FY2010.

[30]ARRA earmarks to state governments were concentrated primarily in Department of Energy (DOE), EPA, and DOJ grant programs.

[31]The 2010 appropriations were enacted on December 16th, so there is less of a concern that those earmarks (unobserved) would spill over into 2011.

[32]An example of this are the recently released data on "unobligated" earmarks for transportation

As a result of dropping observations with earmark percentages over 100 percent, the average earmark for the analysis ($478,700) was slightly lower than the average noted above ($517,000) due to the fact that observations with earmark percentages over 100 percent had larger earmark amounts than those with earmark percentages 100 percent and less, on average. The results for both the local government data and the state government data (detailed below) are not sensitive to including observations with earmarked percentages greater than 100 percent, with the exception of several extremely large values.

Tables 2.3 and 2.4 display summary statistics for the congressional district and state-agency observations respectively. Districts with earmarks tended to receive more federal grants, while the average percent of federal grants earmarked for those that received earmarks was 26.9 percent. In terms of the congressional variables, it is not surprising to see that districts that received earmarks also had longer tenured Democrats in both the House and the Senate and were twice as likely to have membership on the relevant HAC subcommittee.

The 2009 Omnibus Appropriations Act, not signed into law until March 11th, 2009, passed the House with a 57 percent majority split largely along party lines. Just over 11 percent of district-agency observations received earmarks, however most districts (374) received at least 1 earmark from some agency. This implies a large coalition and the possibility of a phenomenon known as "vote buying," where members of the HAC (or SAC) give earmarks to non-members in exchange for votes supporting appropriations bills (Alexander et al., 2016).[33] Districts that received earmarks also had higher population densities than those that did not receive earmarks, reflecting the fact that smaller districts in terms of geographic size were more likely to receive earmarks and the fact that at-large states were less likely to receive earmarks. Districts that received earmarks also received more project grants from the ARRA than those that did not.

For the state-agency data, the differences are less distinct due to the higher level of aggregation. The earmark group contained larger states in terms of population, income per capita, and gross state product (GSP), in addition to higher unemployment rates and lower poverty rates. Conditional on receiving a positive amount of earmarks, earmarks made up 24.8 percent of grants for the average state-agency observation.

There were also similar differences for the congressional variables as with the local government data: earmark receiving states were more likely to have longer tenured Democrats than Republicans, reflecting the Democrat majority in the Senate for 2007-2014. The SAC subcommittee membership variable differed in a similar way between the No earmark and Earmark groups as the HAC subcommittee variable did for the local government data. Unlike the local government data, state-agency observations with earmarks received less in total federal grants than those without, but this difference was not statistically significant from zero.

As noted above, earmarks were reallocations, not extra amounts of funds. The

funding to states (AASHTO, 2016).

[33]Knight (2005) uses a similar interpretation of districts receiving earmarked transportation

process of earmarking was controlled entirely by members of the HAC and SAC who were required to abide by the 302(b) allocations resulting from each year's congressional budget resolution.[34] Instead of simply increasing the amount of funding to programs they favored, the appropriators were forced to reallocate funds, effectively reordering agency priorities. To the extent that earmarks actually did conflict with agency priorities, an agency would have been limited in its ability to prioritize funding in line with grant program objectives.

Several important changes took place from the 111th to 112th Congresses that may influence the analysis. The first was the change in the majority party in the House of Representatives. This shifted the balance of power in Congress towards the Republicans and, most importantly for my analysis, lead to a replacement of committee chairs with members of the Republican Party. Controlling for party affiliation of House Members will thus be important. The second was the major reauthorization bill (MAP-21) which reauthorized grant programs for the DOT. This act distributed more funds through formula programs and fewer funds through competitive grant programs (Kirk et al., 2012). I control for the passage of MAP-21 with DOT-year interacted dummy variables to ensure that I am not capturing mechanical changes in relative grant levels due to altered authorization legislation.

III. Empirical Analysis

The main challenge in estimating the impact of the 2011 earmark ban is the possibility that preceding (earmark reforms prior to 2011 and the ARRA) or contemporaneous (elections in Congress) events may confound the analysis. To mitigate this concern, I adopt an econometric approach that allows for the impact of the earmark ban to be estimated in a flexible way that reveals whether an event in any year prior to or following 2011 may have impacted relative grant levels between more and less heavily earmarked regions. This methodology is analogous to the approach taken by Finkelstein (2007) and Finkelstein and McKnight (2008) who estimate the impact of the introduction of Medicare on various health outcomes using pre-existing geographic variation in elderly insurance rates.

My identification strategy takes advantage of the wide geographic variation in the extent of earmarking across districts, states, and agencies as measured by the percent of federal grants earmarked in the 2009 Omnibus Appropriations Act. In order to utilize this variation, however, earmarks and grants must be disaggregated to the local and state levels individually. An aggregate analysis where both local and state earmarks and grants were lumped together at the state level, for example, would mask extensive variation across agency-district observations. Similarly, disaggregating state government grants to the district level is not possible since state level grants

projects versus those receiving none.

[34] 302(b) allocations cap the amount that appropriations subcommittees may appropriate in a given fiscal year.

benefit states as a whole.[35]

The strength of the local government analysis is that it allows me to capture the cross sectional variation in earmarking across congressional districts driven largely by members of the U.S. House of Representatives.[36] The state government analysis allows me to capture longitudinal variation that the local government analysis cannot due to redistricting changes that took effect in 2013. This limits the local government analysis to end in 2012, while the state government analysis runs to 2014.

Due to the reforms that lead up to the 2011 ban, a change in the difference in grants between earmark and non-earmark districts (or states) may have occurred earlier than 2011. I thus look for a change in the pre-2011 ban trend in the relative grant levels between earmark districts and non-earmark districts. I interact the impact of the earmark ban ($\%earmarked_{ia}$) with year dummies, allowing me to observe changes in the differences between the earmark and non-earmark groups over time. The identifying assumption is that without the ban, *trends* in relative grant levels would have continued unchanged. The year-interacted trend approach is preferable to a simple differences-in-differences approach because it allows me to avoid making any ex ante assumptions about when a change might occur. The reforms before the ban might have had more of an impact than the actual ban, masking the fact that the ban may have only been a superficial change. While a simple differences-in-differences analysis would only capture the tendency for earmark districts to change in grants more than non-earmark districts, by looking for a change in the relative trends around the 2011 earmark ban, I am able to look for a reversal in a pre-existing, time-varying relationship.

Table 2.5 displays a comparison of the means in log federal grants by group and year. For simplicity, the treatment effect here is defined as a binary indicator rather than a continuous variable as it is in the formal regression model. The rows labeled "DnD 1" and "DnD 2" illustrate estimation of the treatment effect under two different counter-factual assumptions. The row labeled "DnD 1" in Table 2.5 shows the resulting treatment effect to be negative from assuming that the level of the differences between the earmark and non-earmark groups would have continued from 2011 on (the "post" period). However, given a counter-factual assumption that the *trend* in the differences would have continued in the post period, the resulting treatment becomes positive. This illustrates the importance of choosing an appropriate counter-factual assumption.

As noted above, members of the HAC and SAC controlled the earmarking process by dividing their subcommittees' 302(b) allocations across appropriations accounts and by including specific requests in accompanying report language. It is possible that members of the HAC and SAC would have been able to direct funds to their

[35]As a robustness check, however, I estimate such a specification where local and state level earmarks and grants are aggregated together at the state level (see below).

[36]Among earmarks to local governments, 75 percent had at least 1 House member as a sponsor, while just over 60 percent had at least 1 Senate member as a sponsor. Recall from Table 2.3 that earmark districts were twice as likely to have representation on a relevant HAC subcommittee than non-earmark districts, while they were 50 percent more likely to have representation on the relevant

home districts despite the ban due to their close proximity to the appropriations process. I thus test for whether the effect of the earmark reforms and ban was different for members of the HAC and SAC by including interaction terms in secondary specifications.

III. A. Local Government Analysis

I estimate the following equation to test for the impact of the earmark ban on federal grant receipts by local governments:

$$\begin{aligned}\ln(grants)_{adt} = \alpha_{ad} \times 1(district_d \times agency_a) + \delta_t \times 1(year_t) \\ + \sum_{t=2007}^{2012} \lambda_t \%earmarked_{ad} \times 1(year_t) \\ + \sum_{t=2007}^{2012} \rho_{dt} 1(DOJ) \times 1(year_t) + X_{adt}\beta + \epsilon_{adt} \end{aligned} \tag{2.1}$$

The dependent variable is the log of total federal grants to local governments by agency a, in district d, and year t. I use the log of federal grants as opposed to the level since using the level would constrain the effect on grants to be the same within each year. This would not be appropriate considering the large variation in grant amounts across districts. The district-agency effects ($1(district_d \times agency_a)$) control for the cross-sectional differences in grants to districts by agencies.[37] The year effects ($1(year_t)$) capture the variation in large, national changes in grants. I am not able to include observations past 2012 due to congressional redistricting that took effect in 2013.

The coefficients of interest are the λ_t's which measure the interaction of the year effects with the treatment variable, $\%earmarked_{ad}$. Their trend shows the time-varying differences in grants between districts where the ban had more of an effect versus districts where it had less of an effect. If the ban had no impact, then the trend in the λ_t's should be the same before and after 2011. Due to the reforms of 2008 and 2009, it is highly possible that breaks may occur in earlier years. Estimating the impact of the ban by averaging the pre and post periods would not allow the data to reveal if prior reforms caused breaks instead of the ban.

I also include in the analysis X_{adt}, a vector of district-year variables including the log of grants funded by the ARRA, tenure-party interactions for both the House and the Senate, and whether the district was in a state with a senator on the relevant SAC subcommittee. The results are unchanged without including these control vari-

SAC subcommittee.

[37]The fixed effects are important in controlling for time-invariant differences such as the fact that virtually all transit grants go to urban areas and, more generally, that particular programs are targeted to particular socioeconomic groups.

ables.[38,39]

I also include year dummy-agency interactions for the DOJ ($\sum_{t=2007}^{2012} \rho_{dt} 1(DOJ) \times 1(year_t)$). As Table 2.1 shows, the DOJ was an outlier in terms of earmark distribution. Estimations of Equation 2.1 without the DOJ yield similar coefficients as they do with including the DOJ, except that the λ_t for 2007 is negative instead of positive. The reason for this is because despite the 2007 earmark moratorium which effectively banned earmarks for all but Department of Defense (DOD) appropriations, some earmarks from FY2006 were funded again in FY2007.[40] A DOJ Office of Justice Programs data search shows $21.8 million in earmarks for FY2007, over $4 million of which were carry overs from FY2006.[41,42]

Figure 2.2 plots the λ_t coefficients estimated by OLS with 95 percent confidence intervals displayed by the bars, while Table 2.6 displays the same coefficients and confidence intervals as well as results for Equation 2.2 (discussed below) along with the computed values for the change in trends over different time periods.

Figure 2.2 shows that federal grants were already declining in earmarked districts relative to non-earmarked districts before 2011, and that this trend continued unchanged through 2011. Had the earmark ban of 2011 impacted relative grant levels between more and less heavily earmarked districts, the graph would show a break in the trend around 2011. The graph thus implies that the 2011 earmark ban had no impact on the distribution of federal grants.

Based on Figure 2.2, a simple differences-in-differences approach would have found a strong negative impact from the earmark ban on federal grants. This is easy to see in the graph in that by defining the pre-period to be 2009-2010 and the post period to be 2011-2012, the result would have been that the ban had a negative impact equal to the difference between the average of λ_{2009} and λ_{2010} and the average of λ_{2011} and λ_{2012}.

I perform statistical tests to corroborate visual impressions from the graph. Formally, I test whether the n-year change in λ_t after the earmark ban is the same as the n-year change in λ_t from before the earmark ban ($\Delta_{n,2011}$). The impact of the

[38]Berry et al. (2010) and Alexander et al. (2016) lag a similar set of congressional variables one period to reflect the difference between calendar and federal government fiscal years, however, my results are not sensitive to either specification and given that the 2009 Omnibus Appropriations Act was enacted late (March of FY2009), I include the contemporaneous congressional variables.

[39]Albouy (2013) shows that states with Republican representation tend to receive more in defense and transportation spending, while those represented by Democrats receive more in education and urban development. Additionally, Beland and Oloomi (2016) show that Democratic governors allocate more of their states' spending to health related uses than Republican governors.

[40](Sec. 112) "Declares that any language specifying an earmark in a committee report or statement of managers accompanying an appropriations Act for FY2006 shall have no legal effect with respect to funds appropriated by this Continuing Resolution" (U.S. Congress, 2007). Evidently, this did not prevent all earmarks, even those in FY2007 appropriations bills enacted after the earmark moratorium.

[41]See: Department of Justice Programs (2007).

[42]I also experimented with including year×agency sets of dummy variables for each agency individually, and the only agency that made a difference in the results was the DOJ.

earmark ban in the first year is computed in the following way:

$$\Delta_{1,2011} = (\lambda_{2012} - \lambda_{2011}) - (\lambda_{2011} - \lambda_{2010})$$

As Table 2.6 shows, the test fails to reject the null hypothesis that the 1 year change in λ_t before and after the ban is statistically significant from zero.[43]

I also test whether members of the HAC were able to subvert the earmark ban somehow due to their power over appropriations. I interact dummies for district-agency observations having a representative on the agency-relevant HAC subcommittee with year dummies and again with the $\%earmarked_{ad}$ variable:

$$\begin{aligned}\ln(grants)_{adt} = {} & \alpha_{ad} \times 1(district_d \times agency_a) + \delta_t \times 1(year_t) \\ & + \sum_{t=2007}^{2012} \lambda_t \%earmarked_{ad} \times 1(year_t) + \sum_{t=2007}^{2012} \gamma_t HACsubcom \times 1(year_t) \\ & + \sum_{t=2007}^{2012} \psi_t \%earmarked_{ad} \times HACsubcom \times 1(year_t) \\ & + \sum_{t=2007}^{2012} \rho_{dt} 1(DOJ) \times 1(year_t) + X_{adt}\beta + \epsilon_{adt} \end{aligned} \tag{2.2}$$

Figure 2.3 shows that the HAC subcommittee group interaction coefficients (ψ_t) are largely insignificant, indicating that the impact of the ban was no different for members of the HAC than the average.[44] This is not surprising, considering that the chairs of the HAC and SAC led the earmark reforms of 2009.

The results are virtually unchanged without the inclusion of the control variables.[45] The coefficient on the dummy for SAC subcommittee representation is insignificant and negative, most likely the result of the lack of variation over time. The Republican tenure variables for both the House and the Senate show positive coefficients significant at the 90 and 95 percent levels respectively, while the Democrat tenure variables are negative and insignificant. This is most likely due to the fact that during the 2010 midterm elections, Democrats lost a particularly large number of seats in both the House and the Senate, despite retaining control of the Senate. The coefficient for the ARRA log grant variable is positive and highly significant, indicating that districts that received more ARRA funding also received more non-ARRA funding.

III. B. State Government Analysis

Aggregating to the state-agency level allows me to look further beyond the earmark ban for an impact. I estimate a similar specification as before:

$$\ln(grants)_{ast} = \alpha_{as} \times 1(district_s \times agency_a) + \delta_t \times 1(year_t)$$

[43]Note that the numbers in Table 2.6 in the parentheses below the 1 year changes are p-values, not standard errors.

[44]The results are robust to using the lag of HAC membership instead of the contemporaneous measure.

[45]However, an F-test for joint significance indicates that these variables are significantly different

$$+ \sum_{t=2007}^{2014} \lambda_t \%earmarked_{as} \times 1(year_t)$$
$$+ \sum_{t=2007}^{2014} \rho_t 1(DOT) \times 1(year_t) + X_{ast}\beta + \epsilon_{ast} \quad (2.3)$$

The dependent variable is the log of total federal grants to state governments by agency a, in state s, and year t. I include state-agency effects ($1(state_s \times agency_a)$) and year effects ($1(year_t)$), in addition to a vector of control variables (X_{ast}) containing tenure-party interactions for the senate, tenure-party interactions for the average of all House members within each state, and the percent of a state's representatives in the House on the HAC. I include state level measures of state GSP, population, the unemployment rate, the poverty rate, and personal income per capita.

I also include year-agency interacted dummies for the DOT. This is to control for the impact of the Moving Ahead for Progress in the 21st Century Act (MAP-21), an authorization that shifted funding away from competitive grant programs and towards formula grant programs for the 2013-2014 fiscal years (Kirk et al., 2012). As expected, the coefficients for the 2013 and 2014 DOT interactions (ρ_{2013} and ρ_{2014}) are negative and statistically significant from zero at the 95 percent level.

I estimate Equation 2.3 by OLS. Results are displayed in Figure 2.4 and Table 2.7. These results suggest that the earmark ban did have an impact. From 2008, after the 2007 earmark moratorium, to 2011, funding in earmarked districts was growing at a faster rate than funding in non-earmarked districts, but after 2011 this trend reversed.

I tested for differences in the 1 year, 2 year, and 3 year changes around the 2011 earmark ban. For a 1 percentage point increase in $\%earmarked_{as}$, federal grants fell by 1.9 percent in the first year, by 3.5 percent over a 2 year window, and by 3.8 percent over a 3 year window. Because of different reference points, these numbers are not directly comparable. In order to compare them, the calculation must be:

$$\Delta_{2,3} = (\lambda_{2014} - \lambda_{2011}) - (\lambda_{2011} - \lambda_{2009}) \quad (2.4)$$

Comparing Δ_2 with $\Delta_{2,3}$ suggests that the impact of the ban increased over time: from 3.5 percent to 3.9 percent.

In a second specification (equation not shown), I also included an interacted term for the SAC subcommittee with year dummies, and an additional term for the SAC subcommittee interacted with $\%earmarked_{as}$ and year dummies. The coefficients for the interaction terms are plotted in Figure 2.5. As with the HAC subcommittee interactions, the coefficients are not statistically different from zero. I thus conclude that members of the SAC subcommittees, like their House counterparts, did not evade the earmark ban.

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from zero.

III. C. Robustness Checks and Discussion

One possibility is that the above results may have been driven by an individual federal agency's idiosyncratic behavior. As a robustness check, I thus repeatedly estimated all of the specifications discussed above while dropping a different agency at a time, and the results were very similar.

I also re-estimated Equation 2.1 excluding all earmarks and grants to cities that were split by multiple congressional districts. The omission of these earmarks and grants yielded very similar results as well.

Another concern is that the results highlighted above might have been a statistical artifact arising from the year in which the $\%earmarked_{ia}$ variable was measured. To address this, I estimated identical specifications with earmark data from 2005 and 2008 appropriations legislation instead of the 2009 Omnibus Appropriations Act.[46]

Figures 2.6 and 2.7 show similar trends to Figure 2.2, while Figures 2.8 and 2.9 show similar trends to Figure 2.4. In addition, specifications with interacted HAC and SAC effects using the 2005 and 2008 earmark data (not shown) were similar to the 2009 specifications as well. These results provide additional evidence that the earmark ban did not impact the distribution of grants to local governments, but did impact the distribution of grants to state governments and, more importantly, that these results were not driven by the particular year used to measure the $\%earmarked_{ia}$ variable.

A final robustness check consisted of estimating the state government model with the local government earmarks and grants added to the state government earmarks and grants. Figure 2.10 shows that the coefficients were similar in magnitude to the state government results, but that the trends before and after 2011 were flat rather than up and down (respectively). Clearly, this would lead to a smaller estimated effect of the ban than the state analysis showed driven by the fact that the local government analysis displayed a negative trend throughout the time period.

As the results show, the earmark ban did not impact the distribution of federal grants to local governments, while it did impact the distribution of federal grants to state governments. This presents somewhat of a puzzle, as the ban was instituted in both the House and the Senate during the same time period. A plausible explanation lies in the fact that before the ban, restrictions were enacted in the House that were not enacted in the Senate. Although the ban was equally enforced in both chambers of Congress, the events that took place before 2011 varied across the House and the Senate in one particularly important way: the House instituted stricter reforms prior to the 2011 ban than did the Senate.

Specifically, in 2009, both chambers' appropriations committees began requiring that members post earmark requests on their websites.[47] The HAC, however, instituted an additional reform that mandated that agencies have 20 days to review each earmark request and "check that the proposed earmark is eligible for funding and

[46]These appropriations acts are the Consolidated Appropriations Act of 2005 and the Consolidated Appropriations Act of 2008.

[47]This reform was not uniformly adhered to, with some legislators posting information and others

meets goals established in law."[48] It is possible that it was this additional reform imposed in the House and not the Senate that initiated a change in the House, thus impacting the distribution of federal grants to local governments but not to state governments.

III. D. Distributional Effects of the Earmark Reforms

I aggregated local government earmarks and grants to the district level and performed T-tests of the equivalence of means of the average $\%earmarked_d$ across demographic groups as defined by data from the 2010 Decennial Census. For this analysis I used earmarks and grants from the 2009 Omnibus Appropriations Act, since this was the closest year to the 2010 Decennial Census.

Table 2.8 displays the means across demographic groups split into the 95^{th} and 5^{th} percentiles for each group. T-tests for the equivalence of means show statistically significant differences in the mean level of $\%earmarked_d$ only for the income per capita groups. The top 5 percent of districts in terms of income per capita received 6.1 percentage points more in earmarks as a share of total grants than the bottom 5 percent. This difference is statistically significant at the 99 percent level and represents an average amount of additional funding of $3.31 million in federal grants to local governments going to rich congressional districts over poor districts that would not have been awarded in 2009 without earmarks. In contrast, I find only a small difference in the means of the percent earmarked between districts with members on the HAC and those without. On average, HAC districts received only 0.39 percentage points more in earmarks as a percent of grants than non-HAC districts and this difference is not statistically significant from zero.

Earmarking thus impacted equality between rich and poor districts by substantially more than it did between HAC and non-HAC districts. In light of the fact that the existing distributive politics literature on earmarks documents the relative differences in earmarks between different geographic areas defined exclusively by legislator characteristics such as committee membership, this finding represents an important contribution to the distributive politics literature. Lastly, I find no evidence of differences across other demographic groups in terms of the $\%earmarked_d$ variable.

Taken together, these findings imply that earmarking, at least in 2009 just before the ban, benefited the rich relative to the poor, which makes intuitive sense considering that rich districts are more likely to have wealthy donors who may be willing to trade campaign contributions for specific projects. Alternatively, local governments in rich districts may be more likely to be able to afford to hire lobbyists.

These results imply that the earmarking system distorted the Federal Government's ability to progressively redistribute federal funds across communities through grants to local governments. To the extent that future earmark reforms, such as those being discussed as of September 2016, are effective in loosening the ban on

not (Doyle, 2011a).

[48] See: Congress, House, Committee on Appropriations, "Press Release: Pelosi, Hoyer, and Obey

earmarking, the distribution of federal funds between income groups may also be impacted.

Lastly, because earmarks represented re-allocations of federal grant dollars rather than additional appropriations, the earmark ban did not decrease federal spending in aggregate. Instead, earmarked projects that legislators had prioritized over federal agencies' preferences were either not funded or funded at a later date and replaced with projects prioritized by agencies. To the extent that the ranking of projects was reordered would have depended on a variety of variables specific to agencies, projects, and geographic areas. Certainly, not all earmarks were at odds with local and state governments and some may have been fairly germane to agency preferences. However, it is probable that earmarked projects did effectively reorder agency preferences, otherwise legislators would have not needed to insert them into appropriations bills in the first place. In order to measure the welfare impact of this reordering of projects, data on the costs and benefits for each individual project would be needed in order to weigh the net gain or loss resulting from earmarked projects being not funded or funded at a later date. It is possible that localities and state governments may have funded some projects with their own sources of funding after the ban, while other projects may have not been funded at all. An analysis of this "reverse flypaper" impact of the earmark ban would require more detailed data on the expenditures of local governments and states in addition to knowledge of agency, state, and local priorities.

IV. Conclusion

My results suggest that the earmark ban had a differential impact on the distribution of federal competitive grants and contracts. For grants to local governments, the 2011 earmark ban was not responsible for the relative decline in grants between districts with earmarks versus those without; that trend had already begun prior to the ban. For state government grants, the ban of 2011 reversed the trend of increasing grant levels in more heavily earmarked states relative to less heavily earmarked states. These results are robust to controlling for legislator attributes, the impact of the ARRA, the set of agencies in the data, and the specific year of the earmarks used to calculate the impact of the ban.

A possible explanation for the differential impact of the ban on local government grants versus state government grants lies in the fact that local government grants were largely influenced by members of the House of Representatives who adopted stricter reforms in 2009 than did the Senate.

I also find that the earmarking system decreased the level of equality in the distribution of federal grants. The top 5 percent wealthiest districts garnered more earmarks relative to the poorest districts. Considering that rich districts are more easily able to fund public works projects due to having larger tax bases, from the perspective of equality, the earmark reforms and ban appear to have been an im-

Announce Further Earmark Reforms", March 11, 2009.

provement.

Of course, there are perhaps benefits to social welfare from earmarking that would need to be considered in making any sort of value judgment regarding the utility of the practice. Critics of the earmark ban have argued that important legislation is now more apt to be stymied by the political gridlock that has become a feature of the law making process in recent years (Evans, 2004), (LaTourette, 2014), (Gold, 2015). Without a measure of these benefits, it would be difficult to draw conclusions regarding earmarking's overall efficiency. However, much of the current debate within Congress over earmarks centers around the idea that only a small minority of earmarks are bad or wasteful, while the majority are good. This rhetoric misconstrues the real question, which is one of information and incentives. An earmark that one group might consider to be wasteful might be entirely appropriate from the perspective of another group.

The point of the debate over earmarks, then, should not be to label potential projects as good or bad, but instead to ask: Who is better incentivized and better informed to determine the allocation of federal grants; legislators or agencies? Future work that attempts to answer the question of whether the earmark ban should be relaxed will need to shed light on this fundamental question in a systematic way.

Figures and Tables

Figure 2.1: Historical Trend in Earmarks According to CAGW

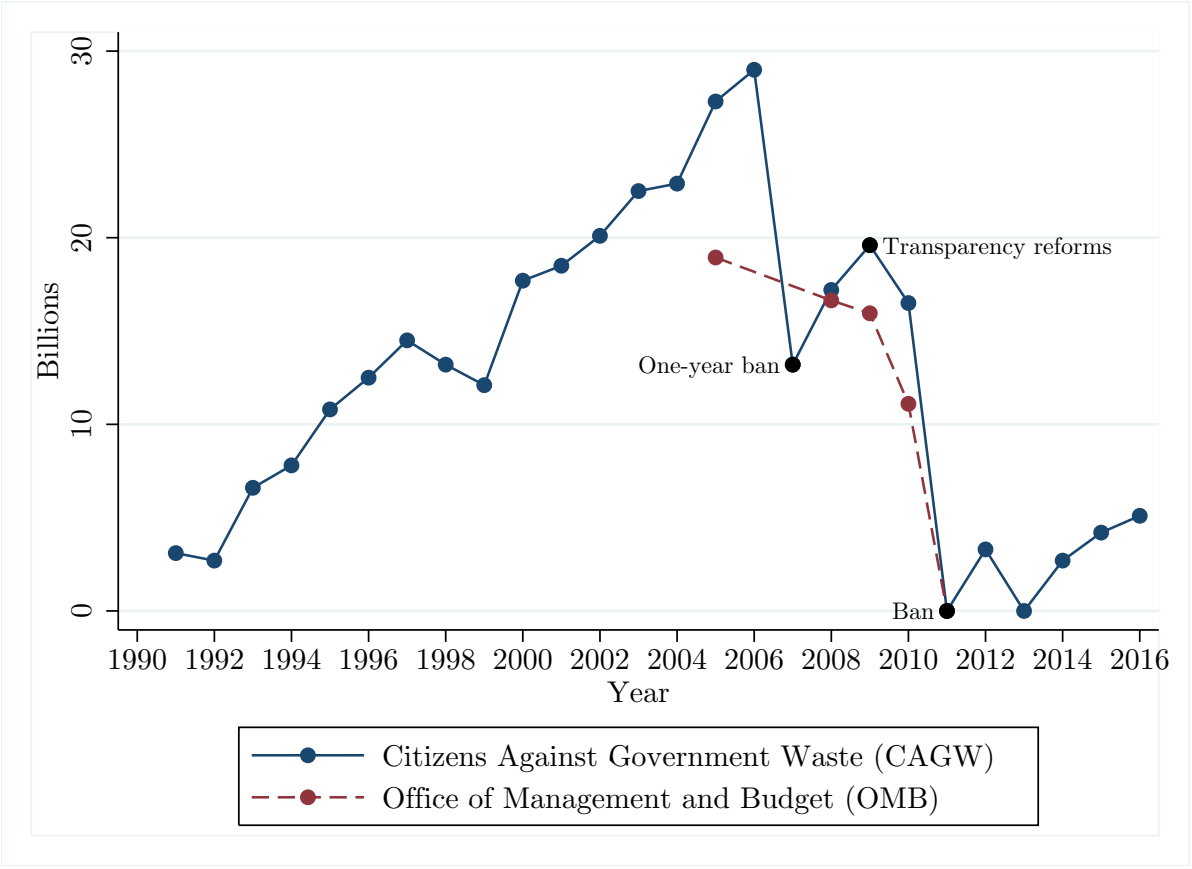

Table 2.1: Federal Earmarks to Local Governments by Agency, Fiscal Year 2009

	Earmarked districts (total)	Earmarked (%)	Average earmark ($ thousands)
Defense	1	94.2	2,625.0
		(.)	(.)
Commerce	4	25.1	1,056.5
		(32.4)	(1,429)
Homeland Security	23	49.4	115.8
		(38.0)	(120)
Energy	22	42.3	347.7
		(32.3)	(337)
Agriculture	49	22.9	159.9
		(31.6)	(276)
EPA	36	37.3	366.3
		(30.9)	(266)
Education	42	2.5	134.9
		(3.7)	(240)
Health and Human Serv.	50	7.3	104.2
		(17.4)	(122)
Transportation	116	9.1	860.7
		(12.4)	(1,483)
Housing and Urban Dev.	115	5.5	327.3
		(11.1)	(424)
Justice	321	43.8	580.5
		(28.2)	(546)
Average		26.9	478.7

Note: For observations with positive earmarks. Standard deviations in parentheses. NEH, CNCS, NEA, DOL, and NSF (not shown) all had zero earmarks.

Table 2.2: Federal Earmarks to State Governments by Agency, Fiscal Year 2009

	Earmarked states (total)	Earmarked (%)	Average earmark ($ thousands)
EPA	1	6.8	15,000.0
		(.)	(.)
Health and Human Serv.	5	1.4	413.8
		(1.04)	(324)
Homeland Security	5	13.6	26,068.2
		(14.75)	(52,549)
Education	5	15.9	1,613.0
		(20.98)	(2,212)
Energy	5	46.2	6,017.8
		(32.73)	(9,844)
Interior	11	8.8	398.6
		(15.16)	(325)
Commerce	15	37.7	1,797.5
		(36.08)	(2,654)
Defense	20	20.4	4,170.1
		(16.61)	(3,765)
Agriculture	29	25.0	1,685.8
		(21.52)	(1,777)
Transportation	31	48.2	10,913.5
		(30.58)	(10,506)
Justice	32	8.2	1,217.2
		(8.36)	(967)
Average		24.8	4,569.0

Note: Sample means for percent earmarked, states earmarked are counts. Standard deviations in parentheses. NEA, DOL, CNCS, and HUD (not shown) all had zero earmarks. Overall averages are for agencies with earmarks only.

Table 2.3: Summary Statistics, FY2009

6,746 Congressional District-Agency Observations

Variable	No earmarks	Earmarks
Federal Grants (millions)	2.62	6.24
	(9.86)	(10.43)
Earmarked (%)	0.00	26.86
	(.)	(29.77)
ARRA grants (millions)	0.27	1.99
	(1.29)	(3.53)
Population density	2,392	2,820
	(6,957)	(7,365)
House Appropriations Subcommittee	0.02	0.04
	(0.15)	(0.19)
Senate Appropriations Subcommittee	0.33	0.43
	(0.47)	(0.50)
House Tenure, Democrat	3.57	4.08
	(4.83)	(5.21)
Senate Tenure, Democrat	13.10	14.50
	(15.73)	(15.76)
House Tenure, Republican	2.35	2.37
	(3.82)	(4.15)
Senate Tenure, Republican	8.24	8.04
	(11.33)	(11.51)
House Appropriations Committee	0.14	0.15
	(0.34)	(0.36)
Population (thousands)	708.27	711.06
	(76.76)	(83.16)
Unemployment Rate (%)	8.00	8.15
	(2.12)	(2.38)
Poverty rate (%)	10.28	10.66
	(4.81)	(5.06)
Personal income, per capita (thousands)	27.27	27.26
	(7.38)	(7.76)
Observations	5,967	779

Note: Sample means. Standard deviations in parentheses. Federal grants are in 2009 dollars. Population, poverty rate, income per capita, and unemployment figures are from the 2010 Decennial Census. Population density in persons per square mile.

Table 2.4: Summary Statistics, FY2009

727 State-Agency Observations

Variable	No earmarks	Earmarks
Federal Grants (millions)	32.94	29.44
	(122.56)	(54.61)
Earmarked (%)	0.00	24.80
	(.)	(26.83)
Personal Income, per capita (thousands)	38.33	39.34
	(5.51)	(5.83)
ARRA grants (millions)	11.57	9.37
	(41.86)	(38.45)
Senate Appropriations Subcommittee	0.30	0.42
	(0.46)	(0.49)
Avg. House Tenure, Republican	4.24	5.05
	(3.48)	(4.23)
Avg. House Tenure, Democrat	4.67	4.60
	(3.23)	(2.77)
Senate Tenure, Democrat	13.78	14.15
	(17.79)	(16.67)
Senate Tenure, Republican	9.49	8.65
	(12.45)	(11.67)
House Appropriations Committee, avg.	0.14	0.13
	(0.18)	(0.14)
Senate Appropriations Committee	0.59	0.62
	(0.49)	(0.49)
Population density	187.63	223.31
	(257.61)	(266.62)
Population (millions)	6.05	6.75
	(6.51)	(7.67)
Unemployment Rate (%)	8.44	8.74
	(2.01)	(1.86)
Gross State Product (billions)	279.03	320.62
	(327.49)	(397.25)
Poverty rate (%)	13.58	13.34
	(3.29)	(3.31)
Observations	568	159

Note: Sample means. Standard deviations in parentheses. All dollar amounts are in terms of 2009 dollars. Population and poverty rate numbers are from the Census, personal income per capita and state GSP are from the BEA, while the unemployment rate is from the BLS. Population density in persons per square mile.

Table 2.5: Log federal grants to local governments

	Pre	*Post*			
Group	2010	2011	2012	N	Treatment
Earmarks	14.36	13.23	12.70	779	
	(0.09)	(0.13)	(0.15)		
No Earmarks	7.79	7.14	6.76	5,967	
	(0.09)	(0.09)	(0.09)		
Differences by year	6.57	6.09	5.94		
	(0.25)	(0.25)	(0.25)		
DnD 1	6.57		6.02		−0.55
	(0.25)		(0.17)		(0.30)
DnD 2	−0.47		−0.16		0.32
	(0.15)		(0.16)		(0.22)

Note: Standard errors in parentheses. Federal grants in logs.

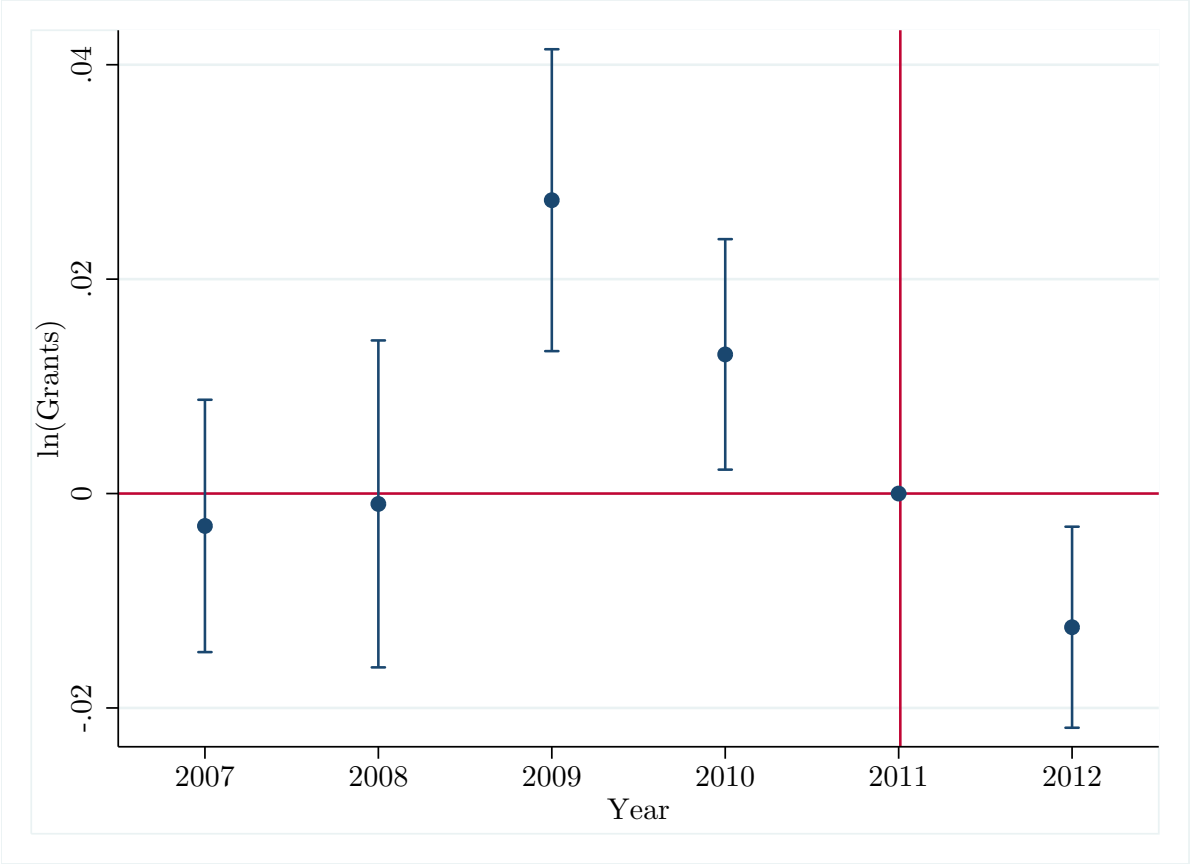

Figure 2.2:
Congressional District-Agency Specification
Figure 2.2 displays the time pattern in the coefficients of log grants on $\%earmarked$ (λ_t). The reference point of the graph is set to zero in 2011, the year the ban took effect. The bars show 95 percent confidence intervals for each coefficient. Control variables include the log of grants funded by the ARRA, House and Senate tenure-party interactions, and a dummy variable for membership on the relevant SAC subcommittee.

Table 2.6: District-agency level data, 2007-2012
Dependent variable: Log of federal grants

	Specification (1)	Specification (2)		
Year interacted	% earmarked	% earmarked	HAC Subcom.	HAC Subcom. × % earmarked
2007	−0.003	−0.004	−0.723*	0.006
	(0.006)	(0.006)	(0.412)	(0.008)
2008	−0.001	−0.001	−0.479	−0.007
	(0.008)	(0.007)	(0.458)	(0.021)
2009	0.027***	0.027***	0.007	−0.008
	(0.007)	(0.007)	(0.378)	(0.011)
2010	0.013**	0.012**	0.197	−0.003
	(0.005)	(0.005)	(0.347)	(0.012)
2011	0.000	0.000	0.663*	−0.020
	(.)	(.)	(0.382)	(0.012)
2012	−0.012**	−0.013***	0.442	−0.014
	(0.005)	(0.005)	(0.309)	(0.009)
Obs.	40,444	40,444	40,444	40,444
District-Agencies	6,746	6,746	6,746	6,746
$\Delta_{1,2011}$	0.001	-0.000		
	(0.96)	(0.98)		

Note: Standard errors in parentheses. Standard errors clustered at the state level. Specification (1) is the OLS estimation of Equation 2.1, while Specification (2) is the OLS estimation of Equation 2.2. Control variables include log of grants funded by the ARRA, House and Senate tenure-party interactions, and a dummy variable for membership on the SAC. $\Delta_{1,2011}$ is the 1 year computed change in trends in the coefficients around the year 2011; P-values are in parentheses.

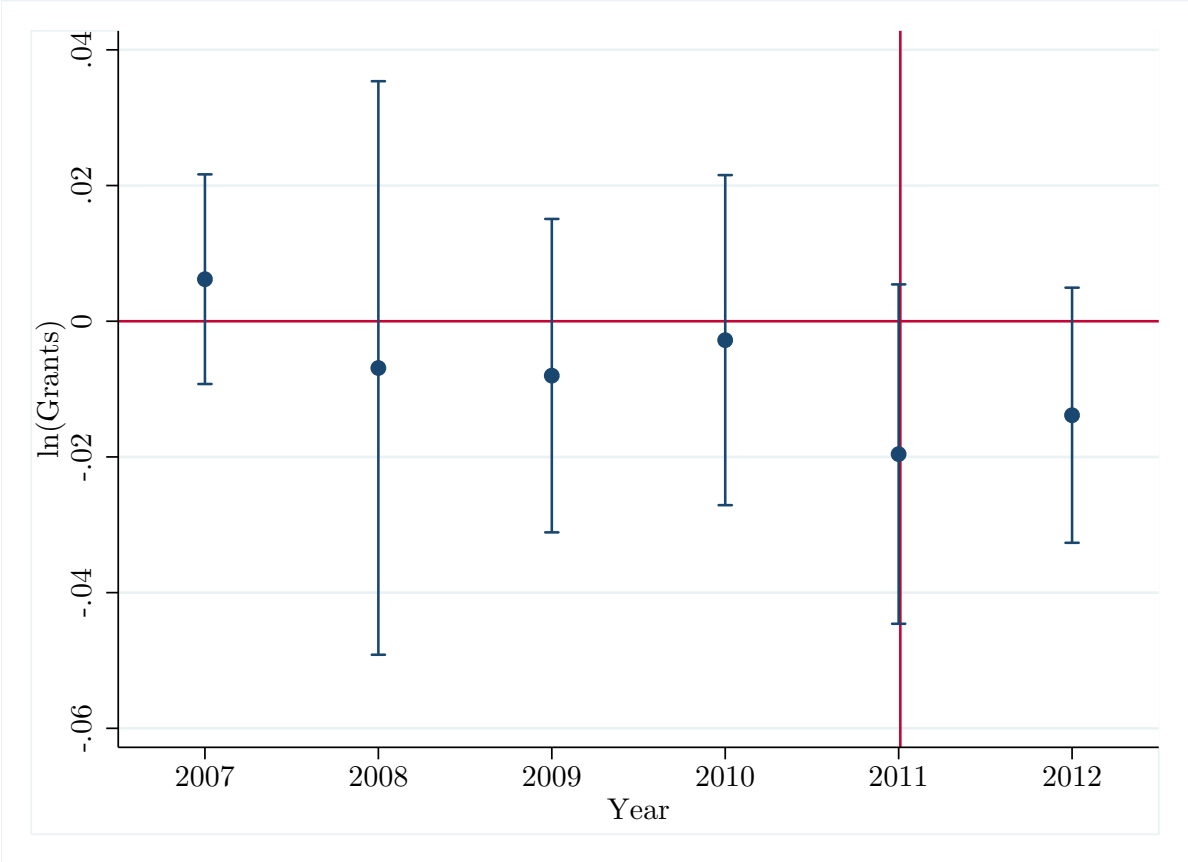

Figure 2.3:
Congressional District-Agency Specification

Figure 2.3 displays the time pattern in the coefficients of log grants on $\%earmarked$ interacted with dummy variables indicating membership on the HAC subcommittee presiding over each agency's appropriations (ψ_t). The reference point of the graph is set to zero in 2011, the year the ban took effect. The bars show 95 percent confidence intervals for each coefficient. Control variables include the log of grants funded by the ARRA, House and Senate tenure-party interactions, and a dummy variable for membership on the relevant SAC subcommittee.

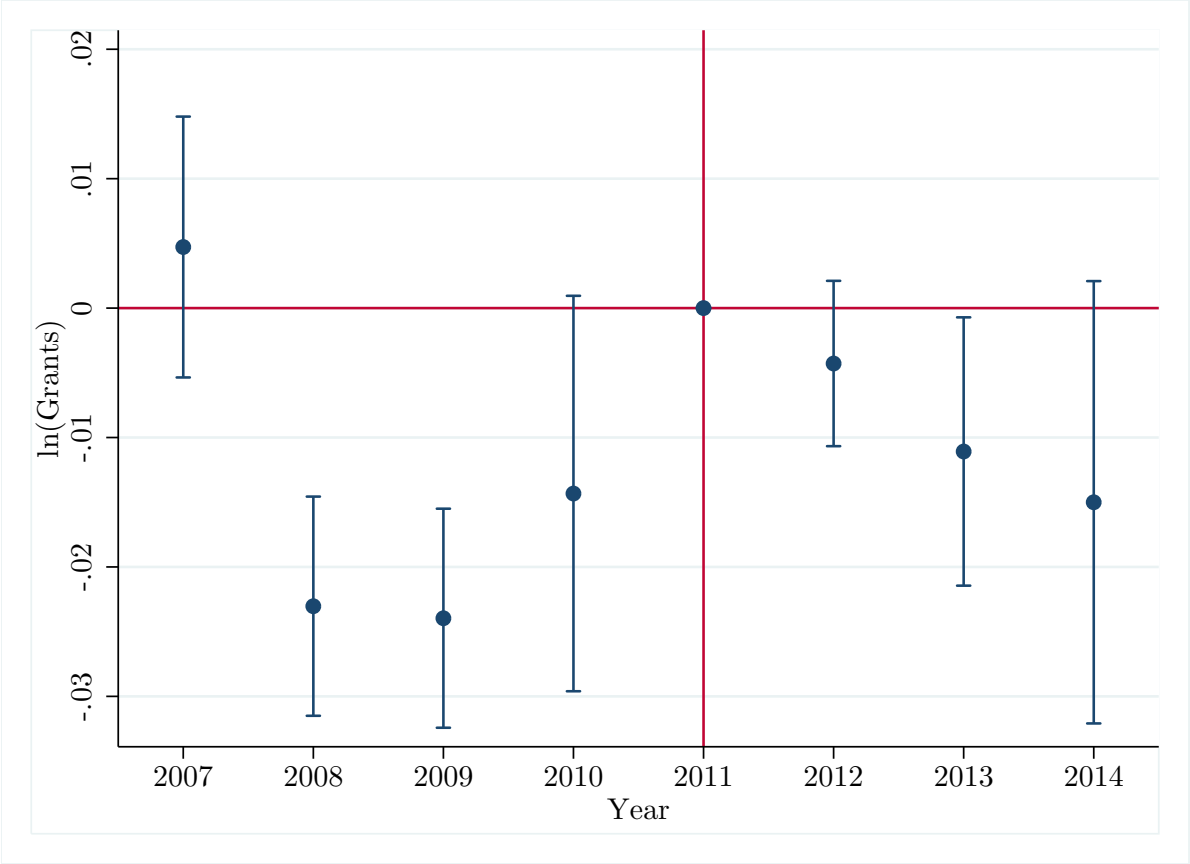

Figure 2.4:
State-Agency Specification

Figure 2.4 displays the time pattern in the coefficients of log grants on $\%earmarked$ (λ_t). The reference point of the graph is set to zero in 2011, the year the ban took effect. The bars show 95 percent confidence intervals for each coefficient. Control variables include the log of grants funded by the ARRA, House and Senate tenure-party interactions, the average of a state's House members on the HAC, the poverty rate, the unemployment rate, personal income per capita, population, and state GSP.

Table 2.7: State-agency level data, 2007-2014
Dependent variable: Log of federal grants

	Specification (1)	Specification (2)		
Year interacted	% earmarked	% earmarked	SAC Subcom.	SAC Subcom. × % earmarked
2007	0.005	−0.004	−0.205	0.019*
	(0.005)	(0.006)	(0.304)	*(0.009)
2008	−0.023***	−0.024***	0.236	0.000
	(0.004)	(0.006)	(0.230)	(0.008)
2009	−0.024***	−0.027***	0.106	0.004
	(0.004)	(0.006)	(0.200)	(0.008)
2010	−0.014*	−0.019	0.334**	0.005
	(0.008)	(0.012)	(0.150)	(0.010)
2011	0.000	0.000	−0.107	0.000
	(.)	(.)	(0.328)	(0.009)
2012	−0.004	−0.002	0.148	−0.007
	(0.003)	(0.006)	(0.245)	(0.006)
2013	−0.011**	−0.009	−0.133	−0.004
	(0.005)	(0.006)	(0.209)	(0.012)
2014	−0.015*	−0.019*	−0.074	0.008
	(0.009)	(0.011)	(0.241)	(0.012)
Obs.	5,809	5,809	5,809	5,809
State-Agencies	727	727	727	727
$\Delta_{1,2011}$	-0.019	-0.021		
	(0.04)	(0.17)		
$\Delta_{2,2011}$	-0.035	-0.037		
	(0.00)	(0.00)		
$\Delta_{3,2011}$	-0.038	-0.044		
	(0.00)	(0.00)		
$\Delta_{2,3,2011}$	-0.039	-0.047		
	(0.00)	(0.00)		

Note: Standard errors in parentheses. Standard errors clustered at the state level. Specification (1) is the OLS estimation of Equation 2.3, while Specification (2) is the OLS estimation of Equation 2.3 with SAC interactions. Control variables include the log of grants funded by the ARRA, House (average in state) and Senate tenure-party interactions, and a dummy variable for average House membership on the HAC.

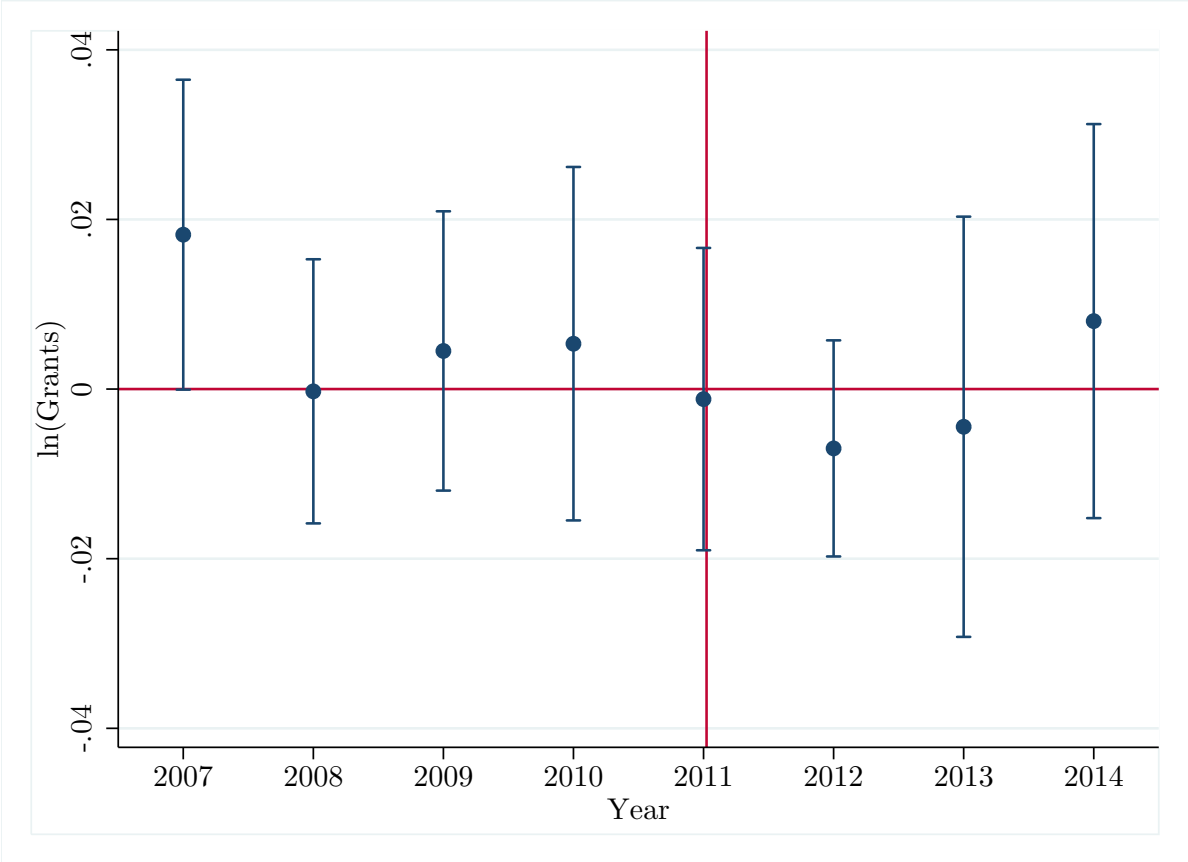

Figure 2.5:
State-Agency Specification

Figure 2.5 graphs the time pattern in the coefficients of log grants on *%earmarked* interacted with dummy variables indicating membership on the SAC subcommittee presiding over each agency's appropriations (ψ_t). The reference point is arbitrary, and is set to 2011. Control variables include the log of grants funded by the ARRA, House and Senate tenure-party interactions, the average of a state's House members on the HAC, the poverty rate, the unemployment rate, personal income per capita, population, and state GSP.

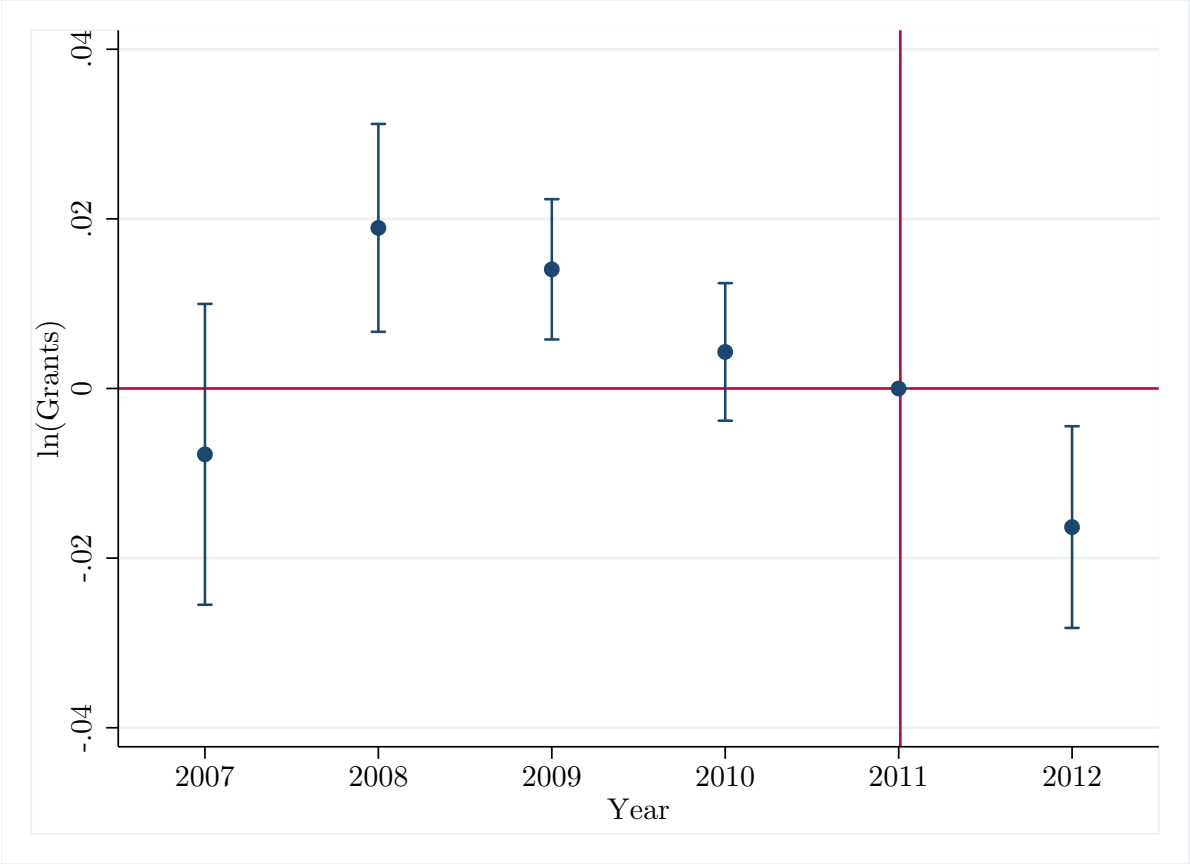

Figure 2.6:
Congressional District-Agency Specification with 2005 earmarks
Figure 2.6 displays the time pattern in the coefficients of log grants on $\%earmarked$ (λ_t), where $\%earmarked$ is defined using earmarks and grants from the Consolidated Appropriations Act of 2005. The reference point of the graph is set to zero in 2011, the year the ban took effect. The bars show 95 percent confidence intervals for each coefficient. Control variables include the log of grants funded by the ARRA, House and Senate tenure-party interactions, and a dummy variable for membership on the relevant SAC subcommittee.

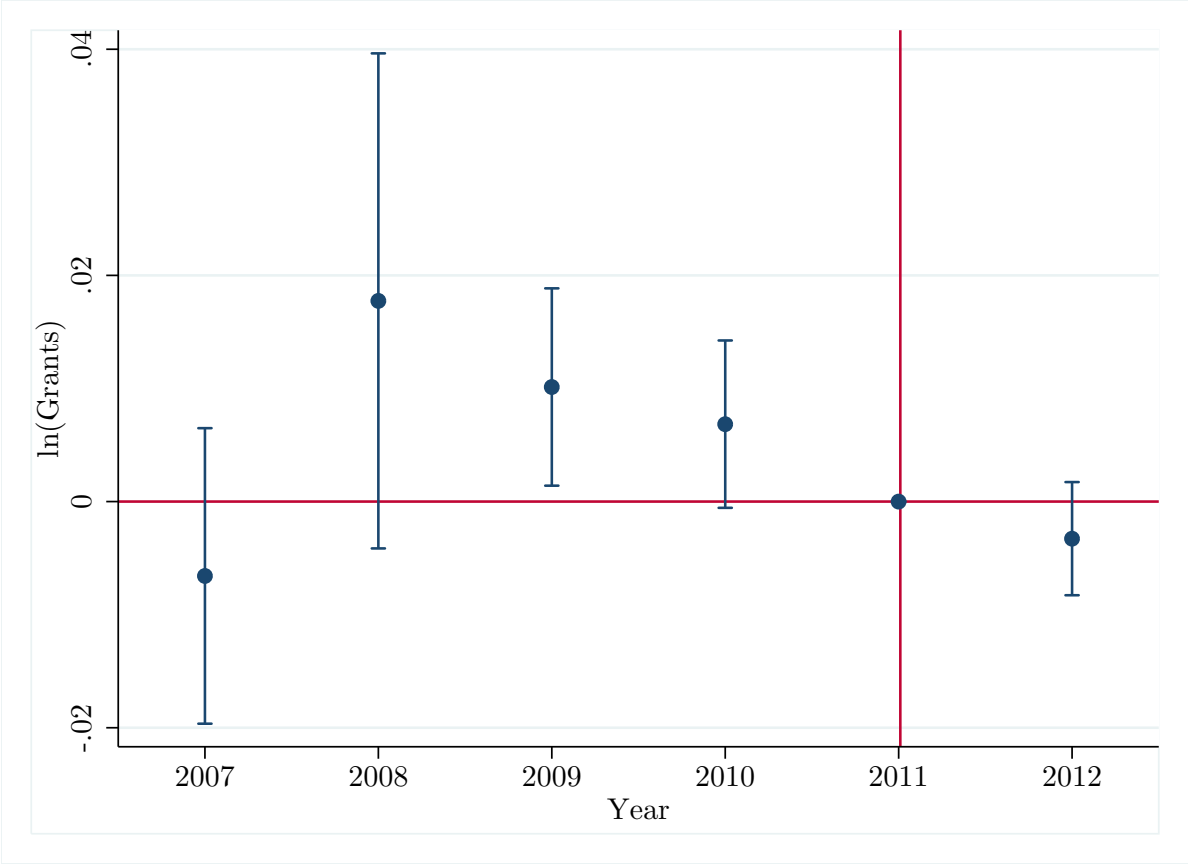

Figure 2.7:
Congressional District-Agency Specification with 2008 earmarks
Figure 2.7 displays the time pattern in the coefficients of log grants on $\%earmarked$ (λ_t), where $\%earmarked$ is defined using earmarks and grants from the Consolidated Appropriations Act of 2008. The reference point of the graph is set to zero in 2011, the year the ban took effect. The bars show 95 percent confidence intervals for each coefficient. Control variables include the log of grants funded by the ARRA, House and Senate tenure-party interactions, and a dummy variable for membership on the relevant SAC subcommittee.

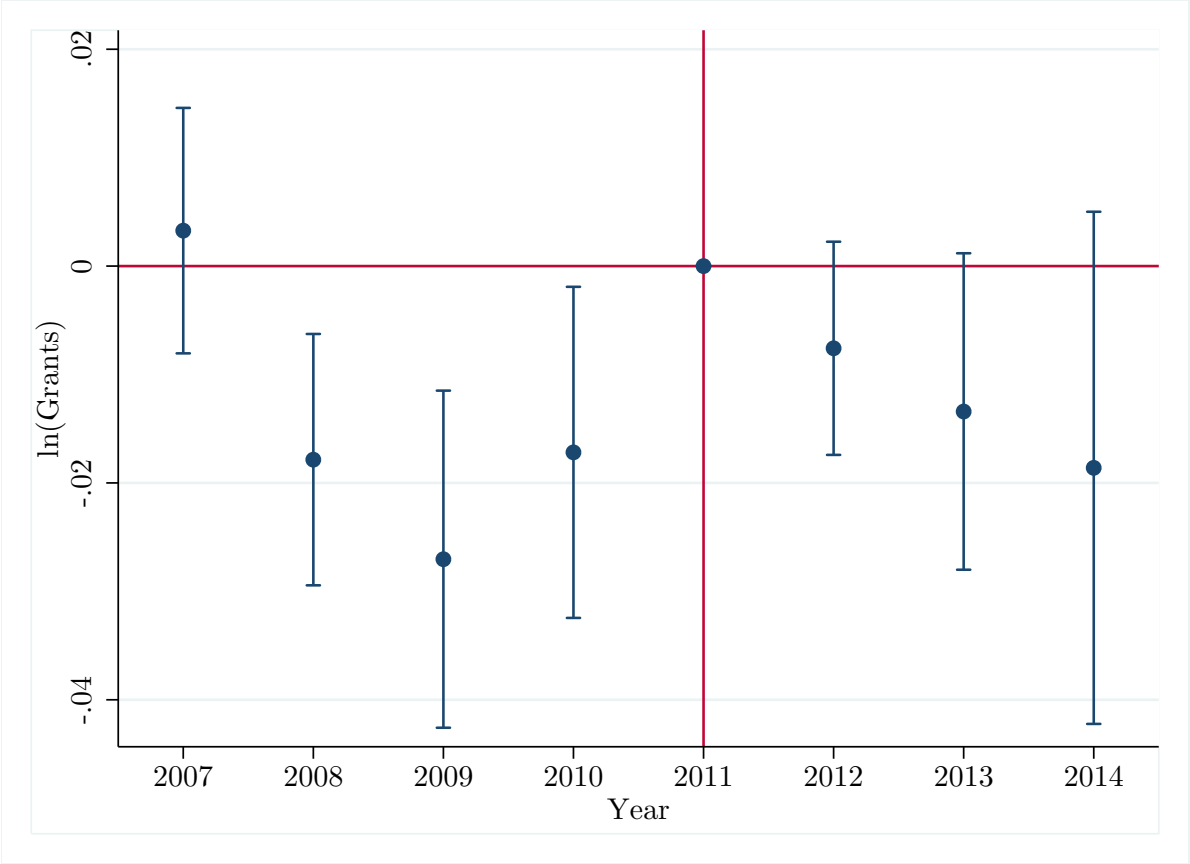

Figure 2.8:
State-Agency Specification with 2005 earmarks
Figure 2.8 displays the time pattern in the coefficients of log grants on $\%earmarked$ (λ_t), where $\%earmarked$ is defined using earmarks and grants from the Consolidated Appropriations Act of 2005. The reference point of the graph is set to zero in 2011, the year the ban took effect. The bars show 95 percent confidence intervals for each coefficient. Control variables include the log of grants funded by the ARRA, House and Senate tenure-party interactions, the average of a state's House members on the HAC, the poverty rate, the unemployment rate, personal income per capita, population, and state GSP.

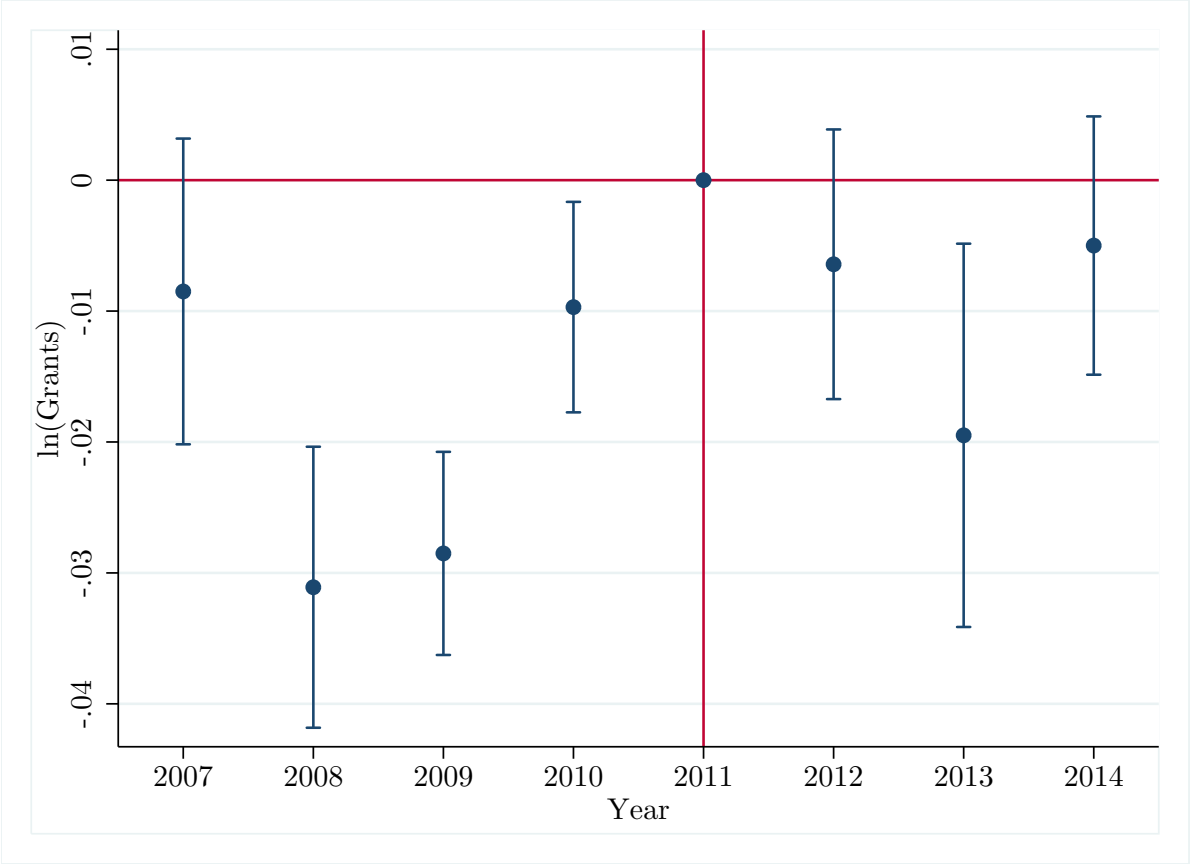

Figure 2.9:
State-Agency Specification with 2008 earmarks
Figure 2.9 displays the time pattern in the coefficients of log grants on $\%earmarked$ (λ_t), where $\%earmarked$ is defined using earmarks and grants from the Consolidated Appropriations Act of 2008. The reference point of the graph is set to zero in 2011, the year the ban took effect. The bars show 95 percent confidence intervals for each coefficient. Control variables include the log of grants funded by the ARRA, House and Senate tenure-party interactions, the average of a state's House members on the HAC, the poverty rate, the unemployment rate, personal income per capita, population, and state GSP.

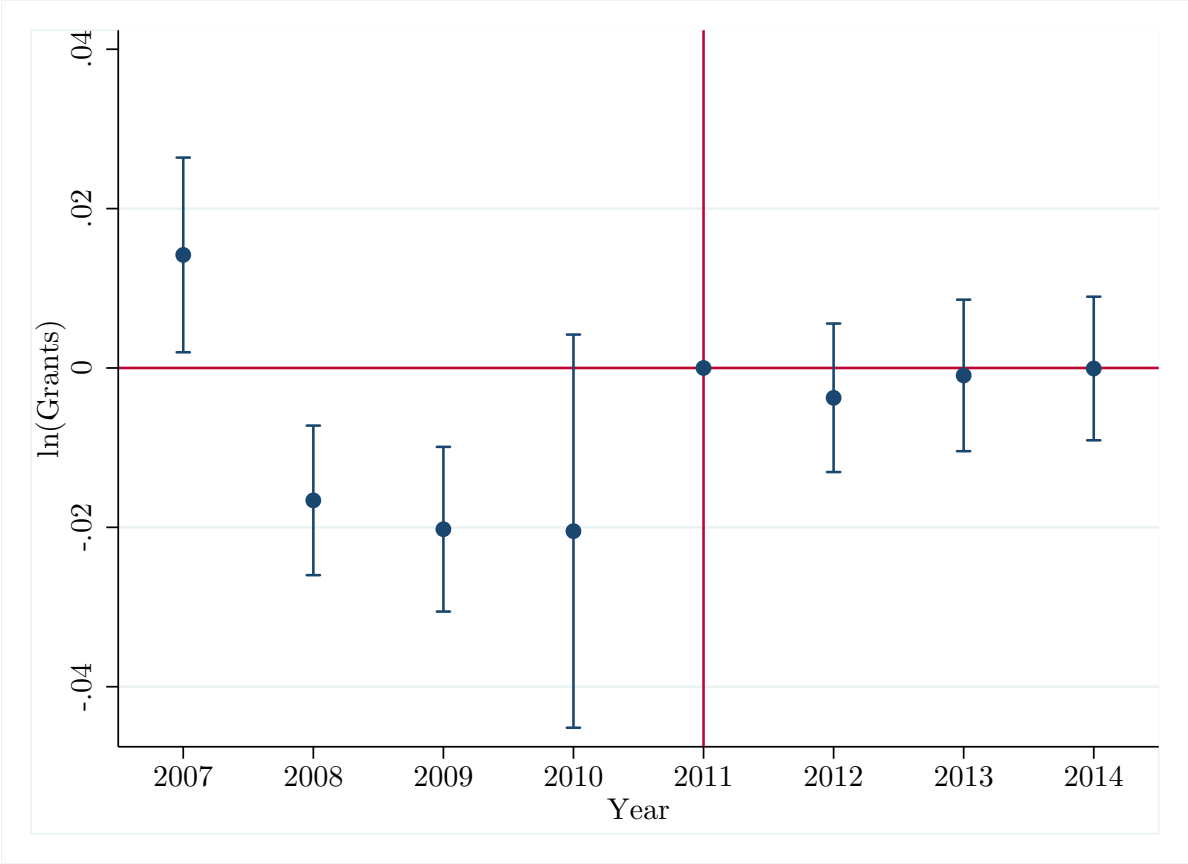

Figure 2.10:
Aggregated State-Agency Specification

Figure 2.10 displays the time pattern in the coefficients of log grants on $\%earmarked$ (λ_t), which includes local government grants and earmarks added to the state government grants and earmarks. The reference point of the graph is set to zero in 2011, the year the ban took effect. The bars show 95 percent confidence intervals for each coefficient. Control variables include the log of grants funded by the ARRA, House and Senate tenure-party interactions, the average of a state's House members on the HAC, the poverty rate, the unemployment rate, personal income per capita, population, and state GSP.

Table 2.8: Equivalence of Means T-tests by Demographic Group, Fiscal Year 2009

435 Congressional Districts

	Top 5%				Bottom 5%			
	Earmarks	Grants	Earmarked (%)	N	Earmarks	Grants	Earmarked (%)	N
Government workers	4.19	114.16***	6.91	23	1.43	46.79***	4.93	22
	(8.67)	(99.89)	(15.16)		(2.54)	(47.42)	(7.05)	
Senior citizens	1.01	40.41*	3.38	22	2.57	76.46*	4.62	26
	(0.96)	(27.42)	(3.79)		(6.04)	(93.83)	(5.77)	
Female	1.45	123.39	1.68	22	3.99	123.02	2.62	23
	(1.73)	(68.95)	(2.02)		(7.70)	(107.33)	(2.65)	
Black	2.93	106.65	3.65	22	2.42	98.85	3.90	25
	(4.37)	(67.32)	(3.79)		(2.85)	(75.94)	(5.41)	
Income	2.76	79.19	8.78***	22	1.72	97.06	2.68***	22
	(4.67)	(92.18)	(10.22)		(1.50)	(71.31)	(2.78)	
Unemployment rate	2.19	103.35*	3.33	23	2.91	67.64*	6.83	25
	(1.97)	(60.64)	(3.82)		(6.29)	(64.60)	(13.69)	
	=1				=0			
HAC	3.00	86.55**	5.51	61	2.18	64.72**	5.12	374
	(3.27)	(78.70)	(6.99)		(4.40)	(64.47)	(9.18)	

Note: *** denotes 99 percent confidence level, ** denotes 95 percent confidence level, * denotes 90 percent confidence level in rejecting the null that the difference in the means for each group is zero against the alternative hypothesis that the Top 5% group is different than the Bottom 5% group. The numbers are sample means with standard deviations in parentheses. Demographic groups are defined by using the 2010 Decennial Census data for congressional districts. Earmarks and Grants in 2009 dollars per capita. Government workers is the share of workers employed by the federal government.

Chapter 3: The Returns to Lobbying: Evidence from Local Governments in the "Age of Earmarks"

I. Introduction

"The reality of the situation is that federal monies are currently available to cities who choose to utilize them... If they do, I hope they would use these funds in a financially responsible way that benefits taxpayers in Texas the most."

–Randy Neugebauer, (R-Texas) on the use of lobbying by local governments[1]

The federal government transfers considerable sums to local governments in the form of intergovernmental grants.[2] With the exception of health and welfare programs, most intergovernmental grants to local governments are classified as discretionary spending. In its annual appropriations process, Congress decides how funding for discretionary spending will be broken up among the various agencies, but more detailed decisions about specific uses of funds are left to the executive branch.

Prior to the earmark ban of 2011, members of Congress frequently intervened in the funding decisions of agencies by earmarking federal funds for particular projects.[3] To those in favor of the practice, earmarking represented an assertion of Congress's power of the purse over bureaucratic objectives. To those opposed to earmarking, it represented little short of corruption. Regardless, earmarks were frequently awarded to private firms, nonprofit organizations, and state and local governments for a wide variety of purposes.

In order to secure earmarks, local governments have often employed lobbyists. In 2003, the city of Treasure Island, Florida, in need of a new bridge, had considered issuing bonds, increasing property taxes, and levying higher tolls. The city instead paid lobbying firm Alcade & Fay $5,000 per month, which resulted in a request for a $50 million earmark by C. W. Bill Young, the Representative of Florida's 10th Congressional District and the chairman of the House Appropriations Committee at the time. That $5,000 per month turned into earmarks for sewer and public infrastructure repairs that totaled more than $1.5 million. Alcade & Fay also represented the cities of North Miami Beach and Homestead, who together received a total of $13 million in earmarks while other, similarly sized Florida cities without lobbyists on retainer received none. These stories were documented in a 2006 New York Times article (Pilhofer, 2006) that calculated an average return of $18.41 for every $1 spent on lobbying for 44 local government clients of Alcade & Fay from 2001 to 2006.

The academic literature measuring the returns to lobbying, however, is sparse. De Figueiredo and Silverman (2006) is currently the only study that provides an es-

[1] See The Texas Tribune (2010).

[2] In 2014 (the latest Census of Governments data at the time of this writing), total intergovernmental aid to local governments was nearly $67 billion.

[3] While the earmark ban of 2011 purported to end the practice, legislators have employed other

timate of the rate of return to lobbying.[4] This essay intends to fill that gap in the literature by estimating the rate of return to lobbying for local governments. I utilize the boom and bust variation in housing prices that took place over the mid-2000s as a source of exogenous variation to predict lobbying expenditures of local governments. My results indicate that the average local government that lobbied received $5 more in federal earmarks for each additional $1 spent in lobbying. However, I also find that for an additional 1 percent of lobbying, or $1,527 on average, the probability of receiving an earmark increased by just 0.06 percent; an expected value of roughly $964. A possible explanation for this difference is the presence of cost prohibitive barriers to entry into lobbying that governments must incur before returns are to be made.

I focus on local governments for several reasons. First, they can be identified geographically and are banned from forming political action committees or mobilizing their employees politically. This limits their tools of influence over the federal government to lobbying, thus avoiding the difficulty of measuring other means of influence. Second, while private firms frequently lobby for policy changes which are difficult to quantify, lobbying by local governments before the earmark ban in 2011 was almost entirely targeted at earmarks, with the exception of the largest local governments that may have also lobbied for policy changes.[5] [6] Conversations with lobbyists indicated that before the moratorium on earmarks, local governments routinely hired lobbyists one to two years ahead of the signing of appropriations bills in order to strategically plan for earmarked appropriations.[7] Earmarks to local governments represent quantifiable benefits to local governments, thus allowing for the returns to lobbying to be measured.

Data on earmarks to local governments reveal several key facts. Earmarks tended to be awarded for a wide range of dollar amounts that represented economically significant sums to local governments and served to fund many local projects of different types. These facts follow from the fiscal reality of constrained revenue creation for many local governments.

In 2009, earmarks among county, municipal, and township governments ranged from small amounts, such as $4,000 to Ransom County, North Dakota for "leafy spurge eradication," and $19,000 for "freshwater mussel recovery" in Randolph County, Arkansas, to the $29.4 million awarded to the city of Sault Sainte Marie, Michigan for the St. Mary's River project. A closer look at the data confirms the impression of wide variation in the size of earmarks relative to local government budgets. Figure

means to direct funds to their home districts, namely through processes known as "lettermarking" or "phonemarking" (Lipton and Nixon, 2010), (Nixon, 2012), (Cuellar, 2012), (Gold, 2015), (Dawson and Kleiner, 2015), (Strand and Butcaru, 2016).

[4]They estimate the rate of return to lobbying for institutions of higher education.

[5]With the ban on earmarks, lobbying by local governments still continues. For an example, see: Mirror (2015).

[6]As a robustness check, I dropped the top fifth percentile in terms of population size of local governments and re-estimate all specifications.

[7]De Figueiredo and Silverman (2006) note that lobbying by universities was carried out on a

3.1 shows the distribution of earmarks by year as a percent of 2007 local government own-source revenues for county, town, and municipal governments aggregated to the county geographic area. The highest percentage was a $9.6 million earmark in 2009 for the operation and maintenance of Wappapello Lake in Missouri that represented 184 percent of county total, own-source revenues. Separating out the data into population quartiles shows that less populous counties experienced the most variation in the ratio of earmarks to own-source revenues. The variation increased dramatically, especially from 2008 to 2009 for counties in the bottom two population quartiles, as Table 3.1 indicates.

As a stylized fact, local governments are heavily reliant on the property tax.[8] This reliance has a stabilizing benefit such that sharp downswings in property values do not immediately translate into lost revenues for local governments (Alm et al., 2011), (Doerner and Ihlanfeldt, 2011), (Ihlanfeldt, 2011). Despite the stability of property tax revenues in relation to the direct effect of declining housing prices during the Great Recession, local governments were impacted by decreases in intergovernmental aid (Chernick et al., 2011), (Jonas, 2012), declines in job and residential growth (Hoene and Pagano, 2010), (Lutz et al., 2011), (Strauss, 2013), and increases in liabilities (Chapman, 2008), (Shoag, 2013).

The Great Recession placed local governments in a constrained position in terms of revenue creation, but the nature of multilevel government in the United States also makes it difficult for local governments to raise revenues due to state mandates such as Proposition 13 (Joyce and Mullins, 1991). Additionally, the fiscal federalism literature predicts the under-provision of public goods at the local level as a result of decentralization. Beginning with Oates et al. (1972), this literature models the way in which local governments compete for investment dollars by decreasing tax rates, which in turn leads to the sub-optimal provision of public goods.[9]

In the mid-2000s, with the Great Recession impacting employment, consumption, and the demand for services, local governments were in a difficult position in terms of generating revenues in the face of rising expenditures. For example, all of the Florida cities detailed in Pilhofer (2006) saw slowdowns in residential growth as a result of the Great Recession. Thus it would seem that for those local governments, lobbying was a highly prudent investment as opposed to increasing tax rates or issuing debt. However, between 2001 and 2014, county and municipal governments in only 19 percent of all county areas lobbied. This raises the question: Why so little lobbying? One possible answer to this question is the fact that lobbying requires high initial costs before returns can be made (Kerr et al., 2014).

Data on federal earmarks from the Office of Management and Budget (OMB) show that from 2005 to 2010, the total number of earmarks decreased by 31.9 percent,

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strictly annual basis. I interviewed 5 lobbyists who generally confirmed that local governments took a slightly longer view.

[8] As of the 2007 Census of Governments, property tax revenues made up 45 percent of general, own-source revenues for local governments. See also: Alm et al. (2011).

[9] See Wilson (1999) for an overview of the tax competition literature.

while the total dollar amount dropped by 41.3 percent.[10] However, federal earmarks to local governments increased dramatically both in number and in monetary value over a similar time period. Figure 3.2 shows that the number of earmarks to local governments increased in number by 51.8 percent from 2005 to 2009, an increase in monetary value of nearly 69 percent.

Over the same time period that local government earmarks increased relative to total earmarks, local government lobbying increased at a faster rate than total lobbying.[11] Figure 3.3 shows that while lobbying expenditures grew in general from 2001 to 2010, lobbying by local governments increased sharply from 2005 to 2006 before the spike in total lobbying, which did not occur until 2008.

The longer panel dataset on local government lobbying from 2001 to 2014 allows me to uncover several relevant facts characterizing counties that contained local governments that engaged in lobbying activity: a subset of large counties that lobbied every year expended the majority of total lobbying expenditures incurred by local governments in any given year. Given that a county lobbied in the previous year, the unconditional likelihood of lobbying in the current year was 82 percent. While lobbying counties had larger populations than the full sample, counties that lobbied every year from 2001 to 2014 were much larger; on average, over 1.2 million in population. Figure 3.4 displays the average share of total annual lobbying by the total number of years that a county engaged in lobbying over 2001-2014. The positive correlation between the total number of years lobbied and the average share of lobbying indicates that for the average year, the local governments that lobbied the most were the local governments that lobbied every year.

The high degree of persistence in the local government lobbying market resembles the lobbying market for private firms and similarly points to barriers to entry in lobbying as described by Kerr et al. (2014). It is highly possible that in order to engage in lobbying, a government must invest in buying lobbying services that do not pay off immediately, i.e. that there are increasing returns to "experience" in lobbying.

While local governments allow for quantifiable costs and benefits of lobbying to be measured and located geographically, an additional challenge to measuring the returns to lobbying is the possibility of endogeneity between lobbying and federal earmarks (De Figueiredo and Silverman, 2006). For at least two reasons, OLS estimates of the returns to lobbying may be biased. First, local governments may be more likely to lobby if they have been awarded an earmark in the past. Second, they may have prior information regarding the probability of their success in obtaining an earmark.

A final characteristic of local government lobbying presents housing prices as a potential instrumental variable. Due to the reliance of local governments on property taxes for generating revenues, housing prices before and during the Great Recession appear to be a useful proxy for the size of the (future) tax base for local govern-

[10] Doyle (2011a) attributes this decline to various reforms.

[11] Total lobbying includes all lobbying at the federal level, whether from private firms, nonprofit organizations, or other government institutions, in addition to local governments. At an average

ments.[12]

While scholars have offered a range of explanations as to the cause of the rapid build up and consequent crash in housing prices that characterized the mid-2000s (Glaeser et al., 2008), (Glaeser et al., 2012), (Shiller, 2015), this variation was largely unanticipated and thus should not be correlated with the error term for an empirical model that estimates the returns to lobbying. Figure 3.5 documents the rapid increase in average county housing prices that peaked in 2007 and then began to decline.

The data show that local governments that experienced decreases in housing prices lobbied more, ostensibly as an alternative means to generate revenue. Figure 3.6 displays lobbying expenditures for two groups of counties: those with positive growth rates in housing prices and those with negative growth rates in housing prices. For the years 2003 to 2006, the two groups lobbied roughly the same amount. Following 2006, however, the growth rate in housing prices predicts distinct differences in lobbying expenditures between the two. On average, counties with decreasing growth increased their lobbying expenditures by roughly 700 percent from 2006 to 2007, while counties with increasing growth decreased their lobbying expenditures over the same time period. This variation indicates that local governments responded to decreases in housing prices, or future property tax revenues, by lobbying more. The data suggest that local governments lobbied to buffer against the consequences of slowing growth in their tax bases.

The theoretical lobbying literature predicts that when interest groups compete in lobbying expenditures, inefficient economic outcomes result. Krueger (1974) models rent seeking for import licenses and shows that competition creates a welfare loss. Becker (1983) provides a theoretical model of how interest groups alter their levels of political pressure in an effort to maximize the total income of their members. Building off of Becker (1983), Hoyt and Toma (1989) show how state mandates regarding local government activities lead to competitive lobbying at both the state and local levels, and Hoyt and Toma (1993) provide a related model of interest group competition in the context of public education. Lobbying by local governments for federal earmarks exemplifies the dynamic of "concentrated benefits and diffuse costs," since earmarks can be large to individual local governments, but are insignificant in cost from the perspective of taxpayers.[13,14]

The distributive politics literature often characterizes earmarks as an input in the political bargaining process (Balla et al., 2002), (Lee, 2003), (Evans, 2004). This literature predicts that interest groups more closely aligned with key policy makers will reap larger returns than those who are not (Helpman and Persson, 2001), which implies that congressional representation impacts the returns to lobbying. More pre-

amount of $26.6 million per year from 2001 to 2014, local government lobbying made up a small fraction of total lobbying which averaged $3.8 billion per year.

[12]Despite the stability of property taxes as a result of the lag between fluctuations in the value of the existing tax base and its assessed value, changes in housing prices translate directly into lost future revenues for local governments.

[13]See Olson (2009).

[14]To the extent that federal dollars would have been distributed via earmarks regardless of lob-

cisely, relevant literature in economics and political science predicts the salience of particular aspects of political representation.[15]

One model of legislator behavior, the partisan model of budget allocation, predicts that congressional representatives will further their own self-interests by serving their parties' interests (Cox and McCubbins, 2007). For example, legislators may be more likely to funnel resources to districts where the majority party has a smaller advantage (Lee, 2003).[16]

The distributive model of budget allocation implies that variables measuring the influence and position of individual legislators, such as seniority or committee appointments, should matter more than partisan affiliation. Knight (2005), for example, found that districts with representation on the House Transportation Committee were awarded more project grants than those without. However, due to the lack of clear direction in the literature as to which attributes of political representation dominate others, I take an agnostic approach and include variables that capture both partisan and distributive model predictions regarding budget allocation.[17] Due to the inclusion of county fixed effects in the empirical specifications and the lack of variation in congressional variables over the sample period, less significance is predicted for the legislator variables.

The remainder of this essay is organized as follows: section II provides the theoretical model, section III, the empirical model, section IV, a discussion of the data and summary statistics, section V, the results and robustness checks, while section VI concludes.

II. Theory

To illustrate the logic that connects changes in housing prices (and therefore future property tax revenues) with lobbying, I propose a simple model of a local government's decision to lobby with the objective of realizing earmark gains. The model presented here motivates the use of the dollar size of earmarks as the dependent variable in the empirical specifications and aims to capture the returns to lobbying along the intensive margin of earmark distribution. An analogous model presented in the Appendix motivates the use of earmarks as a binary dependent variable that allows for analysis of the extensive margin in the distribution of earmarks.[18] Regardless of the approach, the implication that risk-averse local governments will respond to shocks in own-source revenues (R_i) by lobbying more, is the same.

Assuming that lobbying has an impact on earmarks by increasing the size of the

bying, local government lobbying could be seen as welfare enhancing in the sense that it might lead to a more efficient distribution of earmarked funds.

[15]Shepsle and Weingast (1994) provide a survey of this literature.

[16]Alignment with the party of the President is another related theory (Larcinese et al., 2006).

[17]As Levitt and Poterba (1999) point out: "the complex institutional structure of Congress, and the possibility of log-rolling and other types of coalition formation, make it difficult to identify influential members based solely on committee assignments" (page 187).

[18]In the alternative approach, the earmark amount (E_i) is random, and lobbying serves only to

earmark (E_i), I define earmarks as a function of lobbying such that:

$$E_i = Z_i L_i \epsilon_i \tag{3.1}$$

Where for local government i, E_i is the dollar amount of the earmark received, Z_i is a series of observable and unobservable variables characterizing local government i, ϵ_i is the error term, and L_i is the lobbying expenditure incurred. Estimation of (3.1) will suffer from omitted variable bias because L_i is likely correlated with unobservable elements in Z_i that are contained in the error term, ϵ_i.

Instrumental variables methods are used identify the empirical model. An instrument must be correlated with lobbying expenditures (L_i) but uncorrelated with the omitted variables that are contained in the error term. In order to derive an instrument, I assume that local governments seek to maximize their total income, and that tax rates are set exogenously.[19] Revenue comes from two sources: earmarks (E_i) and own-source revenues which are a function of changes in the tax base: $R_i = \Delta B_i$.[20] Substituting in from (3.1), the maximization problem for local government i becomes:

$$\max_{L_i}\{\pi_i\} = \{(B_i + Z_i L_i)^\beta - cL_i\} \tag{3.2}$$

where the utility function is of the form $U(\cdot)^\beta$, where $\beta \in (0,1)$, and c is a constant marginal cost to lobbying. Differentiating with respect to L_i yields the first order condition:

$$\frac{\partial \pi_i}{\partial L_i} = \beta(B_i + Z_i L_i)^{\beta-1} - c = 0 \tag{3.3}$$

Which is satisfied by L_i^*, the optimal amount of lobbying. In order to determine the impact of a change in the tax base (B_i) on lobbying (L_i), I totally differentiate (3.3) with respect to B_i to obtain:

$$\frac{dL_i^*}{dB_i} = -\frac{\frac{\partial^2 \pi_i}{\partial L_i \partial B_i}}{\frac{\partial^2 \pi_i}{\partial L_i^2}} \tag{3.4}$$

Then:

$$sign\left[\frac{dL_i^*}{dB_i}\right] = sign\left[\frac{\partial^2 \pi_i}{\partial L_i \partial B_i}\right] \tag{3.5}$$

since by the second order condition $\frac{\partial^2 \pi_i}{\partial L_i^2} < 0$.[21]

Because:

$$\frac{\partial^2 \pi_i}{\partial L_i \partial B_i} = \beta(\beta - 1)(B_i + Z_i L_i)^{\beta-2} < 0 \tag{3.6}$$

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increase the probability of receiving the earmark.

[19] This can be generalized to show that local governments maximize the utility of the representative citizen.

[20] In this model, I abstract from local governments choosing tax rates. However, the model could be generalized to allow for this without a change in result.

[21] See the Appendix for the second order condition.

Therefore:

$$\frac{dL_i^*}{dB_i} < 0 \tag{3.7}$$

The comparative static result in (3.7) shows that the optimal amount of lobbying expenditures decreases in response to positive shocks to the tax base (ΔB_i).

The intuition behind this last result is that local governments, when faced with a shortfall in own-source revenues, will pay a cost (c) to lobby for earmarks (E_i). (3.7) thus implies a viable instrument in shocks to tax base growth, as ΔB_i is predicted to be correlated (inversely) with lobbying, but not with the error term from estimations of Equation (3.1).

III. Empirical Model and Identification Strategy

For the empirical model, the panel data aspect of the sample is utilized. Because there are many variables that cannot be observed on an annual frequency at the county level, all panel data models include fixed effects, unless otherwise noted.

In terms of timing, all congressional variables are lagged by one period from the date of the enactment of the earmark. For earmarks enacted in 2005, for example, congressional variables from 2004 are used. Lobbying expenditures are also lagged. Where lobbying is interacted with earmarks, the lobbying amount is always from the year prior to the earmark amount. The main empirical model for estimating the rate of return to lobbying is:

$$Earmark_{it} = c + \beta_L Lobbying_{it-1} + \beta_{X_k} X_{kit} + \beta_{Cm} Cm_{it-1} + \beta_A A_{st-1} + \eta_i + \tau_t + \epsilon_{it} \tag{3.8}$$

where i indexes counties and t indexes the enactment year of the earmark. $Earmark_{it}$ is defined in two different ways: the logarithm of the dollar amount of the earmark and a binary variable taking on 1 if an earmark is received and 0 if not.[22] Defining earmarks as a continuous variable allows me to test the impact of lobbying along the intensive margin of earmarks, while defining earmarks as a binary variable and utilizing a linear probability model tests the impact of lobbying along the extensive margin.

$Lobbying_{it}$ is the logarithm of lobbying expenditures. The X_{kit} are k control variables that include the growth rate and level of personal income per capita, the change in the unemployment rate, and the growth rate and level of county population. The C_{mit-1} are m political variables, lagged one period. A_{st-1} is the lagged log of state to local government aid, indexed by state s and time t. While this variable is only available on an annual basis at the state aggregated level, it is still included to control for changes in state aid to local governments. The η_i are the fixed effects, and the τ_t are the year effects.

[22]The short panel length of the earmark data makes specifying ΔE_i as the dependent variable

To deal with the possibility of an endogenous relationship between earmarks and lobbying, I use instrumental variables methods (De Figueiredo and Silverman, 2006). Motivated by the theoretical model, my strategy is to search for a proxy for changes in the tax base of local governments. While local government property taxes were a stable source of revenue for local governments during the Great Recession due to lags in assessment (Doerner and Ihlanfeldt, 2011), (Alm et al., 2011), (Ihlanfeldt, 2011), contemporaneous declines in property values represented future losses in tax revenues. Since the majority of local government own-source revenues are related to residential property values (Lutz et al., 2011), (Chernick et al., 2011), (Jonas, 2012), the growth rate of housing prices at the county level ($\Delta HousingPrices_{it}$), provides a measurement of ΔB_i from Equation (3.2), and is not predicted to be contained in the error term.

For the instrumental variables model, the equation becomes:

$$Earmark_{it} = c + \beta_{\widehat{L}} \widehat{Lobbying}_{it-1} + \beta_{X_k} X_{kit} + \beta_{C_m} C_{mit-1} + \beta_A A_{st-1} + \eta_i + \tau_t + \epsilon_{it} \tag{3.9}$$

where $\widehat{Lobbying}_{it-1}$ is the predicted value from the first stage equation:

$$Lobbying_{it-1} = c + \beta_{hp} \delta HousingPrices_{it-1} + \beta_{X_k} X_{kit} + \beta_{C_m} C_{mit-1} + \beta_A A_{st-1} + \eta_i + \tau_t + \upsilon_{it} \tag{3.10}$$

The instrumental variables equation is estimated using 2-Stage Least Squares (2SLS).

IV. Data

Unit of observation

All numbers for earmarks and lobbying are for county and municipal governments which make up roughly 63 percent of total local government lobbying expenditures and over 86 percent of total local government earmarks, the remainder of which is attributed to special districts and school districts.[23] The data were aggregated to the county geographic level and matched with data from the other sources. What results is a three-year panel on earmarks for 3,079 counties, virtually every single county in the lower forty-eight states.[24] The few earmark and lobbying expenditure observations that took place in municipalities split across county lines were divided up and weighted by population across each of the overlapping counties. Any earmark or lobbying expenditure whose recipient or client was noted as "multiple jurisdictions"

unfeasible.

[23]The fact that special districts and school districts lobby a greater share of total lobbying than the share of total earmarks they received points to the possibility that special district and school district governments may be more interested in lobbying for policies as opposed to earmarks.

[24]In keeping with the practice of the Bureau of Economic Analysis (BEA), the independent cities of Virginia were added together with their adjacent counties into one single county-city area. Alaska and Hawaii were eliminated from the analysis in keeping with the public finance literature. Also,

was dropped.[25] The lobbying, Bureau of Economic Analysis (BEA), Bureau of Labor Statistics (BLS), and congressional data sources are all available for a long enough period of time to match the appropriate lagged values with the earmark data.

My decision to limit the analysis to local governments categorized as county, municipal, or township comes from the fact that these "general purpose" governments are easily defined geographically. Data on the precise geographic boundaries of special purpose district governments and some school district governments are not available.[26]

For the remainder of the analysis, I use the term "local government" and "county" interchangeably in reference to observations.

Earmarks

There are several commonly used criteria for an appropriation to be considered an earmark, including 1) the inclusion of a specific recipient or amount, 2) the lack of a competitive allocation process, and 3) the request having come from a single member of Congress (Porter and Walsh, 2008). As a result of a series of transparency reforms, in 2008 the OMB began collecting information on earmarks in appropriations bills under a single definition.[27] The OMB required federal agencies to submit the details of their spending related to earmarks within a specified time period of receiving each earmark request. This highlights the advantage of using the OMB database over other nongovernmental organizations' earmark databases.[28] I am able to observe every earmark that was included in each of the three different consolidated or omnibus appropriations bills: the 2005 Consolidated Appropriations Act signed into law on December 8th, 2004, the 2008 Consolidated Appropriations Act signed into law December 27th, 2007, and the 2009 Omnibus Appropriations Act signed into law March 11th, 2009.

The OMB chose 2005 as its "base year" and did not collect data for 2006 or 2007. This may have been motivated by the fact that 2005 came before the earmark reforms began in 2006 (Doyle, 2011b). Although there were no consolidated appropriations bills for 2006 or 2007, earmarks were signed into law in 2006. However, in

Alaska is an extreme outlier, receiving a disproportionate number of earmarks on a per capita basis.

[25]This follows a similar practice as Knight (2005) in his analysis of transportation earmarks across congressional districts.

[26]See the Data Description below for more information.

[27]The OMB definition is: "funds provided by the Congress for projects, programs, or grants where the purported congressional direction (whether in statutory text, report language, or other communication) circumvents otherwise applicable merit-based or competitive allocation processes, or specifies the location or recipient, or otherwise curtails the ability of the executive branch to manage its statutory and constitutional responsibilities pertaining to the funds allocation process."

[28]Two other organizations, Citizens Against Government Waste (CAGW) and Taxpayers for Common Sense (TCS) both keep track of earmarks. However, CAGW does not classify them by recipient, and TCS classifies them only by the intended recipient. Because the recipient portion of the data are generated by reports submitted by the agencies actually spending the money, the OMB data provide actual amounts based on where they were actually spent. This is vital for my estimations, since local governments were not always the intended recipients of earmarks, but may have been a part of a larger group that included private and nonprofit entities.

2007 a large number of earmarks were blocked by a one-time earmark moratorium that was championed by the House Appropriations Committee (HAC) and the Senate Appropriations Committee (SAC) as the majority party shifted from Republican to Democrat beginning with the 110th Congress. Beginning in fiscal year 2008, however, earmarks were required to be reported in a timely fashion, with more transparency regarding the sponsor and recipient (Doyle, 2011b). However, effective as of 2011, the Republican-controlled House banned earmarks, a moratorium that persists to this day (Politifact, 2013).

I assign each earmark to the year it was enacted, which is the year after it was signed into law for the 2005 and 2008 data. For the 2009 earmarks, the timing is slightly different, since the 2009 Omnibus Appropriations Act was not signed into law until March 11th, 2009. However, no adjustments were made for the difference in timing, since it is unlikely that early 2009 lobbying would have been directed towards 2009 enacted earmarks given that local governments tend to begin lobbying for the next year's appropriations bills a year in advance.[29] These laws represent virtually all of the appropriations earmarks enacted during those years, as they are comprehensive by definition.[30]

I analyze earmarks only to recipients that were county, municipal, or township governments. Only earmarks whose recipient was a single government were included in the sample. This leaves out coalitions of governments, special district governments, and school districts.[31] I match each earmark to a particular county using the recipient information provided by the OMB.

Lobbying

The lobbying data come from the 1995 Lobbying Disclosure Act, which mandated that federal lobbyists disclose information to the Senate Office of Public Records (SOPR), including their client and the amount they were paid. These data are available semi-annually prior to 2008, and quarterly afterwards.[32] Approximately one third of local government lobbying in terms of both the number of records and the

[29] A reason to adjust for the difference in timing would be the extent to which unobserved factors enter into the error term. For example, it is possible that the earmarks signed into law on March 11th, 2009 were influenced by changes in congressional representation, as the 111th Congress was sworn in on January 6th, 2009. Freshman representatives may have been less able to defend their predecessors' earmarks, for example.

[30] The Department of Defense Appropriations Act of 2008 had three earmarks included in the analysis as well, and were all around $75,000. For 2009, the only other appropriations bill was the Consolidated Security, Disaster Assistance, and Continuing Appropriations Act of 2009 signed September 30th, 2008. There were several earmarks from this bill, and they were dropped from the analysis.

[31] This excludes about 20 percent of local government earmarks in terms of the dollar amount, and just over 13 percent in terms of the number of those that went to special district governments or coalitions of governments.

[32] The Honest Leadership and Open Government Act of 2007 required the quarterly submission of electronic records. Prior to this law change, several different submission methods were used. Due to this change, there is some concern for measurement error in the data before 2008. However,

dollar amounts was expended by special districts. A similar approach was followed in matching the lobbying data to counties as with the earmark data. Records were matched to county areas based on the client name. By manually matching the clients to counties by name, I was able to mitigate the potential for measurement error.[33] The lobbying data allows me to identify annual amounts paid by clients to lobbyists for lobbying services as defined by SOPR guidelines (SOPR, 2013).

Congressional variables

For U.S. House congressional variables, I take a different approach than previous literature that allows me to measure congressional variables in a more realistic way. In their well cited paper on the distribution of federal spending, Berry et al. (2010) group counties by congressional districts for their county level analysis, which naturally represents a problem for counties that overlap with more than one congressional district. To be able to assign variables for congressional representation, they simply drop all such counties, noting the probable impact that this would make on their analysis due to the fact that these observations are all in highly urbanized areas. In my analysis, the counties that are split by congressional districts typically expend greater amounts on lobbying and receive larger earmarks, thus excluding them from the sample would bias the results.

Typically, a simple 0 or 1 is assigned to an observation to represent membership on a committee or party membership, or an integer is assigned for the number of terms or rank of the representative (Knight, 2005), (De Figueiredo and Silverman, 2006), (Berry et al., 2010). However, in the context of my analysis, which involves the interaction between local government-hired lobbyists and congressional representatives, a simple 0 or 1 does not capture the variation between counties' representation by a congressional representative *within* that representative's congressional district. Counties that form a larger part of the population (constituents) of congressional districts should have a larger sway over their representatives than counties that make up a smaller percentage of that representative's constituents. I thus normalize each county level House variable by the share of each congressional district that falls into each particular county.

Formally, I define a constituent weighted House Congressional variable (C_{it}) at the county i level, based on congressional representative variables (y_{jt}) at the congressional district j level in the following way:

$$C_{it} = \sum_{j=1}^{435} y_{jt}\alpha_{ij}$$

Where i indexes counties, j indexes one of 435 congressional districts, t indexes

the variables of interest are only the time period, lobbying expenditure amount, and client name. In analyzing the lobbying reports, the greatest chances for measurement error appear to be in the description of the lobbying activity.

[33]For example, some lobbying firms listed their clients as being located in Virginia, even though

the year, and α_{ij} represents the constituent weight given to each county. For every congressional district j, split by H counties, $\sum_{i=1}^{H} \alpha_{ij} = 1$. y_{jt} represents each of the House variables as commonly defined: 0 or 1 for HAC representation, and the number of terms served in the House, by political party.

For example, Kansas's 4th Congressional District was represented by Republican Todd Tiahrt from 1995 to 2011. The fact that Tiahrt served on the HAC implies that the counties within his congressional district should receive positive values for the HAC variable. However, as Figure 3.7 shows, the 4th Congressional District varies greatly in terms of its population distribution across the counties it contains. Sedgwick County, which includes the city of Wichita, contains the majority of the district's population. Thus, to assign a dummy variable of 1 to all eleven counties in the 4th district would be misleading, assuming that a representative cares most about the welfare of the areas where the majority of his or her constituents are located. The numbers in Figure 3.7 are thus the constituent weighted HAC variable values for each of the counties in the 4th Congressional District of Kansas.

My method of constituent weighting congressional variables proves especially valuable for more complicated scenarios. The highest HAC value over the sample period is for Los Angles County, which is split by 18 congressional districts, not all of which are perfectly contained within the county lines. It receives a 2 for the HAC variable since during the years 2007 to 2010 it had two members whose districts were completely contained within its borders: Lucille Roybal-Allard (D, CA, 34) and Adam Schiff (D, CA, 29). Again, to give Los Angeles County a HAC value of 1 would downplay the level of access the county had to representation on the HAC during those years.

Information on congressional committee appointments to the House and Senate Appropriations Committees (HAC and SAC respectively) and member tenure by term length and party ($HouseD.$, $HouseR.$, $SenateD.$, and $SenateR.$) come from Charles Stewart's congressional database.[34]

One additional political control variable available at the county level is the absolute value of the deviation of the county percent Democrat vote in the last presidential election compared to the national average ($Votegap$). This follows the Levitt and Poterba (1999) approach to measuring politically "competitive" regions.[35]

Other variables

Until recently, measuring housing prices at the county level was not possible. Using repeat sales data, Bogin et al. (2016) develop a housing price index at the zip code level for 1975 to 2015. I constructed county level annual averages of the Bogin et al. (2016) data by weighting each zip code by its percent of each county's population.

The BEA Regional Statistics Series provides data by NAICS industry code on

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they were clearly not located in that state based on the client name.

[34] See: Stewart (2011)

[35] The data for the $Votegap$ variable come from the CQ electoral database.

the wages and employments of every county in the United States from 1969 to 2014. Additionally, they provide the level of personal income and population. The BLS Local Area Unemployment Survey (LAUS) is used for unemployment rate data by county.

Because the level of state intergovernmental aid that local governments receive is likely to impact the fiscal condition of local governments and their decision to lobby for earmarks, I also use the state level aggregated total of state-to-local government aid from the Census Bureau.[36] This series is used from year 2004 onward, and represents the state level aggregate funding supplied to local governments by their states.[37]

Summary Statistics

Table 3.2 highlights the summary statistics for the data for the year 2009. Only 19 percent of the county-year observations lobbied at some point over the period of 2001 to 2014, and the differences are apparent. The lobbying group of counties received almost seven times as many earmarks as non-lobbying counties both in number and dollar amount. They were also more likely to have HAC representation and longer tenured representatives in the House. Interestingly, these differences were not present for Senate controls, suggesting that the allocation of federal earmarks to local governments depends on House rather than Senate variables. Lobbying counties were also more politically competitive, had slightly higher unemployment rates and larger populations, were less farm- and manufacturing-based in industry, and had larger levels of personal income per capita. In other words, lobbying counties tended to be more urban.[38] They also received more federal grants in total, and experienced larger decreases in their housing price growth rates.

Table 3.3 shows that the correlations were as expected. All of the House variables were strongly correlated with earmarks, while the Senate variables were not. The strongest correlation was between lobbying and earmarks. The constituent weighted variables HAC, $HouseD.$, and $HouseR.$ (terms of tenure for House Democrats and Republicans, respectively) were correlated strongly with both earmarks and with lobbying.

Figure 3.8 shows the relationship between the amount of lobbying expenditures and the number of earmarks received. Each data point is a county and is indexed by state, congressional district, and the last digit of the year that the earmark was enacted matched with the lagged year that the lobbying took place. A detectable aggregate pattern exists between lagged lobbying expenditures and earmarks. There are some counties that exhibited a strong upward correlation where lobbying and earmarks were positively correlated over time. For example, Los Angeles County, (CA, 27) shows a strong, upward trend, spending $1.22 million, $2.23 million, and $2.64

[36] Unfortunately, there are no annual series at the county or local government level.

[37] Although there are earlier years available, the data are not available for 2002 to 2003 because the Census Bureau did not conduct a local government survey in those years. Rather than impute 2002 and 2003, I simply begin using these data in 2004.

[38] This corroborates with the findings of Chernick et al. (2011), in that more urban local govern-

million in 2004, 2007, and 2008 respectively, and receiving 32, 50, and 41 earmarks in 2005, 2008, and 2009 respectively.[39] However, there were some places with very little or no lobbying that did receive earmarks, such as Westchester, NY (NY, 18) which spent just over $80,000 in each of the years prior to receiving 16 earmarks in 2008 and 17 in 2009.

V. Results

For each of the tables, column (1) is a pooled cross section OLS model with no control variables, and columns (2) and (3) include fixed effects and several control variables that are likely to be important explaining earmarks. Given that there are many institutional differences across the United States in terms of local governments, the fixed effects will be important in order to avoid bias in estimating the rate of returns to lobbying.

Another potential concern is the possibility for earmarks funded by the American Recovery and Reinvestment Act (ARRA) of 2009 to be correlated with housing prices. This would violate a key, identifying assumption of the instrumental variables model. However, the ARRA was claimed to be earmark free (Adair, 2009), and while it is possible that it funded some earmarks, scholarly work on the ARRA has noted that the law, for the most part, used pre-existing formulas and did not target funds to areas with higher than average unemployment rates (Wilson, 2012), (Young and Sobel, 2013), (Dupor et al., 2014). This makes it highly unlikely that housing price changes in 2008 (the instrument for lobbying in 2008 used to calculate the rate of returns to lobbying for 2009 earmarks) would be correlated with earmarks in 2009.

The results for specifications where earmarks are defined as the log of the dollar amount are displayed in Table 3.4. Column (1) is a pooled cross section with no control variables and shows that for a 1 percent increase in lobbying expenditures, earmarks increased by 0.56 percent, significant at the 99 percent level. The inclusion of control variables in columns (2) and (3) decrease the coefficient further to 0.23 percent with the same level of statistical significance.

Table 3.5 displays results for earmarks as a binary variable in order to show the impact of lobbying on earmarks along the extensive margin of earmark distribution. Column (1) implies that for a 1 percent increase in lobbying, the probability of receiving an earmark increased by 0.04 percentage points. Column (2) shows that including control variables decreases the coefficient to 0.015.

Of the congressional variables, only the coefficient on tenure for membership on the SAC and years of tenure for Senators in the Democratic party are statistically significant. At first glance, this may seem puzzling, since the correlation coefficients indicated the presence of a strong relationship and theory predicts that the constituent weighted House variables should matter more than the Senate variables. However, as

ments tend to be less reliant on the property tax. They would be more likely to be hit by the direct effects of the Great Recession, and therefore more likely to lobby.

[39]For the purposes of illustration, counties in Figure 3.8 are assigned to the congressional district

the Data Description below notes, there was only one change in majority party over the sample period, leaving the county fixed effects to absorb most of the variation in the congressional variables.[40]

Instrumental Variables

The decision to lobby may be endogenous to receiving an earmark. For example, if a local government is more or less likely to lobby based on their expectations about their chances of success, then the point estimates of the elasticity of earmarks to lobbying will be biased. To address this, I use instrumental variables methods.

I instrument for lobbying expenditures with the growth rate of the housing price index. Column (5) of Table 3.4 shows the first stage results from the instrumental variables regressions with fixed effects.

The dependent variable is the lagged logarithm of lobbying. It is strongly correlated with the instrument which is significant at the 99 percent level with a coefficient of -0.046. This negative correlation implies that a 1 percentage point increase in the growth rate of the housing price index is associated with a decrease in lobbying of 4.6 percent. The time period of the analysis (2005, 2008-2009) captures the before and after variation in housing prices that occurred around the time of the Great Recession. The rest of the coefficients demonstrate that governments that lobbied were, on average, more politically competitive, had decreasing growth in personal income per capita, and experienced positive changes in their unemployment rates.

The second stage instrumental variables results are shown in Column (4) of Tables 3.4 and 3.5. The first stage F-test statistic of the excluded instrument is 56.69, indicating a strong correlation between housing prices and lobbying.

For the specification with earmarks defined as the log dollar amount (Table 3.4), the point estimate jumps to 0.486, however it is significant at the 90 percent level. Using this point estimate as an elasticity, I find that for an additional $1 in lobbying expenditures among local governments that lobbied, there was an increase in the size of earmarks of $5.11.

Table 3.5 also displays a large jump in the point estimate for lobbying to 0.06, statistically significant at the 95 percent level. This result implies that an additional 1 percent of lobbying increased the probability of receiving an earmark by 0.06 percentage points, which suggests that among local governments that lobbied, an additional 1 percent of lobbying, or $1,527 on average, increased the probability of receiving an earmark by just 0.06 percent; an expected value of roughly $964. This is comparable to an additional $1 in lobbying expenditures leading to an increase of $0.63 in the expected value of earmarks.

Taken together, these findings point to the existence of barriers to receiving earmarks in terms of lobbying expenditures. Counties that wished to improve their

that contains the majority of their population. Los Angeles County is thus labeled as belonging to the 27th congressional district, even though it contains 18 congressional districts.

[40]The same specifications were estimated with random effects instead of fixed effects, and all of the House congressional variables proved statistically significant and large in magnitude. This

probability of receiving an earmark needed to overspend on lobbying relative to what was sensible in terms of expected value. This may perhaps be why there was so little lobbying among local governments and why the return to lobbying along the extensive margin was so profitable; more was actually required than just an additional $1 in lobbying in order to get that additional $5 in earmarks.

The unprofitable rate of return to lobbying along the extensive margin of earmarks may have also been the result of unobserved, future returns to lobbying; going from 0 to positive amounts of earmarks was more costly than going from some positive amount of earmarks to a larger amount. It may be that there is a non-linear effect of lobbying expenditures, where the first portion of the expense solidifies a base of goodwill between the legislator and the local government, which then allows for additional conversations to be had regarding specific projects and issues. A similar phenomenon is described by Kerr et al. (2014) in the context of private firms' lobbying activities as "increasing returns to experience." Also, lobbying may have longer term effects not captured with the 1 year lag included in the model. Although the lobbyists interviewed suggested that 1-2 years was the period of time in advance for lobbying to be effective, this observation may suffer from a small sample bias (as noted, I interviewed five lobbyists).

Robustness Checks

Due to the possibility that larger local governments may have been more likely to lobby for something other than earmarks such as policy changes, I re-estimated all of the models after dropping the largest 5th percentile of counties in terms of population. These results are noted in the table titles as "dropped largest counties" (Tables 3.6 and 3.7).

In both cases, the instrumental variables coefficient is not statistically significant. Also, the F statistic drops to below 6, causing concern over the strength of housing prices as an instrument. These results corroborate the fact that local government lobbying was dominated by large counties.

VI. Conclusion

This essay contributes to the economic literature on lobbying by providing estimates of the rate of returns to lobbying. My analysis finds economically and statistically significant returns to lobbying along both the intensive and extensive margins of the distribution of earmarks to local governments, but the estimated rate of return in each case points to different conclusions regarding the optimal level of lobbying expenditures: additional lobbying was not likely to be profitable in securing *an* earmark, while it was highly likely to be profitable in securing a *larger* earmark. This difference may explain why relatively few counties lobbied (19 percent) or received earmarks (22.5 percent), and why the majority of local government lobbying was done

corroborates De Figueiredo and Silverman (2006).

by the most highly populated counties. Most local governments could not count on receiving an earmark, and thus most places simply did not bother lobbying for them.

Several other more nuanced explanations of the relative lack of lobbying may also be relevant. Local governments that wished to lobby may have been deterred from doing so due to financially prohibitive initial costs that would not have paid off until years later. Additionally, some lobbying was carried out by national associations such as the National League of Cities. Local governments with fewer resources may have been more likely to opt for representation through such an organization, or through partnerships with private companies.[41]

A final explanation of the dearth of lobbying relates to the potential spillover effects of earmarks and lobbying. If earmarks tended to benefit neighboring counties as well as the receiving county, then local governments may have been less likely to lobby. To the extent that local governments were aware of their neighbors' propensity to lobby, they may have been less likely to engage in the costly investment themselves given that they also stood to benefit if their neighbor lobbied. Future work may be needed to model this interaction in a game-theoretic way, and by using spatial econometric methods.

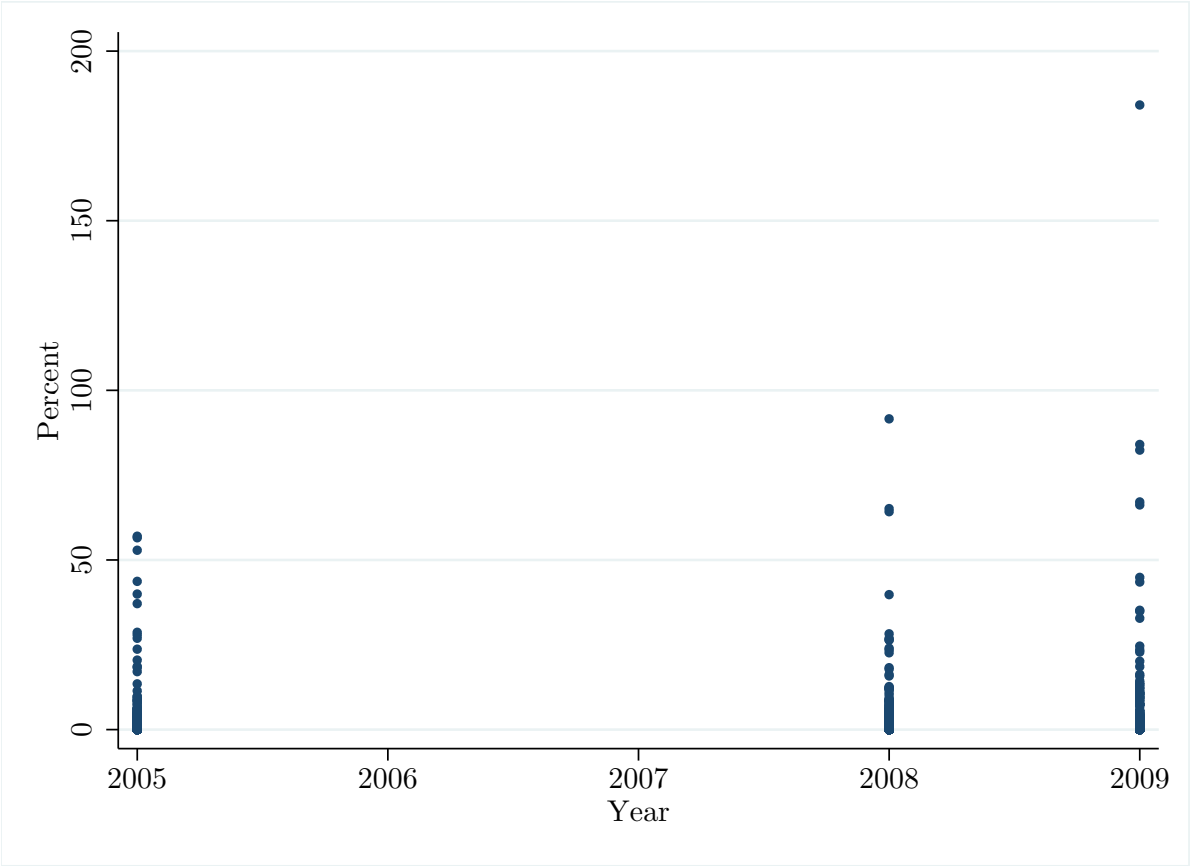
Given the ban on earmarks that went into effect in 2011, the situation at the time of this writing is significantly altered. Local governments no longer have access to the same opportunities.[42] How lobbying has changed since the end of the "Age of Earmarks" remains to be seen.

[41] A conversation with one lobbyist indicated that local governments without the funds to hire lobbyists frequently join with other interested parties.

[42] See: Times (2012).

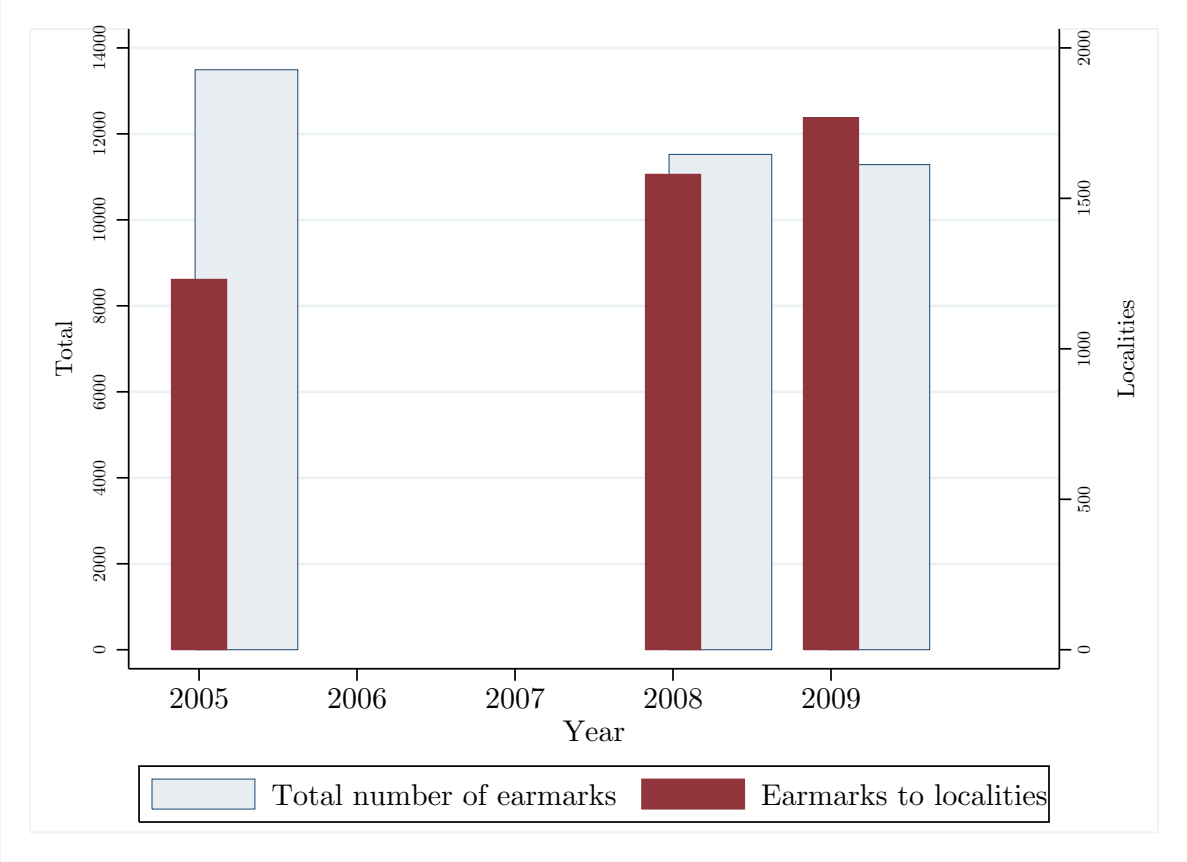
Figures and Tables

Figure 3.1: Earmarks As Percent of 2007 Own-Source Revenues



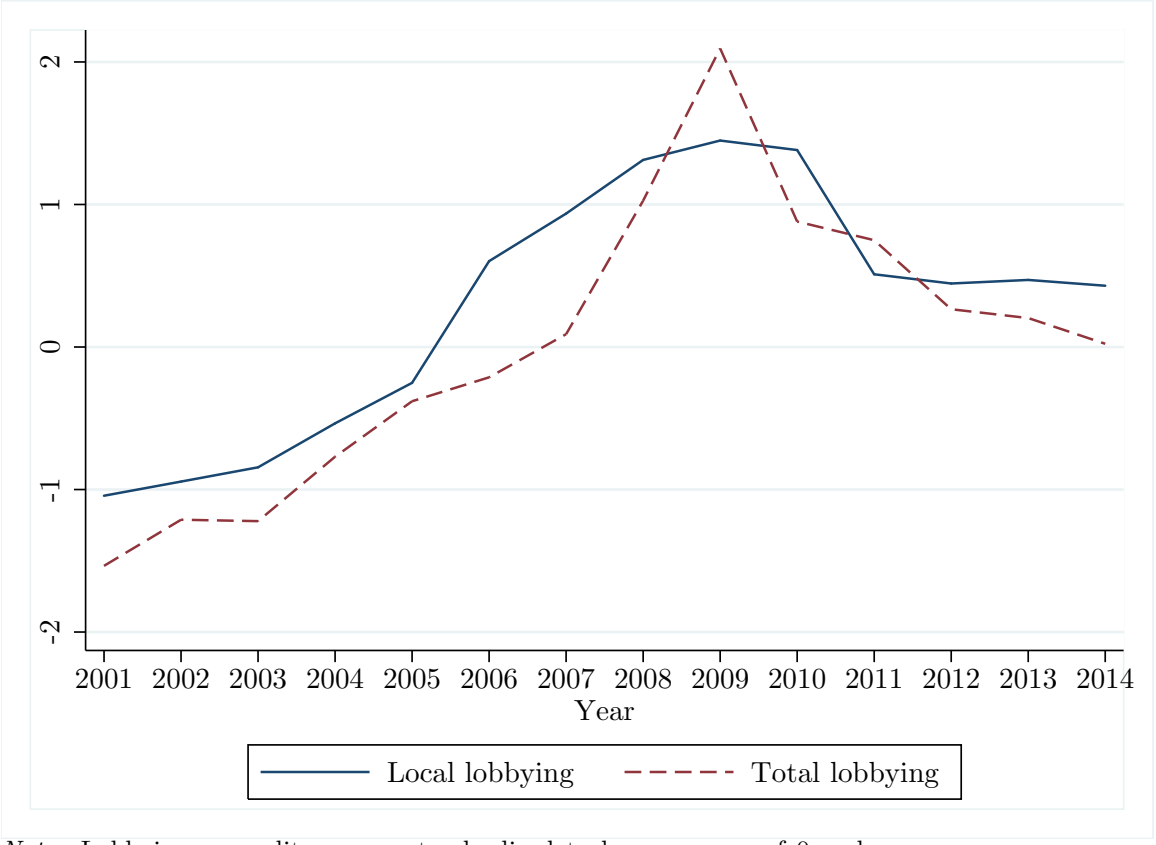
Note: Earmark data from the OMB are only available at the recipient level for 2005, 2008, and 2009

Figure 3.2: Number of Earmarks



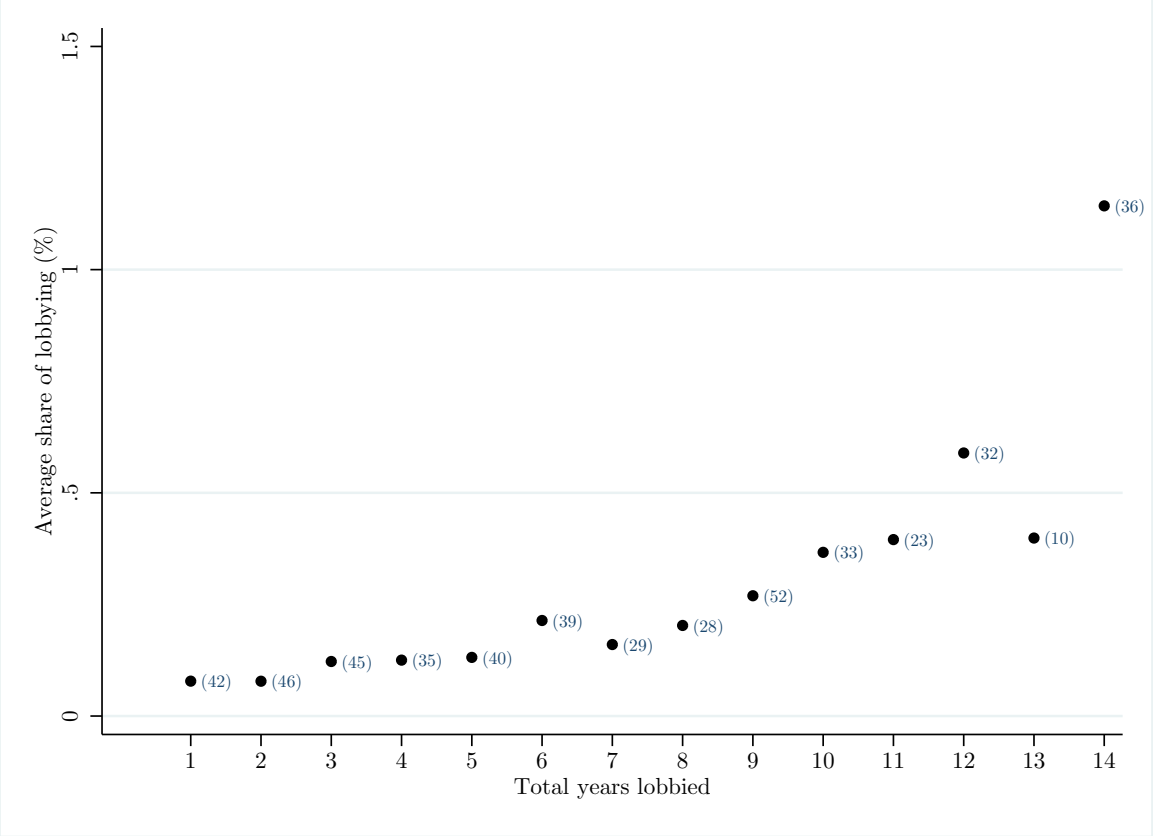
Note: Earmark data from the OMB are only available at the recipient level for 2005, 2008, and 2009

Figure 3.3: Standardized Lobbying Expenditures



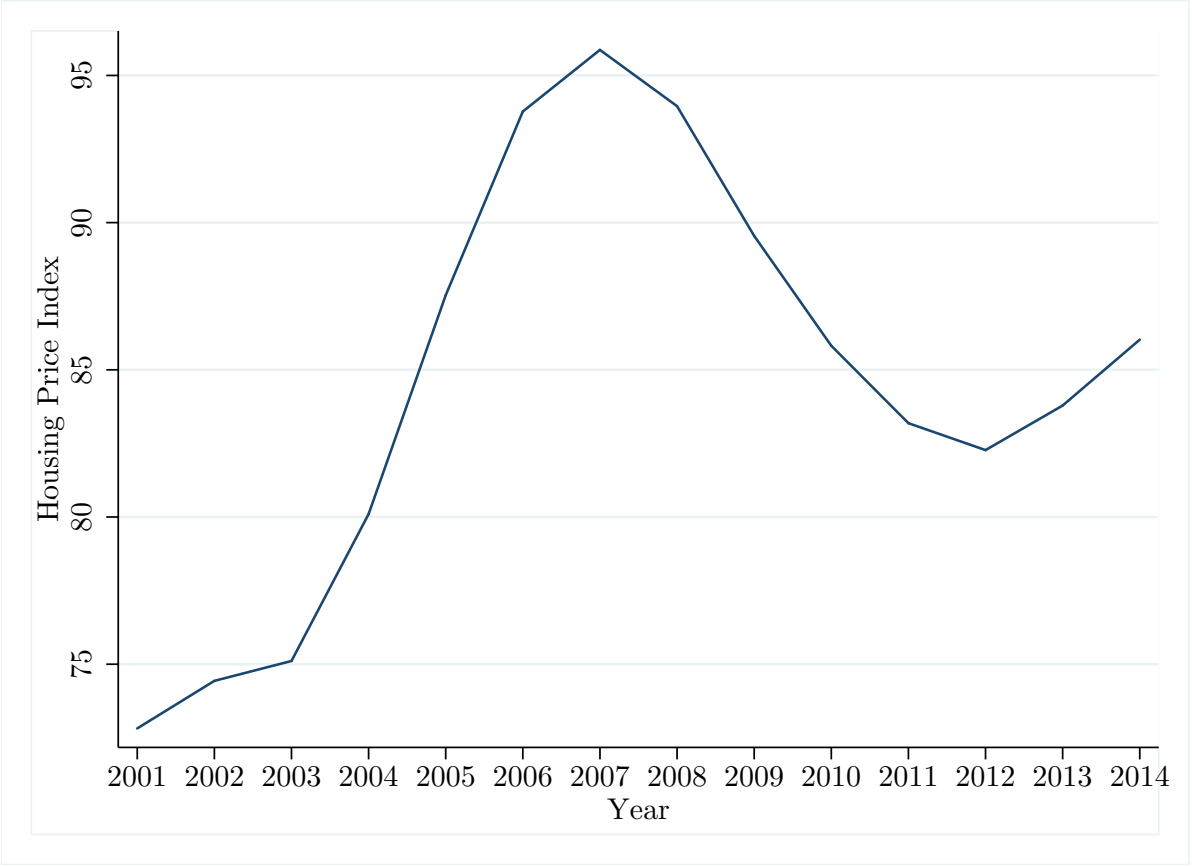
Note: Lobbying expenditures are standardized to have a mean of 0 and standard deviation of 1 for both series in order to show the relative trends.

Figure 3.4: Average Lobbying by Total Years Lobbied



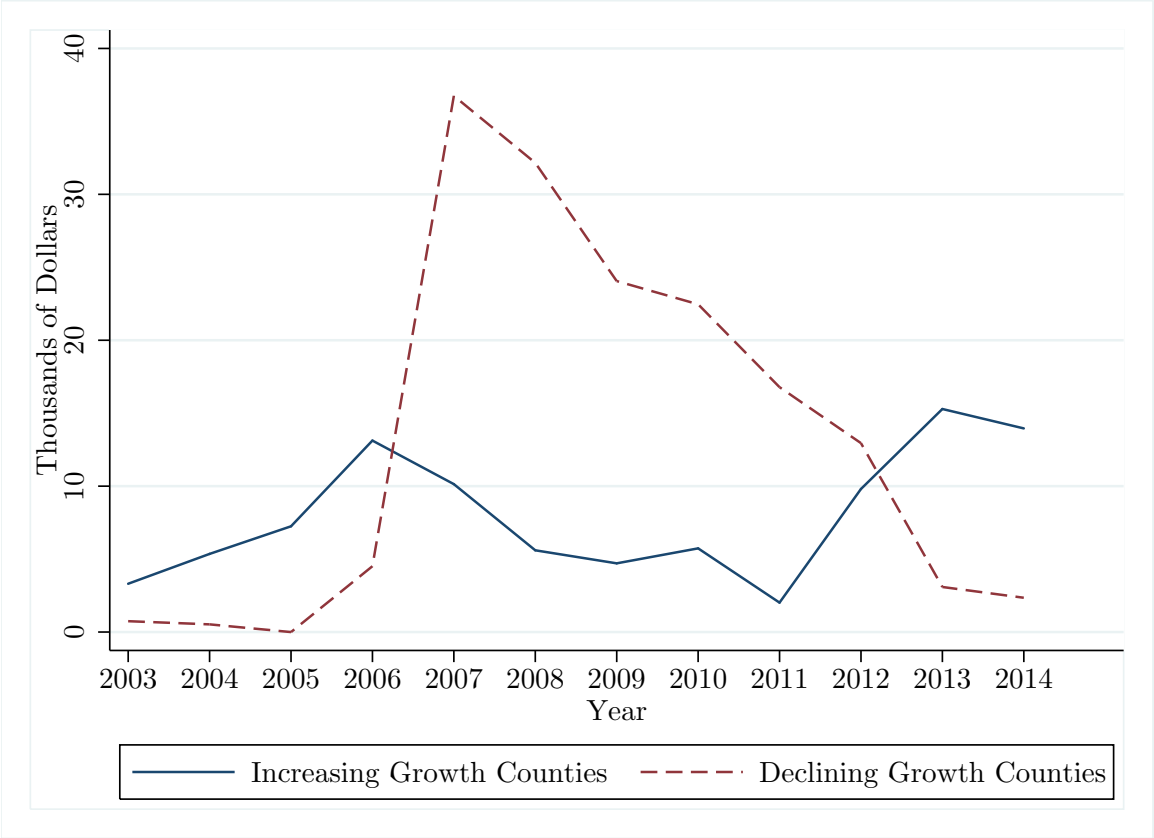
Note: Numbers in parentheses represent the number of different counties as categorized by total number of years lobbied. Average share of lobbying (%) represents the percentage of total local government lobbying a county expends in the average year. Total Years Lobbied is the total number of years a county lobbied from 2001 to 2014.

Figure 3.5: Housing Prices and the Great Recession



Note: The base year for the housing price index is 2000. The data come from Bogin et al. (2016).

Figure 3.6: Average Lobbying Expenditures by Housing Price Growth Rates



Note: Each annual data point represents the average lobbying expenditures for counties based on the growth rate of housing prices. For each year, counties are assigned into one of two groups based on whether their growth rate in housing prices was positive or negative. Average lobbying expenditures are in thousands of 2009 dollars.

Figure 3.7: The 4th Congressional District of Kansas

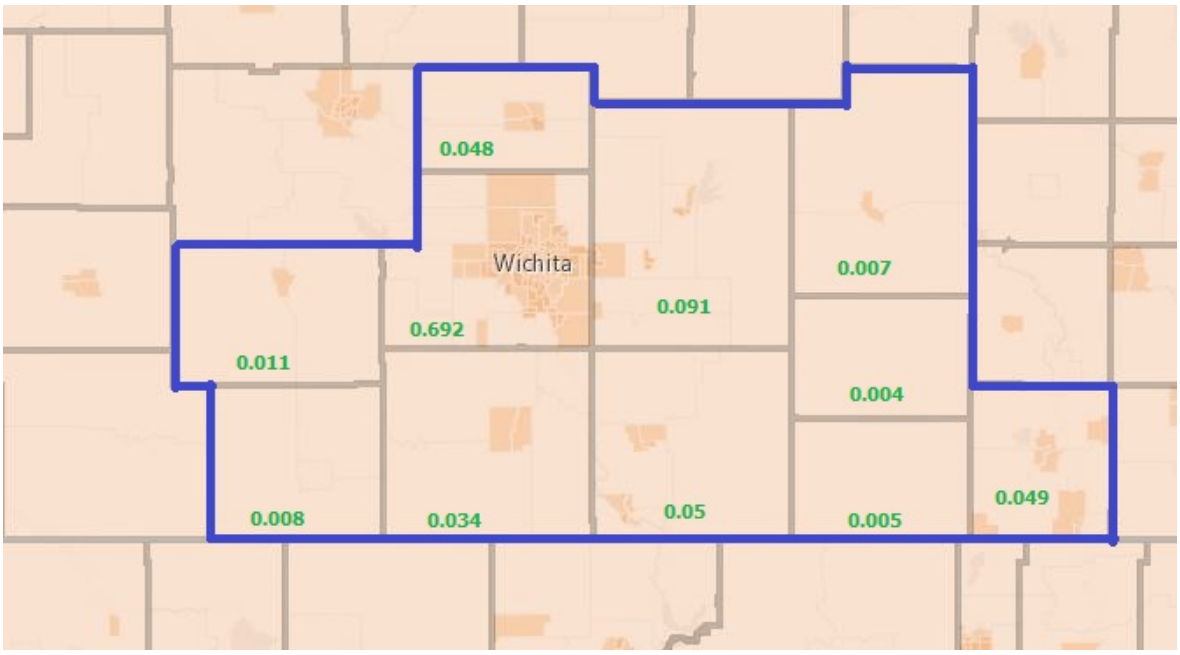
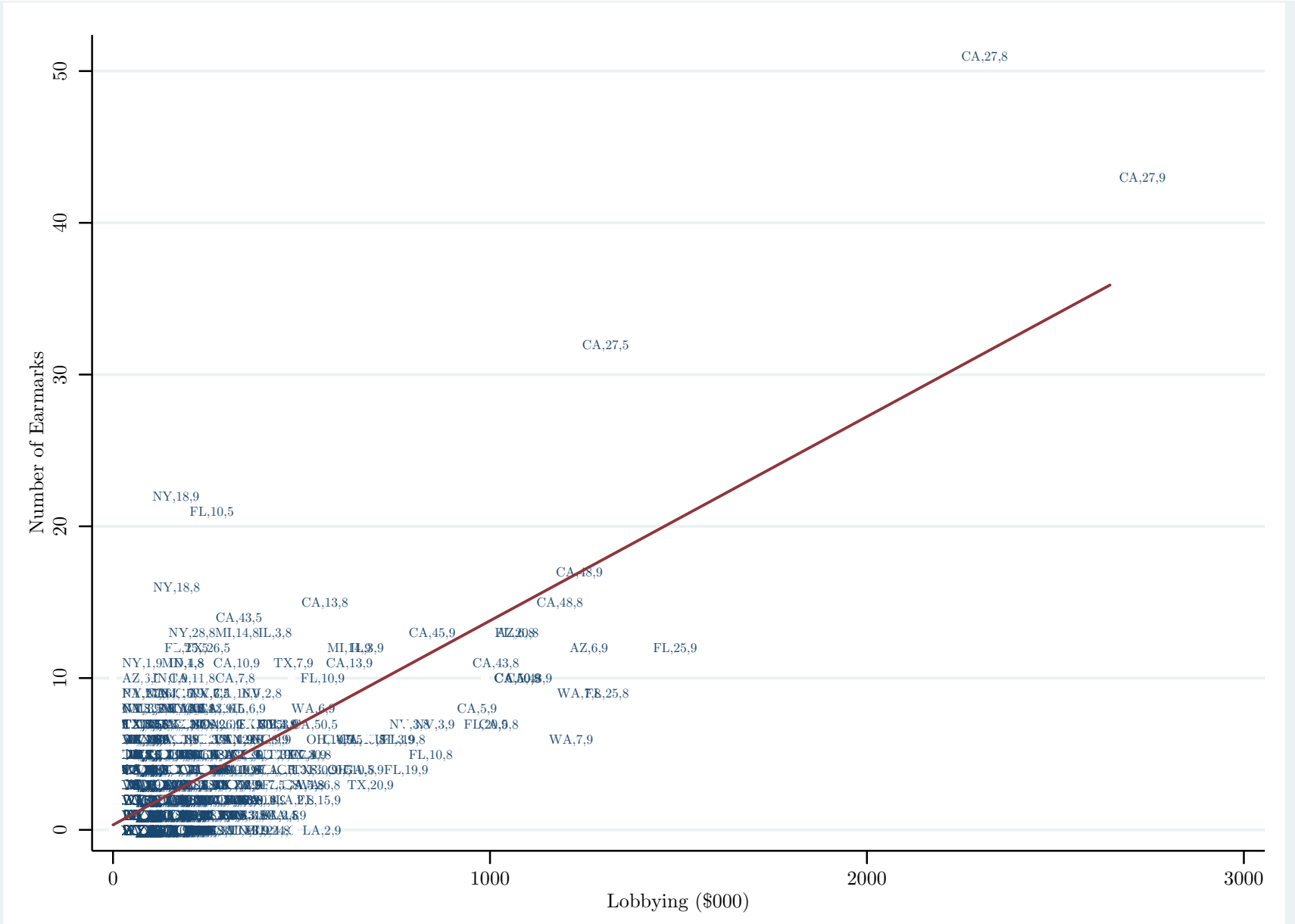


Figure 3.8: Distribution of Earmarks and Lobbying Expenditures



Note: State, congressional district, and last digit of year noted for each county in graph. Lobbying expenditures are lagged, and in thousands of 2009 dollars.

Table 3.1: Earmarks As Percentages of Own-Source Revenues
By Population Quartiles

	Mean	SD	N
Q1			
2005	5.00	10.23	155
2008	3.82	8.25	202
2009	6.05	17.18	176
Q2			
2005	0.93	1.11	151
2008	1.81	7.00	196
2009	1.98	7.98	186
Q3			
2005	0.41	0.96	151
2008	0.50	1.55	181
2009	0.50	1.23	201
Q4			
2005	0.13	0.21	143
2008	0.23	0.65	187
2009	0.16	0.21	192

Note: All values are in percent terms in relation to local government own-source revenues for county, municipal, and township governments from the 2007 Census of Governments.

Table 3.2: County Descriptive Statistics, 2009

	Never lobbied (N = 2589)		Lobbied (N = 490)	
	Mean	SD	Mean	SD
Earmarks (number)	0.30	0.82	2.02	3.31
Earmark amounts (thousands)	171	1,257	1,204	2,696
Lobbying amounts (thousands)	0	0	109	211
HAC	0.01	0.06	0.07	0.22
SAC	0.62	0.49	0.50	0.50
Tenure (House Dem.)	0.23	1.26	1.69	5.42
Tenure (House Repub.)	0.20	0.58	1.26	2.85
Tenure (Senate Dem.)	10.07	15.82	9.86	12.92
Tenure (Senate Repub.)	14.46	12.94	13.72	13.70
Vote gap	15.52	10.01	11.99	8.80
Unemployment Rate	8.16	3.98	8.78	3.52
Personal Income, Per Capita (thousands)	32	7	36	9
Federal Grants (millions)	99	693	832	1,919
Population (thousands)	49	119	362	679
Farm Employment, Share	0.0856	0.0728	0.0225	0.0288
Construction Employment, Share	0.0641	0.0276	0.0607	0.0211
Manufacturing Employment, Share	0.0927	0.0682	0.0742	0.0484
Housing Price Index, %Δ	-2.2603	3.6422	-6.3079	7.3478

Note: Counties are categorized as either having lobbied or having never lobbied based on whether they lobbied at any point during 2001 to 2014.

Table 3.3: Cross Correlations

	Earmarks	Lobbying	HAC	SAC	House D.	House R.	Senate D.	Senate R.	Vote gap
Earmarks	1.00								
Lobbying	0.67	1.00							
HAC	0.53	0.42	1.00						
SAC	0.02	−0.01	−0.02	1.00					
House D.	0.65	0.56	0.54	−0.02	1.00				
House R.	0.51	0.54	0.45	−0.02	0.26	1.00			
Senate D.	0.10	0.04	0.04	0.10	0.11	0.04	1.00		
Senate R.	−0.06	−0.06	−0.05	0.22	−0.10	−0.07	−0.48	1.00	
Vote gap	−0.09	−0.05	−0.06	0.14	−0.01	−0.11	−0.22	0.19	1.00

Note: Earmarks are defined here as the number of earmarks each county received. Each of the House and Senate variables are the tenure variables by party.

Table 3.4: Rate of Returns to Lobbying
Dependent variable: Earmark Amount (logarithm of total dollar value)

	(1)	(2)	(3)	(4)	(5)
Lobbying	0.557 ***	0.233 ***	0.231 ***	0.486 *	
	(0.017)	(0.041)	(0.040)	(0.266)	
PI per capita (%Δ)		2.758*	2.866*	3.106*	−1.031*
		(1.608)	(0.561)	(1.546)	(1.548)
Unemployment rate (%Δ)		0.019	0.017	0.013	0.015**
		(0.021)	(0.021)	(0.021)	(0.006)
Population (%Δ)		16.395 **	16.141 **	16.520 **	3.594
		(7.762)	(7.783)	(7.661)	(3.585)
State-to-local aid		−1.490	−0.801	−0.786	0.096
		(1.867)	(2.063)	(2.076)	(0.706)
Log of population		−3.563	−3.788	−6.245*	8.839***
		(2.393)	(2.372)	(3.677)	(1.935)
Log of personal income percap		−2.112	−1.997	−1.938	0.473
		(1.476)	(1.438)	(1.473)	(0.730)
Vote gap			−0.054	−0.046	−0.021***
			(0.035)	(0.037)	(0.008)
HAC			0.189	0.536	−1.624
			(1.527)	(1.631)	(1.077)
SAC			−0.604**	−0.609**	0.009
			(0.238)	(0.258)	(0.149)
House D.			−0.005	−0.053	0.142
			(0.130)	(0.130)	(0.146)
House R.			0.334*	0.342*	−0.013
			(0.199)	(0.207)	(0.112)
Senate D.			0.003	0.005	−0.005
			(0.011)	(0.011)	(0.007)
Senate R.			−0.022	−0.023	0.010
			(0.022)	(0.023)	(0.010)
Housing Price Index (%Δ)					−0.046***
					(0.006)
Obs. Counties	8,122	8,122	8,122	8,122	8,122
IV F Statistic		2,714	2,714	2,714	2,714
				56.69	
Fixed Effects	No	Yes	Yes	Yes	Yes
Year Effects	No	Yes	Yes	Yes	Yes

Note: *** denotes 99 percent confidence level, ** denotes 95 percent confidence level, * denotes 90 percent confidence level. Standard errors in parentheses. Standard errors clustered at the state level.

Table 3.5: Rate of Returns to Lobbying
Dependent variable: Earmark Receipient (binary variable)

	(1)	(2)	(3)	(4)	(5)
Lobbying	0.044 ***	0.015 ***	0.015 ***	0.060 **	
	(0.001)	(0.003)	(0.003)	(0.027)	
PI per capita (%Δ)		0.097	0.107	0.150	−1.031*
		(0.134)	(0.129)	(0.140)	(0.561)
Unemployment rate (%Δ)		0.001	0.001	0.001	0.015**
		(0.002)	(0.002)	(0.002)	(0.006)
Population (%Δ)		0.758	0.679	0.746	3.594
		(0.677)	(0.683)	(0.663)	(3.585)
State-to-local aid		−0.299	−0.148	−0.145	0.096
		(0.187)	(0.200)	(0.207)	(0.706)
Log of population		−0.430*	−0.370	−0.808**	8.839***
		(0.225)	(0.227)	(0.334)	(1.935)
Log of personal income percap		−0.157	−0.160	−0.149	0.473
		(0.120)	(0.111)	(0.122)	(0.730)
Vote gap			−0.003	−0.002	−0.021***
			(0.003)	(0.003)	(0.008)
HAC			−0.054	0.008	−1.624
			(0.094)	(0.118)	(1.077)
SAC			−0.029	−0.030*	0.009
			(0.023)	(0.016)	(0.149)
House D.			0.000	−0.008	0.142
			(0.011)	(0.012)	(0.146)
House R.			0.002	0.003	−0.013
			(0.011)	(0.013)	(0.112)
Senate D.			0.004***	0.004***	−0.005 (0.001)
				(0.001)	(0.007)
Senate R.			−0.001	−0.001	0.010
			(0.002)	(0.002)	(0.010)
Housing Price Index (%Δ), lagged					−0.046***
					(0.006)
Obs. Counties	8,122	8,122	8,122	8,122	8,122
IV F Statistic		2,714	2,714	2,714	2,714
				56.69	
Fixed Effects	No	Yes	Yes	Yes	Yes
Year Effects	No	Yes	Yes	Yes	Yes

Note: *** denotes 99 percent confidence level, ** denotes 95 percent confidence level, * denotes 90 percent confidence level. Standard errors in parentheses. Standard errors clustered at the state level.

Table 3.6: Rate of Returns to Lobbying (dropped largest counties) Dependent variable: Earmark Amount (logarithm of total dollar value)

	(1)	(2)	(3)	(4)	(5)
Lobbying	0.413 ***	0.280 ***	0.279 ***	0.438	
	(0.020)	(0.053)	(0.052)	(0.655)	
PI per capita (%Δ)		2.539*	2.682*	2.736*	−0.376
		(1.481)	(1.526)	(1.558)	(0.508)
Unemployment rate (%Δ)		0.019	0.017	0.015	0.013**
		(0.022)	(0.022)	(0.023)	(0.006)
Population (%Δ)		15.271**	14.904*	15.565*	−1.107
		(7.989)	(7.614)	(7.616)	(3.185)
State-to-local aid		−1.690	−0.947	−0.972	0.270
		(1.818)	(2.087)	(2.098)	(0.610)
Log of population		−4.366*	−4.443*	−5.931	8.878***
		(2.425)	(2.422)	(6.711)	(1.679)
Log of personal income percap		−2.165	−2.072	−2.100	0.441
		(1.419)	(1.430)	(1.436)	(0.619)
Vote gap			−0.048	−0.044	−0.022***
			(0.035)	(0.042)	(0.007)
HAC			6.864	7.238	−2.166
			(4.448)	(4.593)	(1.591)
SAC			−0.472**	−0.469*	−0.012
			(0.241)	(0.253)	(0.117)
House D.			0.149	0.054	0.466
			(0.620)	(0.787)	(0.658)
House R.			−0.037	−0.019	−0.130
			(0.380)	(0.369)	(0.304)
Senate D.			0.002	0.003	−0.009
			(0.012)	(0.013)	(0.007)
Senate R.			−0.025	−0.026	0.011
			(0.021)	(0.024)	(0.009)
Housing Price Index (%Δ)					−0.027**
					(0.011)
Obs. Counties	7,642	7,642	7,642	7,642	7,642
IV F Statistic		2,554	2,554	2,554	2,554
				5.57	
Fixed Effects	No	Yes	Yes	Yes	Yes
Year Effects	No	Yes	Yes	Yes	Yes

Note: *** denotes 99 percent confidence level, ** denotes 95 percent confidence level, * denotes 90 percent confidence level. Standard errors in parentheses. Standard errors clustered at the state level.

Table 3.7: Rate of Returns to Lobbying (dropped largest counties) Dependent variable: Earmark Receipient (binary variable)

	(1)	(2)	(3)	(4)	(5)
Lobbying	0.035 ***	0.017 ***	0.017 ***	0.080	
	(0.002)	(0.004)	(0.004)	(0.061)	
PI per capita (%Δ)		0.108	0.111	0.132	−0.376
		(0.132)	(0.127)	(0.141)	(0.508)
Unemployment rate (%Δ)		0.002	0.002	0.001	0.013**
		(0.002)	(0.002)	(0.002)	(0.006)
Population (%Δ)		0.617	0.544	0.807	−1.107
		(0.665)	(0.663)	(0.687)	(3.185)
State-to-local aid		−0.285	−0.131	−0.141	0.270
		(0.194)	(0.202)	(0.207)	(0.610)
Log of population		−0.467*	−0.405	−0.996	8.878***
		(0.257)	(0.261)	(0.607)	(1.679)
Log of personal income percap		−0.192	−0.172	−0.183	0.441
		(0.122)	(0.114)	(0.125)	(0.619)
Vote gap			−0.002	−0.001	−0.022***
			(0.003)	(0.003)	(0.007)
HAC			0.287	0.436	−2.166
			(0.286)	(0.318)	(1.591)
SAC			−0.041**	−0.040***	−0.012
			(0.017)	(0.015)	(0.117)
House D.			0.113*	0.075	0.466
			(0.059)	(0.085)	(0.658)
House R.			−0.010	−0.003	−0.130
			(0.024)	(0.029)	(0.304)
Senate D.			0.004***	0.005***	−0.009 (0.001)
				(0.001)	(0.007)
Senate R.			−0.000	−0.001	0.011
			(0.002)	(0.002)	(0.009)
Housing Price Index (%Δ), lagged					−0.027**
					(0.011)
Obs. Counties	7,642	7,642	7,642	7,642	7,642
IV F Statistic		2,554	2,554	2,554	2,554
				5.57	
Fixed Effects	No	Yes	Yes	Yes	Yes
Year Effects	No	Yes	Yes	Yes	Yes

Note: *** denotes 99 percent confidence level, ** denotes 95 percent confidence level, * denotes 90 percent confidence level. Standard errors in parentheses. Standard errors clustered at the state level.

Chapter 4: Trust, Attitudes Towards Government, and the Growth of Government: Evidence on their Coevolution

I. Introduction

"With public sentiment, nothing can fail; without it, nothing can succeed."
-Abraham Lincoln

Scholars across economics, political science, and legal studies have commonly been divided over the role of government in economic life. Two contrasting models, the "public interest" and "public choice" views of government, predict differing outcomes in terms of social well being and economic production as a result of increases in government activity (Mueller, 2004).

A literature on social institutions argues that government functions tend to be more effective when the public exhibits trust in their leaders (Knack and Keefer, 1997). One could thus imagine a long run equilibrium arrived at by the mutual reinforcement of government growth and corresponding changes in social trust in government. The public interest model would consequentially predict a long run equilibrium where higher levels of government growth, on average, lead to higher levels of social trust, making for a more effective government overall. The public choice view, on the other hand, would predict a long run equilibrium where government growth, as a result of the reality of interest group activity, tends to decrease the level of social trust, in turn making existing government less effective and thus requiring higher levels of government activity to achieve the same goals.[1]

The growth of government activity in the United States over the latter half of the 20th and early 21st centuries provides an opportunity for a direct comparison of the public interest and public choice model predictions. As of 2014, the Code of Federal Regulations (CFR) documented a historic high of 159,835 pages of laws. Similarly, in 2009, federal spending less defense spending as a percent of GDP reached nearly 20 percent for the first time.

This essay adopts a novel approach to test whether government policy tends toward equilibrium in the long run and, if such an equilibrium exists, to characterize it. I utilize an extensive time series on public trust in government in order to test whether the public interest or public choice model better explains the data. While a large literature has documented and sought to explain the growth of government both in the United States and globally, no work has been able to provide macroeconomic evidence of the consequences for social trust as a result of this expansion in government size.

The findings documented in this essay are of relevance to both the political economy literature and the broader economic literature on trust and social institutions

[1]The fact that policy in the United States is created via the process of majority rule does provide potential benefits in the form of "cyclicality" (Buchanan, 1954). In theory, one could imagine a long-

for at least two reasons. First, existing work on the growth of government has been unable to say anything regarding the relative effectiveness of government activity, and has instead focused solely on making causal arguments towards its size. Broadly speaking, these arguments consist of institutional, political, and other factors (Holsey and Borcherding, 1997), (Borcherding and Lee, 2004). Plausible explanations include both institutional factors such as the income and price elasticities of demand for public services, and political factors that may enable rent seeking and determine the influence of interest groups in gaining redistribution in their favor. Kau and Rubin (2002), for example, classify potential causes of the growth of government into two categories: the "demand" for government (idiosyncratic preferences for government) and the "supply" of government (tax revenue creation and associated deadweight costs).

Second, the political economy literature offers a wide range of theoretical predictions regarding the outcome of government expansion in a free democracy, while related empirical work in this area has tended to focus on uncovering the various institutional characteristics (i.e. the "extensive margin" of government activity) that may lead to or inhibit economic growth (Acemoglu et al., 2005). Instead of examining this extensive margin of government activity (whether a robust property right system leads to positive economic outcomes, for example), I examine whether government activity along the "intensive margin" (i.e. more spending and regulations) leads to positive outcomes.[2]

I specify an empirical model that allows me to examine the dynamics of the relationship between public trust in government and government growth in a flexible way that minimizes prior structure. Using a vector error correction model (VECM), I test for and characterize a long run relationship between trust, government activity, and two other variables that I hypothesize play a role in the dynamic adjustment process: rent seeking, and labor productivity. When measuring government activity with federal transfer spending and pages in the CFR, my estimates imply the existence of a long run equilibrium between trust and government activity where higher levels of government growth lead to lower trust, higher rent seeking, lower productivity growth, and finally, higher government activity, consistent with the public choice model of government activity.

The remainder of this essay is structured as follows: Section II presents a motivation for the research question in the context of literature on the growth of government, Section III presents a brief theoretical motivation, Section IV provides an overview of the data, Section V describes the econometric analysis and the findings, and Section VI concludes.

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run equilibrium where bad policies are voted out and good policies remain.

[2]Dawson and Seater (2013) examine the impact of increases in the size of the CFR on growth.

II. Motivation

While public confidence in the United States Federal Government has been declining over the last fifty years (Pew Research Center, 2013), government regulation and rent seeking efforts have steadily increased. Despite continued growth in economic productivity over this same time period, theory and empirical work points to the possibility of forgone economic prosperity as a result of expanding government regulations and rent seeking (Krueger, 1974); (Goff, 1996); (Nicoletti and Scarpetta, 2003); (Dawson and Seater, 2013).

Garen and Clark (2015) present a model where government activity is not simply exogenous to economic performance, but is one of several endogenous variables: expansions in government activity lead to increases in rent seeking, which in turn lead to declines in productivity, leading to declines in the public's confidence in government, which results in a decrease in the effectiveness of government. The cycle is completed with this decrease in the effectiveness of government leading to the necessity of more government, thus restarting the cycle again. This essay both draws support from and contributes to the economic literature in two main areas: the growth of government and social trust in public institutions.

A. Growth of Government

Since at least the beginning of the 20th century, the idea that government naturally grows in proportion to national income, often known as "Wagner's Law," has been accepted almost universally (Atkinson and Stiglitz, 2015). Wagner's Law theorizes that this growth manifests via expansions in three main government functions: social services of the state, judicial, police, and defense, and welfare spending. A large body of work has sought to provide empirical tests of Wagner's law in a variety of settings, with mixed results (Henrekson, 1990), (Akitoby et al., 2006).

Abizadeh and Gray (1985) test Wagner's Law by examining 53 countries that they group into poor, developing, and developed categories. They find that Wagner's Law holds for developing countries, but not for poor countries. More puzzling, they find that the reverse of Wagner's Law holds for developed countries, where economic growth leads to less government growth as a share of total income. Ram (1987) examines data on 115 market economies over the 1950-1980 time period and finds little support for Wagner's Law. However, he excludes transfer payments from his analysis, one of the main government functions predicted to grow by Wagner's Law. In a related vein, Murrell (1985) finds that for a subsample of OECD countries in 1970 and 1980, a greater percentage of socialist leaning politicians leads to increases in the size of government, as do greater unemployment rates.

More generally, empirical work on the growth of government has sought to uncover new causal mechanisms that go beyond the basics of Wagner's Law. Most notably, Meltzer and Richard (1983) develop and test a general equilibrium model that examines the relationship between the average level of income among voters and the government's share of total income. Arguing that previous tests of Wagner's Law have omitted an important variable, the distribution of income, they test whether an

increase in the voting franchise increases government's share of the economy. They find that as both the level of median income and the ratio of mean to median income rises, government grows in terms of its share of total income, thus providing evidence in favor of Wagner's Law. They conclude that, in large part, the growth of government in the United States over the mid-20th century appears to have originated from voters with incomes below the mean voting for higher levels of redistribution, the costs of which were largely borne by those with incomes above the mean. This result amends Wagner's Law by including the income distribution as a relevant variable in determining the growth of government. However, Meltzer and Richard (1983) exclude public goods from their analysis such as defense, police, veterans' benefits, and highway spending.

Husted and Kenny (1997) corroborate the Meltzer and Richard (1983) findings by utilizing cross-state variation in Voting Rights Acts in the United States from 1950-1988. Their results indicate that a broader voting base leads to more government growth. More recent work, however, has found less support for the Meltzer and Richard (1983) findings.

In an analysis of 184 countries from 1960 to 2010, Acemoglu et al. (2013) find smaller impacts of the expansion of democracy in terms of redistribution and inequality than the Meltzer and Richard (1983) predictions. They argue that democracy both broadens the voting base and increases economic opportunities, which in turn increase income inequality mechanically. Democracy may also have a diluted effect on redistribution and inequality due to institutional constraints on government growth, or by serving middle class-specific preferences.

Historical changes to the nature of voting in the United States may have also played a role in the growth of government. Lott (1999) shows that extending voting rights to women led to increases in government growth measured both in expenditures and in more progressive voting records of members of Congress, while Tarabar and Hall (2015) describe how the election of state Senators by popular vote in the late 1800s led to an ideological shift in the U.S. Senate toward more progressive views.

Two alternative theories to Wagner's Law that offer differing explanations for the growth of government have gained prominence in the literature (Peltzman, 1980). The first is that any event that concentrates more power in the hands of a central government will necessarily lead to government growth. An example of this is Peacock and Wiseman (1961), who show that the government to GNP ratio of Britain increased after each of the World Wars. They use wartime spending increases as exogenous variation in the government's share of national income to argue that shocks to the centralization of government in the short run produce an acceleration of government growth in the long run. Evidence confirming this "centralization" view of government growth, however, is limited to the availability of plausibly exogenous, historical events.

A second theory of government growth described by Peltzman (1980) is the "public good" view, where the growth of government is the result of shifts in the demand for public goods. However, due to the inherent requirement for public good provision to benefit the population as a whole, Peltzman argues that the public good view cannot explain the growth in redistribution that has made up a large part of government

growth over the 20th century. Peltzman concludes with evidence that the growth in the middle class is what has been responsible for the growth of government across developed countries in the second half of the 20th century. He argues that this has broadened the voting base, which has increased the demand for government programs serving specific needs and for redistribution. This is similar to the argument made by Meltzer and Richard (1983): that more equality leads to the demand for even more equality.

Another related, underlying cause of the growth of government is proposed by Mueller and Murrell (1986) who argue that as the number of interest groups rises, even more interest groups are incentivized to form, all offering votes in exchange for specific favors. While some interest groups may be in favor of decreasing government expenditures, the authors hypothesize that on average, interest groups will seek to increase the level of government expenditures.[3]

In contrast to Wagner's Law, I argue that the interest group activity described by Mueller and Murrell relates government growth with public trust in government held by voters, a previously unconnected link in the feedback loop between government policy and voters' preferences.

B. Social Trust

Social trust in government may enhance the productivity of government activity by lowering the costs inherent in crime and tax fraud (Nye et al., 1997). Aghion et al. (2010), for example, use data on trust from the World Values Survey and find cross-country correlations between government regulation and public trust in government. They find that governments that play a more active regulatory role in their countries' economies are trusted less.[4] They document a pattern of reinforcing equilibria with both "good" and "bad" outcomes.

Other work has highlighted the role that social attitudes and trust towards private parties and governments plays in economic performance. Specifically, Knack and Keefer (1997) use measures of trust and cooperation from the World Values Survey to show that countries with more trust have higher levels of GDP growth and investment. Sapienza et al. (2006) find correlations between cultural backgrounds and attitudes, and the decision of workers to become entrepreneurs and save. Rosenberg et al. (1986) describe the general conditions necessary for economic growth based on the West's rise to wealth over the last several hundred years. They highlight several important details that allowed for the West to grow, including the rule of law, the ability to honor contracts, and a commonly held moral sense led by the Protestant Reformation that facilitated entrepreneurial activity. McCloskey (2009) argues that it was the attitudes towards the bourgeoisie class that shifted more favorably, allowing for growth to take place. Greif (1994) finds that cultural practices regarding contract enforcement were

[3]Holcombe (1999) argues that historically, Civil War veterans paved the way for special interests to influence American politics in the 20th century, as they were the first large and highly mobilized group to lobby the government.

[4]The World Values Survey measures trust based on the following question: *"Generally speaking,*

responsible for the differing growth rates between various trade and merchant groups. Francois and Zabojnik (2005) claim that the level of trustworthiness in a society is what leads to trade, and ultimately economic growth. The more people are able to trade with people outside of their close relatives, the better. Tabellini (2008) poses that moral values are what influence institutions. They note that since morality is largely inherited, long past history impacts current economic progress.

III. Theory

The model presented in Garen and Clark (2015) is consistent with existing literature. It predicts that social trust and productive government are complementary. At the same time, the model goes beyond other work on trust by introducing rent seeking and its impact on productivity into the determinants of trust, and by accounting for the mutual causation inherent in the relationship between trust and government growth.

In the Garen and Clark (2015) model, wasteful government activity incentivizes rent seeking, which, in turn, leads to a cycle of more government spending, lower productivity, and less confidence or trust in government. The model assumes that more powerful governments create greater incentives for rent seeking activity, and that the portion of government growth specifically intended to cater to special interests thus expands, which leads to a decrease in macroeconomic productivity and consequent decreases in public trust. Declines in trust are then assumed to lead to the necessity of a larger and more powerful government, thus perpetuating the cycle.

The model rests on the assumption that governments with more power increase the returns to rent seeking (or "political activity"), creating a bias of effort toward rent seeking and away from economic growth enhancing activity. In the model, rent seeking represents an exchange between politicians and private firms and citizens, where the former receive financial support and positive publicity, while the latter receive a wide variety of "prizes" increasing with the size of government growth (Buchanan et al., 1980).[5]

The Garen and Clark (2015) model allows for government activity (G) to be made up of two parts: good government activity (G_g) and bad (productivity decreasing) government activity (G_b). G_g consists of functions of government that enhance productivity such as the protection of property rights and infrastructure that leads to improved economic efficiency. G_b represents the portion of government that goes towards special interests or government programs that merely redistribute resources rather than enhance productivity.

The model implies that the greater the scale of G_b, the greater the returns to non-

would you say that most people can be trusted or that you need to be very careful in dealing with people?", coupled with several other questions that relate more closely to government institutions, such as: *"Do you have a lot of confidence, quite a lot of confidence, not very much confidence, no confidence at all in the following : Major Companies? Unions ? Justice ? Parliamentary democracy?"*

[5]As Stigler (1971) points out, there is much "machinery" that the government, chiefly the Federal

productive work, leading individuals to choose to engage in more rent seeking activity rather than socially productive activity. This theoretical prediction is illustrated by Figure 4.1, where trust (T) is a declining function of G_b.

Several assumptions regarding the utility function of individuals are required to drive the result that increases in the returns to rent seeking lead to increases in rent seeking activity over productive work, and that government activity that increases trust also increases social welfare. Specifically, the utility function of the representative individual includes terms measuring the positive impact of after tax income, the payoff from rent seeking activity, and the costs and benefits from cooperation with government. The utility maximizing individual thus chooses his levels of productive work and rent seeking as well as cooperation in order to maximize utility. While the levels of productive work and rent seeking are chosen based on the relative return between the two activities, the level of cooperation is chosen as a function of the trustworthiness of government; the more trust enhancing activity that the government engages in, the higher the returns from cooperation for the individual, and vice versa. The aggregate levels of trust (cooperation), productive work, and rent seeking in the economy are thus based on the choices of individual utility maximizers.

The model allows for a simultaneous increase in G_g, potentially enough to offset the productivity losses resulting from the increases in G_b and the increased tax rates needed to pay for the greater government activity. However, the model also assumes that politicians are utility maximizers, as public choice theory suggests, not welfare maximizers. This results in a divergence between what politicians seek to do with tax payer dollars and the uses of taxpayer dollars that maximize public welfare. Rational ignorance leads voters to continue to support politicians even after they impose inefficient policies, and the concept of concentrated benefits and dispersed costs allows the rent seekers to continue to avoid taxpayer scrutiny (Olson, 1971), (Caplan, 2011).

Thus, in the long run, the initial increase in government activity represents merely one part of a circle of actions in the economy, the end result being that private citizens are incentivized to invest increased amounts of human capital in rent seeking skills instead of productive skills. Analogously, the increased government spending that does not encourage the general welfare instead weakens the legitimacy of government and leads to a decline in trust. This decline in trust continues the cycle because it leads to a decline in private citizens' cooperation, a necessary input for government policy to be effective. As a result of the decline in trust, all government policies become less effective, including those policies that do enhance value such as the protection of property rights and contracts, general law enforcement, and externality mitigation.[6] Resources that normally would have been used elsewhere in the economy will then

Government, has to offer private industry. Blanes i Vidal et al. (2012) note that lobbyists with connections to federal officials are able to demand a premium over those without, implying that much lobbying activity is specifically directed toward the Federal Government.

[6]For example, complying with the rule of law in terms of property and contract disputes will minimize the number of disputes.

be consumed by higher transaction costs.[7,8] Ultimately, the decline in the effectiveness of government leads to a necessary increase in the amount of good government activity required to accomplish the same ends, which in turn increases the returns to rent seeking relative to productive activity. This finally leads to more productivity decreasing government and lower trust, thus directing the economy towards a persistently "bad" equilibrium.[9]

As a consequence of the feedback loop between social trust and government growth, the Garen and Clark (2015) model predicts that an increase in bad government activity may, on net, lead to a disproportionate decrease in trust, similar to a multiplier effect. Figure 4.2 illustrates how an initial increase in G_b, represented by the shift from $G_{b1}(T)$ to $G_{b2}(T)$, leads to a much larger decrease in trust. Drastic jumps between "good" and "bad" equilibria imply that policy efforts aimed at reversing course to an equilibrium with more trust may be particularly difficult.[10]

An empirically testable hypothesis emerges from the theory here: If the Garen and Clark (2015) and public choice models are correct, then in the long run G should be positively related with rent seeking and negatively related with productivity and trust. Additionally, deviations from the long run equilibrium in terms of government growth should result in further increases in government activity and rent seeking, but decreases in productivity and trust. If, however, the public interest model is correct, then in the long run, G should be positively related with productivity and trust, while the impact of rent seeking should be negligible.

IV. Data

The annual times series data are described in Table 4.1. The key constraining variable is the series on political organizations which runs from 1960 to 2013. The average marginal tax rate series is also only available up to year 2012.

A central contribution of this essay is the utilization of the Pew Research Center's survey data measuring public trust in government. The data are in terms of the percentage of respondents that "trust" the government.[11]

As Table 4.1 shows, the mean level of trust is 41.3 percent over the course of the entire sample, however, the trend is mostly downward sloping. Figure 4.3 shows that the maximum value (76.6 percent) takes place near the beginning of the sample in

[7]Consider the growth in the number of lobbyists (Post, 2005).

[8]For example, infrastructure projects that would have been met with more private cooperation would have lead to saved costs in terms of legal fees.

[9]A similar phenomenon is noted in Murphy et al. (1993), who show how increases in rent seeking may lead to equilibria where productivity growth is low and the number of lobbyists is high.

[10]Caplan (2003) also developed a model where poor economic outcomes and bad policies and ideas mutually reinforce each other, resulting in an "idea trap."

[11]Surveys asked the following question: "How much of the time do you think you can trust government in Washington to do what is right – just about always, most of the time, or only some of the time?" Respondents who answered "just about always" or "most of the time" were grouped together as those that trust the government. For much of the sample, the Pew Research Center data is a three year moving average with other surveys that take place periodically throughout the year.

1964, while the minimum value (18.6 percent) takes place near the end of the sample in 2011. From 1964, there is a sharp decline until 1981. This decline is sharpest during the 1973 to 1974 OPEC embargo. From 1981 to 1990, however, there is a significant increase up to 46 percent during the Reagan presidential administration years. Trust does not exhibit any significant downward trend until the Gulf War of 1991, after which it reaches a new low of 21 percent in 1994. From there, the Clinton years saw an increase in trust up to a peak of 48 percent in 2001. Following the September 11th terrorist attacks, trust falls sharply again until reaching a global minimum in 2011.

Admittedly, the data on trust do seem to respond to various exogenous shocks not explained theoretically. However, the advantage of the empirical strategy employed in the analysis is that any shock to trust or government spending can be utilized, regardless of its source. Furthermore, several control variables discussed below are included in alternative specifications in order to limit the impact of exogenous, structural change.

As De Figueiredo and Richter (2014) describe, data used to measure lobbying (rent seeking) directly have become more easily available since the Lobbying Disclosure Act of 1995. However, in order to utilize the full series of data on trust, a measure of rent seeking that stretches back farther in time is necessary. Following Sobel and Garrett (2002), I proxy for rent seeking activity with the activity of "political organizations." These data are recorded in the "County Business Patterns" annual survey of business activity by industry code (currently NAICS) from the Census Bureau. The number of establishments, employment size, and payrolls are recorded for each year beginning in 1959.[12] Political organization payrolls are chosen over both the number of establishments and employments.[13] As technology changed drastically from 1960 to the present day, I hypothesize that payrolls, reflecting the alternative return to labor, should be more resistant to change over time than either employments, representing the efficient scale of political organizations, or the number of establishments, representing the structure of the political organization industry.

The series is converted into a percentage of total U.S. annual payrolls and scaled by a factor of 1,000,000. Additionally, a two year moving average is used in order to smooth out election year spikes that take place in even years. Table 4.1 shows that both the payroll and employment measures of political organizations exhibit considerable variation. Figure 4.4 displays the normalized time paths of trust and

Sources include National Election Studies, Gallup, ABC/Washington Post, CBS/New York Times, and CNN Polls. For most years, there are more than one survey. Note that for the year 2012, there was no survey and the data were linearly interpolated. The data are also broken down by political party (Democrat, Republican, Independent). The Pew Research Center conducts its surveys via telephone interviews on a national sample of 1,504 adults age 18 or older (2013 survey) across all fifty of the United States and the District of Columbia. The sample was weighted to match recent telephone usage patterns across the United States and is a "random digit" sample of both landline and cell phone numbers. Over time, the inclusion of cell phone numbers has grown to match the use of these devices. Response rates range from 5 to 15 percent, on average.

[12]Note that years 1960, 1961, and 1963 were missing and were imputed based on historical trends.

[13]As a robustness check, political organization employments as a percentage of total employments was also used and the empirical results (discussed below) were very similar.

political organization payrolls. Political organizations are clearly inversely correlated with trust, and from 1981 on there is a sustained, upward trend that does not significantly reverse itself until 2005.

To measure economic productivity, data on labor productivity from the Bureau of Labor Statistics (BLS) are available in a variety of measures. I use the "non–farm labor productivity index" (base year of 2009) which measures the output per hour of non-farm workers. Figure 4.5 shows that labor productivity slopes upward for almost the entire sample and would thus appear to be inversely related to trust. However, as the correlation coefficients and further analysis below show, it is actually positively related to trust.

To measure regulations, I use the number of pages in the Code of Federal Regulations (CFR). Dawson and Seater (2013) show that the CFR is a more precise approximation of the level of regulation than broader measures such as the Federal Register.[14] The page count of total regulations in the CFR is used to capture both the amount of government regulatory intervention and its complexity, since both more regulations and more complicated regulations presumably require a greater number of pages.[15]

The CFR includes all regulations, and is broken down into 50 titles, each of which covers a different subject area.[16] As an additional measure of regulation, I also use the largest 5 titles summed together which make up over a third of the total CFR page count.[17] Table 4.1 shows that the number of total pages in the CFR grew from a minimum level of 37,680 pages at the beginning of the sample to a maximum level of 155,788 pages in 2013, the end of the sample. Figure 4.6 shows a consistently upward trend in the CFR throughout the sample, despite several periods of faster and slower growth. The graph shows that from roughly 1960 onward, periods of faster and slower growth alternated, coinciding largely with presidential administrations (Dawson and Seater, 2013).

The 1970s experienced the most rapid growth in the CFR over the sample period. Dawson and Seater (2013) point out that despite deregulation in the transportation, telecommunications, and energy areas during that time period, the total amount of regulation grew due to regulatory increases in other areas, such as environmental and occupational safety regulations (Hopkins, 1991).

The deregulation era of the 1980s, brought on by the Reagan administration, shows a slackening of the trend in the CFR coupled with positive growth in trust. However, the number of pages in the CFR continued to rise until the 1990s, when there were three years of decreases in regulations due to the Clinton administration initiative, "Reinventing Government."

An alternative way to measure government growth is through government spend-

[14]The correlation between pages in the Federal Register and the CFR is 0.89.

[15]As Dawson and Seater (2013) note, the word count per page has remained roughly the same over the entire sample period, as has the verbosity of the text.

[16]The first six titles of the CFR are excluded because they focus on the internal workings of the Federal Government.

[17]This series was computed by adding together the page counts for the top 5 largest titles of reg-

ing. Annual data on three different measures of federal spending come from the Office of Management and Budget (OMB). Federal outlays as a percent of GDP offer the broadest view of government spending activity, and shows counter-cyclical variation, most notably following the Great Recession. The counter-cyclical nature of federal outlays is most likely due to the "automatic stabilization" aspect of many policies, such as unemployment insurance (Rejda, 1966).

Figure 4.7 shows a changing relationship between federal outlays and trust. From 1960 to 1981, trust and federal outlays appear to follow opposite trends where trust is decreasing while spending is increasing. This changes in the 1980s, where trust trends in the same way as federal outlays. This positive correlation reverses around the year 2005, when federal outlays increase sharply with a simultaneous decrease in trust.

Displayed in both Table 4.1 and Figure 4.8, federal outlays less defense spending as a percentage of GDP shows a similar correlation with trust, but there is a longer middle time period of close correlation, most likely due to the fact that federal spending without the defense component is not driven by military conflict. However, the standard deviation of federal outlays less defense is larger than that of federal outlays alone.

Transfer payments are, by definition, a non-productive use of government expenditure and would seem a priori to represent more inefficient government spending per dollar than broader measures of spending. On average, transfer payments are 7 percent of GDP and range from a low of 4 percent during 1964 to 1966, to a high of over 11 percent in 2010. Figure 4.9 shows that the path of transfer payments over time was more moderate in terms of variability than the other measures of federal spending.

A final measure of government activity used is the federal average marginal tax rate on personal income (AMTR). Dawson and Seater (2013) use the AMTR to proxy for the impact of the tax system on the private economy in terms of the degree of distortion effects, given that the AMTR alters the relative rate of return on various productive activities. This series comes from the Stephenson (1998) update of Barro and Sahasakul (1983), which I updated further to 2012, the latest available year of the IRS Statistics of Income (SOI) Tax Stats data. The AMTR also includes Social Security taxes, but not the corporate income tax, as there is no consistent way to measure the corporate income tax rate due to various exemptions that are difficult to account for. The AMTR is weighted by taxpayer adjusted gross income (AGI).

Figure 4.10 shows that before 1981, trust and the AMTR appear to be inversely correlated, while after 1981, they display some positive co-movement. Note that the AMTR not only represents policy changes, but also the result of "bracket creep," i.e. the mechanical increase in the average tax rate that is purely the result of increases in the tax base.[18]

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ulatory areas: environment, wildlife and fisheries, internal revenue, agriculture, banks and banking, transportation, and labor.

[18]See Mertens (2013) for an in depth explanation of the various movements in the average marginal

Taken together, all of the series seem to imply that, over the sample period, trust has been declining while labor productivity has been rising, rent seeking as proxied for by political organizations has been rising, and government activity has been increasing.

The 1960 to 2013 time period was also an interval of social and economic changes, many of them exogenous to changes related to government or private economic output and efficiency. Figure 4.11 shows the paths of four variables intended to measure changes in social preferences or beliefs that possibly impact trust exogencously.

The price of crude oil is used to measure the impact of energy costs on trust. The data come from the Energy Information Administration (EIA) and are the "first purchase price" of oil. With two exceptions (1960-1973 and 1985-2000), oil prices tended to rise over the course of the sample period.

The divorce rate is in terms of divorced people over the age of 15 years per 1,000 people, and comes from the Census Current Population Survey (CPS). The divorce rate climbs sharply from a low of just over 2 people per 1,000 in 1960, to a maximum of just over 5 people per 1,000 in the late 1970s, before gradually decreasing to roughly 3.5 people per 1,000 by 2013.

The data for violent crime come from the FBI Uniform Crime Reports prepared by the National Archive of Criminal Justice.[19] Violent crime shows a mostly upward trend, increasing from just under 400,000 counts in 1960 to a maximum of nearly 2 million counts in the 1990-1995 period. After 1995, it falls to 1.2 million counts by 2013.

Lastly, out of wedlock births measured as a percent of all births to unmarried women comes from the Center of Disease Control (CDC) National Vital Statistics database. The trend of this series is mostly positive over the sample period, with only two plateaus from 1995 to 2005 and from 2010 to 2013.

The price of crude oil is meant to control for exogenous shocks to productivity, while the divorce rate, violent crime, and out of wedlock births are meant to control for changes in social preferences and beliefs that may impact trust in government. Two other variables (not shown) are the national unemployment rate for civilians and non-active military, and a dummy variable that takes on the value of 0 for a Republican president and 1 for a Democrat president. These two additional variables should capture the variation in the business cycle and political process respectively. Note that all of the data seres are displayed in levels, but logs are used in the analysis.

Table 4.2 shows the contemporaneous correlations between the variables. Trust is most strongly correlated (negatively) with transfer payments, which supports the hypothesis that transfer payments are more important in measuring the form of government spending that most negatively impacts public trust. There is only a slightly lower correlation between trust and federal less defense spending, but a much lower correlation between trust and total federal outlays. Thus, defense spending does not appear to be closely linked to trust.

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tax rate.

[19]The FBI's Uniform Crime Reporting (UCR) Program defines violent crime as murder, non-

The CFR is strongly correlated with all of the variables, with the exception of federal spending as a percent of GDP, and is most strongly (positively) correlated with labor productivity. Finally, the AMTR is not strongly correlated with any of the variables, as its strongest correlation is with political organizations (-0.45).

The signs of the correlation coefficients displayed in Table 4.2 corroborate the trends of each of the series as displayed in the graphs. From these coefficients, it would appear that labor productivity and trust are inversely related, while labor productivity and the CFR are positively related. To uncover whether these correlations are more than just a spurious result of the time trends of the series over time, I turn to formal tests for unit roots and cointegration.

V. Emprical Methods and Results

Unit root tests

In selecting an appropriate empirical model, a first concern is to determine if the data series contain unit roots or are "non-stationary." Traditional regression techniques are invalid if the data follow a non-stationary process, i.e. if past shocks do not die off. All of the series in the analysis show mixed evidence for the presence of unit roots.

Many conventional unit root tests, however, are biased in the direction of a non-rejection of the null hypothesis of a unit root in the presence of breaks. Given that a variety of breakpoint tests were performed and multiple breakpoints were found in each of the series (some of which contained as many as 5 breaks), unit root tests that allow for the presence of breaks were also performed.[20,21]

Table 4.3 displays the results from a battery of unit root tests. Taken together, the majority of the evidence supports neither the acceptance nor rejection of unit roots for several of the series, therefore no attempt is made to first difference them before estimating the Vector Error Correction Models (VECMs) in the analysis. Additionally, Johansen (1995) states that pre-testing is not necessary in order to determine the order of integration between series, and that having stationary variables in the cointegrating equation does not prevent the use of cointegration analysis.

Following Dawson and Seater (2013) who use some of the same data over a similar sample period, I proceed with the analysis assuming that the presence of unit roots can be neither confirmed nor rejected.[22]

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negligent manslaughter, forcible rape, robbery, and aggravated assault, all offenses involving force or the threat of force. The UCR numbers do not include the September 11th, 2001 terrorist attacks.

[20]Figure 4.6 shows that trust and the CFR, for example, both appear to have a break at year 1972-73.

[21]Versions of the Bai (1997) and Bai and Perron (2003a) breakpoint tests were performed for each series, assuming unknown break point dates. For trust, the various specifications found breaks at 1974, 1983, 1992, and 2000 using the Bai-Perron tests of "l globally optimized breaks" against the null of "none." Heteroskedasticity and autocorrelation consistent (HAC) standard errors were used in estimating the series as an AR(1) process in order to allow for serial correlation.

[22]See p. 651 of Hamilton (1994) for a discussion of VAR estimation when there is inconclusive

Cointegration tests

The theoretical predictions discussed above imply the existence of a long run relationship between trust, productivity, rent seeking, and government activity. Cointegration implies the existence of some equilibrium distance between multiple time series such that when deviations from the equilibrium take place, each of the series will respond in some way to return to the equilibrium. Cointegration thus serves as a test of the theoretical predictions made by the Garen and Clark (2015) model.

The test for cointegration from Johansen (1991) is used to test for the existence of a cointegrating relationship among trust, labor productivity, political organizations, and one of the various measures of government activity. The goal is to determine whether trust, productivity, political organizations (my proxy for rent seeking), and measures of government activity move together in equilibrium in the long run.

The first step is to test for cointegration and specify the VECMs with the appropriate number of cointegrating equations found by the tests. Before testing can begin, however, the appropriate lag length must be selected. As Keele and Kelly (2006) note, public opinion data are frequently modeled as $AR(1)$ processes; that is, any time series model including a public opinion variable will need to have at least one lagged value to account for the serial correlation in the residuals. Coincidentally, the SBIC lag length tests imply a lag length of 1 lag for all of the combinations of variables tested, and a constant is also allowed for in the cointegrating relationship.

Table 4.4 displays the results of tests for the three main variables (trust, political organizations as a percent of total payrolls, and labor productivity) combined with one of each of the measures of government activity. The results display the p-values for the trace test statistic. The null of zero cointegrating relationships is rejected, but the null of 1 cointegrating relationship is not rejected for all government variables, implying the existence of 1 cointegrating relationship for each of the combinations tested. Transfer payments and the CFR both show a rejection of the null of zero cointegrating relationships at above the 99 percent level of confidence. Federal outlays and the AMTR each show 95 percent rejections of the null, while the sum of the top 5 titles of the CFR and federal outlays less defense spending both show 90 percent confidence levels in rejecting the null.

Vector Error Correction Model (VECM)

Given the existence of 1 cointegrating relationship for each of the combinations of the series, VECMs are estimated as follows:

$$T_t = \mu + \beta_{LP} LP_t + \beta_{POL} POL_t + \beta_X X_t + \upsilon_t \tag{4.1}$$

The cointegrating equation (4.1) includes a constant (μ), trust (T_t), labor productivity (LP_t), political organizations (POL_t), and a different measure of government activity (X_t). υ_t is the deviation from the long run equilibrium (the "disequillibrium error,"

evidence of a unit root.

itself a stationary series given cointegration), while β_{LP}, β_{POL}, and β_X are estimates of the long run coefficients that define how the system of variables moves together in equilibrium.

Given the parameters of one cointegrating relationship, the VECM yields the following equations:

$$\begin{aligned}\Delta T_t = \nu_1 + \alpha_1(\beta_T T_{t-1} - \beta_{LP} LP_{t-1} - \beta_{POL} POL_{t-1} - \beta_X X_{t-1} - \mu) \\ + \Gamma_{1,T}\Delta T_{t-1} + \Gamma_{1,LP}\Delta LP_{t-1} + \Gamma_{1,POL}\Delta POL_{t-1} + \Gamma_{1,X}\Delta X_{t-1} + \epsilon_t\end{aligned} \tag{4.2}$$

$$\begin{aligned}\Delta LP_t = \nu_2 + \alpha_2(\beta_T T_{t-1} - \beta_{LP} LP_{t-1} - \beta_{POL} POL_{t-1} - \beta_X X_{t-1} - \mu) \\ + \Gamma_{2,T}\Delta T_{t-1} + \Gamma_{2,LP}\Delta LP_{t-1} + \Gamma_{2,POL}\Delta POL_{t-1} + \Gamma_{2,X}\Delta X_{t-1} + \epsilon_t\end{aligned} \tag{4.3}$$

$$\begin{aligned}\Delta POL_t = \nu_3 + \alpha_3(\beta_T T_{t-1} - \beta_{LP} LP_{t-1} - \beta_{POL} POL_{t-1} - \beta_X X_{t-1} - \mu) \\ + \Gamma_{3,T}\Delta T_{t-1} + \Gamma_{3,LP}\Delta LP_{t-1} + \Gamma_{3,POL}\Delta POL_{t-1} + \Gamma_{3,X}\Delta X_{t-1} + \epsilon_t\end{aligned} \tag{4.4}$$

$$\begin{aligned}\Delta X_t = \nu_4 + \alpha_4(\beta_T T_{t-1} - \beta_{LP} LP_{t-1} - \beta_{POL} POL_{t-1} - \beta_X X_{t-1} - \mu) \\ + \Gamma_{4,T}\Delta T_{t-1} + \Gamma_{4,LP}\Delta LP_{t-1} + \Gamma_{4,POL}\Delta POL_{t-1} + \Gamma_{4,X}\Delta X_{t-1} + \epsilon_t\end{aligned} \tag{4.5}$$

Equations 4.2 through 4.5 each show how the system responds or "adjusts" in the short run when the cointegrated series from Equation 4.1 is out of equilibrium, i.e. $\upsilon_{t-1} \neq 0$. When the lagged disequilibrium error from Equation 4.1 is positive, i.e. $\upsilon_{t-1} > 0$, trust (T_t) responds at a "speed" of α_1, the magnitude of this response. Each of the other series in the model have a short run adjustment coefficient indicating the magnitude and direction of their responses as well, but reported results include only the adjustment coefficients for trust. Additionally, coefficients on the lagged terms ($\Gamma_{1,T}$, $\Gamma_{1,T}$, $\Gamma_{1,LP}$, $\Gamma_{1,POL}$, $\Gamma_{1,X}$) each show the dynamic process through which the other variables impact trust. Again, I am interested only in the values for Equation 4.2, since that is the part of the VECM that relates trust as the dependent variable.

Results

Tables 4.5 through 4.10 show the estimates of the VECMs all estimated using the main variables of trust, labor productivity, and political organizations as a percentage of total payrolls, each with a different measure of government activity. A cointegration rank of 1 is imposed following the cointegration tests. Note that the cointegrating equation may be normalized to include or omit any of the variables, but in every case I have normalized trust to have a coefficient equal to 1 for a consistent interpretation of the level of trust as the system's reference point. For all specifications, the SBIC chose 1 lag, and a constant (ν_1) is included in the cointegrating relationship.

In tables 4.5 through 4.10 rows (1) through (3) correspond to specifications (1) through (3), respectively. Specification (1) includes no exogenous control variables. Specification (2) includes a dummy variable that takes on 0 for Republican presidents and 1 for Democrats, the unemployment rate, and the real price of crude oil. Specification (3) includes all of the control variables found in specification (2), plus control

variables intended to capture social change. These include violent crime, the divorce rate, and births out of wedlock. All specifications were estimated in logs.

Table 4.5 reports estimates of the cointegrating relationship between the main three variables (trust, labor productivity, political organizations) and transfer payments as a percentage of GDP. Both specifications (1) and (2) follow what the public choice and Garen and Clark (2015) models predict: a positive relationship between labor productivity and trust (though insignificant), and negative relationships between political organizations and transfer payments and trust, which are highly significant. Following convention, the signs of the β coefficients are displayed as the opposite of the VECM shown in Equation 4.2.

The addition of the social change control variables in specification (3) is puzzling, as they reverse the signs of the coefficients for both labor productivity and transfer payments. Furthermore, these coefficients are highly significant and larger in magnitude than in specifications (1) and (2).

A comparison of the short run coefficients across the specifications shows that trust responds to deviations from the long run equilibrium by decreasing, and that this response is statistically significant from zero in each specification, with the exception of specification (3). The other lagged terms show the expected signs in support of the public choice model, except for political organizations, which appears to be positively related to trust in the short run.

Table 4.6 reports estimations for the model with CFR used as the measure of government activity. All of the long run coefficients show signs consistent with the public choice model and are significant with the exception of specification (3). However, the coefficients with altered signs in specification (3) are not statistically significant. The short run adjustment coefficients are also of the expected signs in accordance with the public choice model and significant and they increase in magnitude throughout each of the specifications. Most of the lagged changes, however, are insignificant with the exception of $\Gamma_{1,CFR}$, which is significant and large in magnitude throughout each of the specifications. This VECM specification is thus the most robust to control variables, and is the most confirming of the theoretical predictions of the Garen and Clark (2015) and public choice models.

Table 4.7 displays results from the model with the AMTR used to measure government activity. Here, the signs are consistent with neither the public choice nor the public interest models, making the short run adjustment coefficients difficult to interpret usefully.

For robustness, alternative measures of government activity were used in the model including federal total outlays, federal total outlays less defense spending, and the top 5 largest CFR titles summed together, and the results were not as strongly indicative of the public choice model predictions. This is not surprising, given that these other measures of government were less correlated with trust. Tables 4.8 through 4.10 show that the signs are either not consistent with the other specifications (Table 4.8) or largely statistically insignificant (Tables 4.9 and 4.10).

Also, an alternative measure of the rent seeking variable (political organizations as a percentage of total employments) was used with transfer payments, CFR, and AMTR. The results (omitted), were very close to those displayed in Tables 4.5 through 4.7.

Discussion

The results imply that a long run relationship exists between trust, labor productivity, rent seeking as proxied for by political organizations, and government activity as proxied for by the CFR. VECM estimates show that this long run relationship is structured in such a way that trust responds positively to increases in productivity, but negatively to increases in both rent seeking and regulations. The nature of this long run relationship thus supports the public choice model of government over the public interest model and appears to be mostly robust to exogenous control variables. The exception is the sign of the coefficient on the CFR variable once the social change controls are added, however, the short run adjustment coefficient on trust remains highly significant, which suggests that trust does respond to deviations from the long run equilibrium even when controlling for social change.

Also, in the short run, trust appears to be affected by none of the series significantly except for negatively by the lagged difference of the CFR. Of the various measures of government activity employed in the analysis, the CFR thus appears to be the strongest measure of productivity decreasing government. Considering that Dawson and Seater (2013) found the CFR to negatively impact total factor productivity, it is no surprise that, given the theoretical predictions, trust would be most negatively affected by it as well.

Regarding the insignificant coefficient, β_{CFR}, in specification (3), one possible explanation is that introducing the social change controls explains how important social change is for the public's trust in government, even though the degree of control that the government has over social conditions is limited. It could be that the populace blames the government for these changes, while ignoring regulation. However, in specification (3), there is still a large, negative short run impact of regulation on trust that is strongly significant. The public seems to still care about regulation and the growth of productivity decreasing government, at least in the short run in this case, even though the social change controls take over the long run relationship. Rent seeking still plays a role in the long run relationship in this case as well, and thus it is possible that some rent seeking may have been directed at social change issues as opposed to purely economic concerns.

VI. Conclusion

In this essay, I have presented new empirical evidence of a long run, macroeconomic relationship between trust, rent seeking, productivity, and government activity that largely supports the public choice model of government in contrast to the public interest model of government. My results contribute to the literature on the growth of government and social trust by pointing to the mechanism by which government

growth hampers economic progress. My work serves to explain this mechanism and also to confirm the idea that the government does not operate in a vacuum; it both influences and is influenced by public opinion.

This essay is also the first paper to provide evidence that the growth in government regulations in the United States over the latter half of the 20th century and early 21st century explains the drop in trust over the same time period. My empirical results indicate that declines in trust and increases in regulations have been negatively interrelated. Had regulations predominantly led to the enforcement of property rights, the defense of the rule of law, and other growth enhancing social institutions, trust would most likely be at a higher level today than in 1960.

It is also possible that steps to reverse the long run equilibrium where trust and regulations are negatively reinforcing could be taken. For example, repealing regulations that limit economic growth might lead to decreased incentives for rent seeking, which might, in turn, lead to higher levels of trust and a more effective government. A reversal of this sort, however, may very well be difficult. It is possible that some point in the size of government exists such that once government grows sufficiently beyond it, exponentially larger declines in trust are triggered. This would imply that more and more government would be needed to perform the same functions as before, thus requiring an even larger reduction in government spending to return to the original level of trust. If this sort of non-linear relationship between trust and government growth exists, then modest reductions in regulations may not be enough to improve the current predicament of "high government" and "low trust." Empirical evidence confirming or refuting this "trust trap" scenario, however, is beyond the scope of this work and must be left up to future research.

Figure 4.1: Equilibrium levels of trust and bad government spending

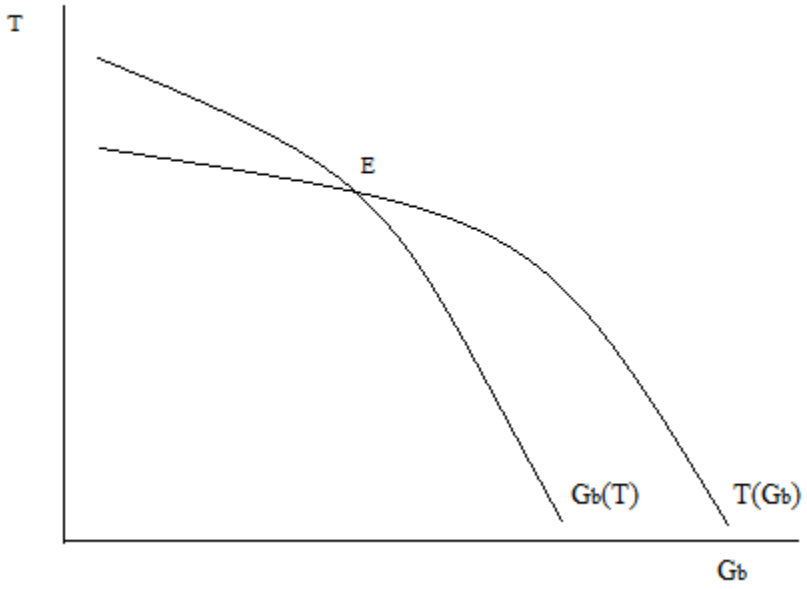


Figure 4.2: Shifting the equilibrium to more spending and less trust

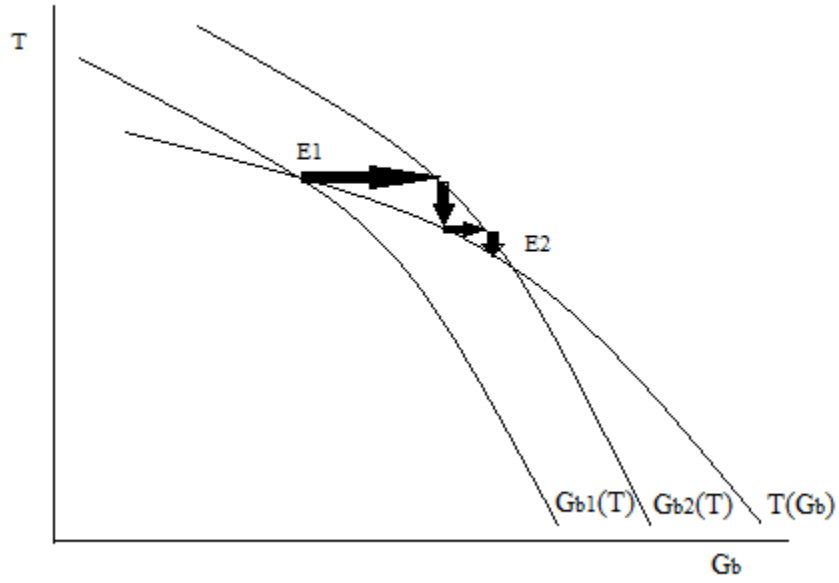


Figure 4.3: Trust in government

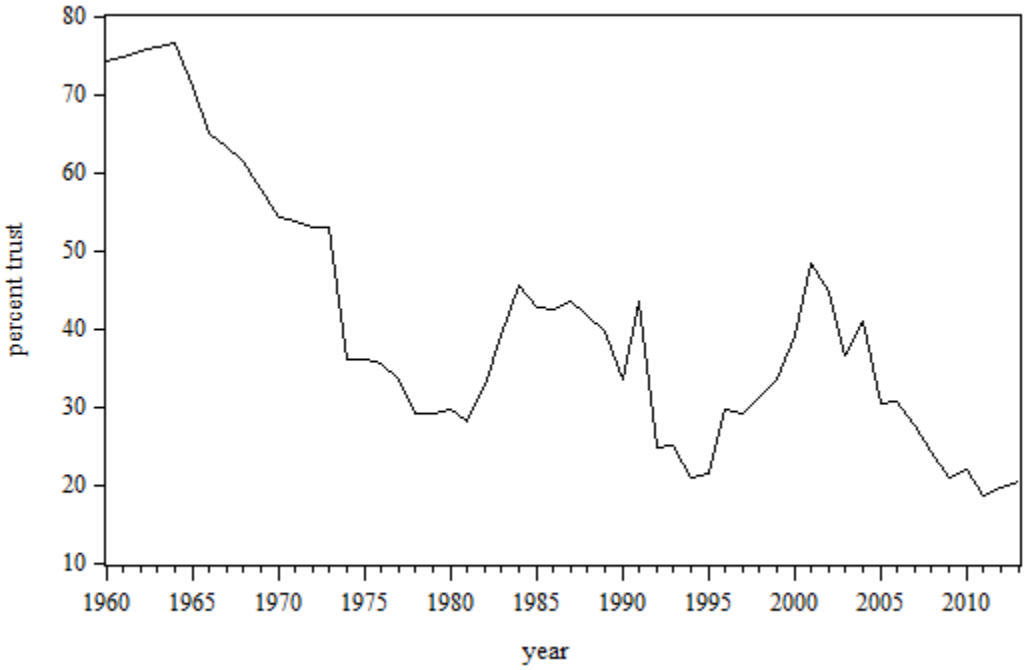
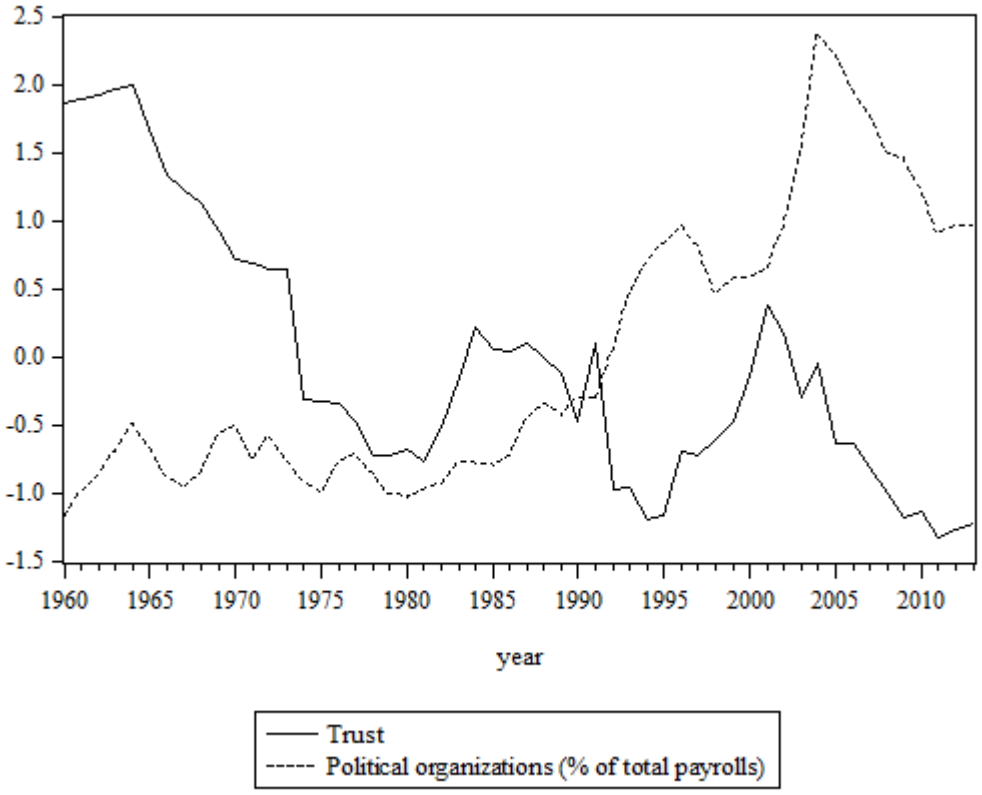
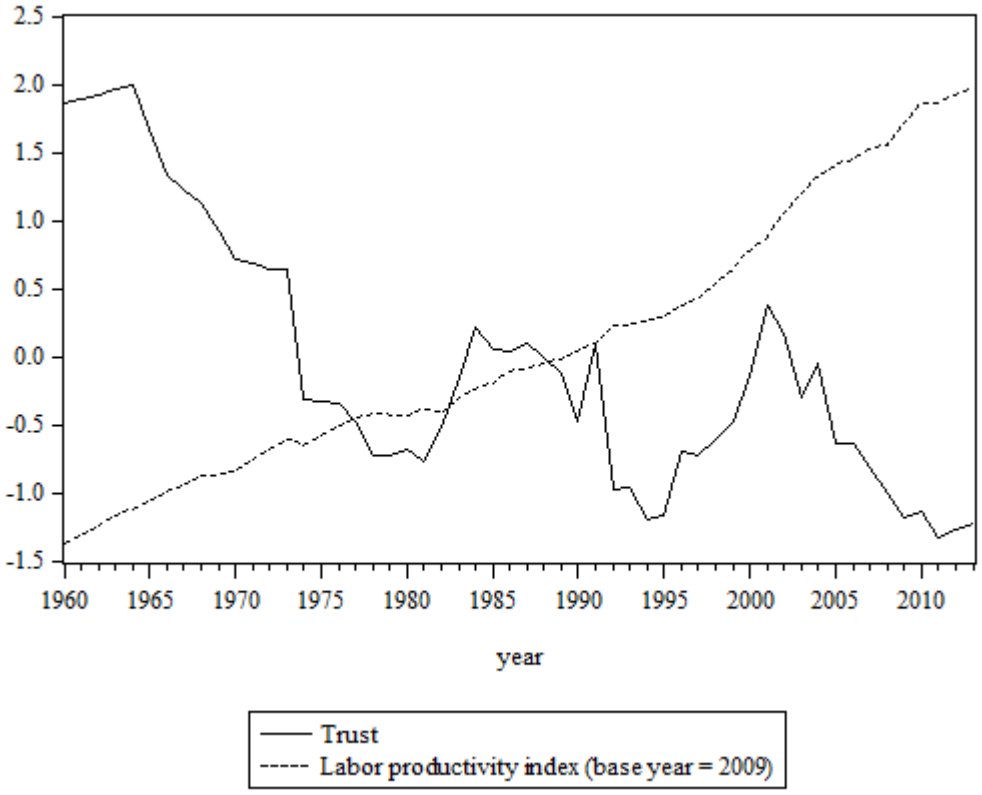


Figure 4.4: Trust and political organizations



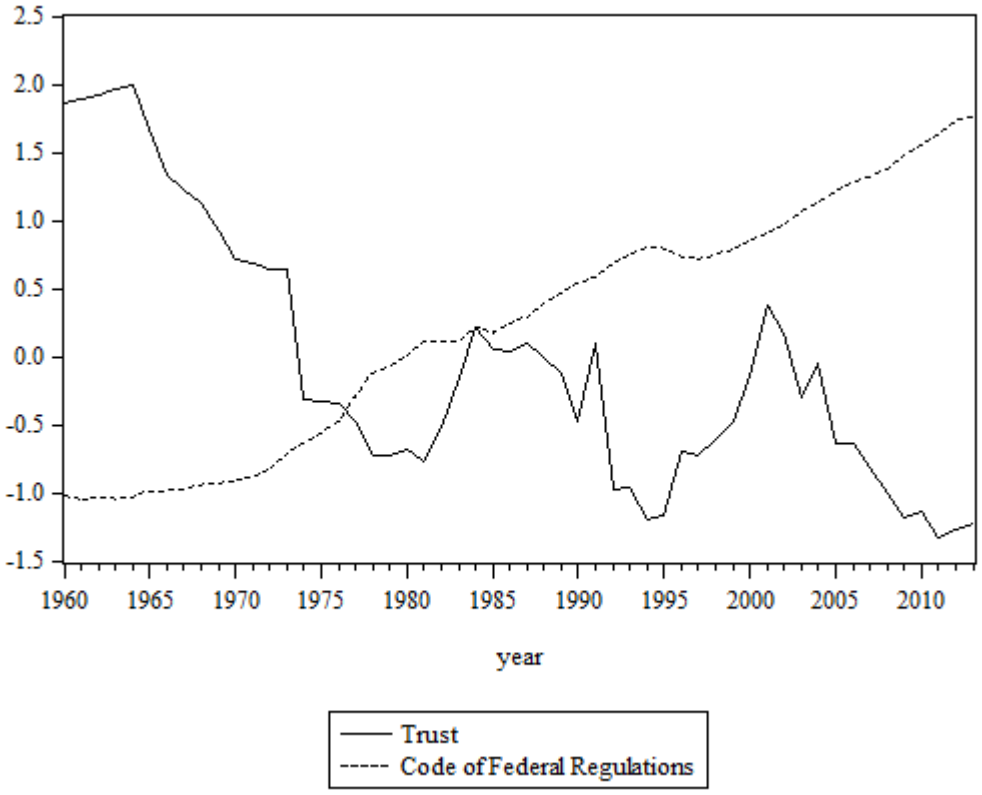
Note: Both trust and political organizations have been normalized to a mean of 0 and standard deviation of 1. Political organizations are in percent of total payrolls multiplied by a factor of 1,000,000.

Figure 4.5: Trust and labor productivity



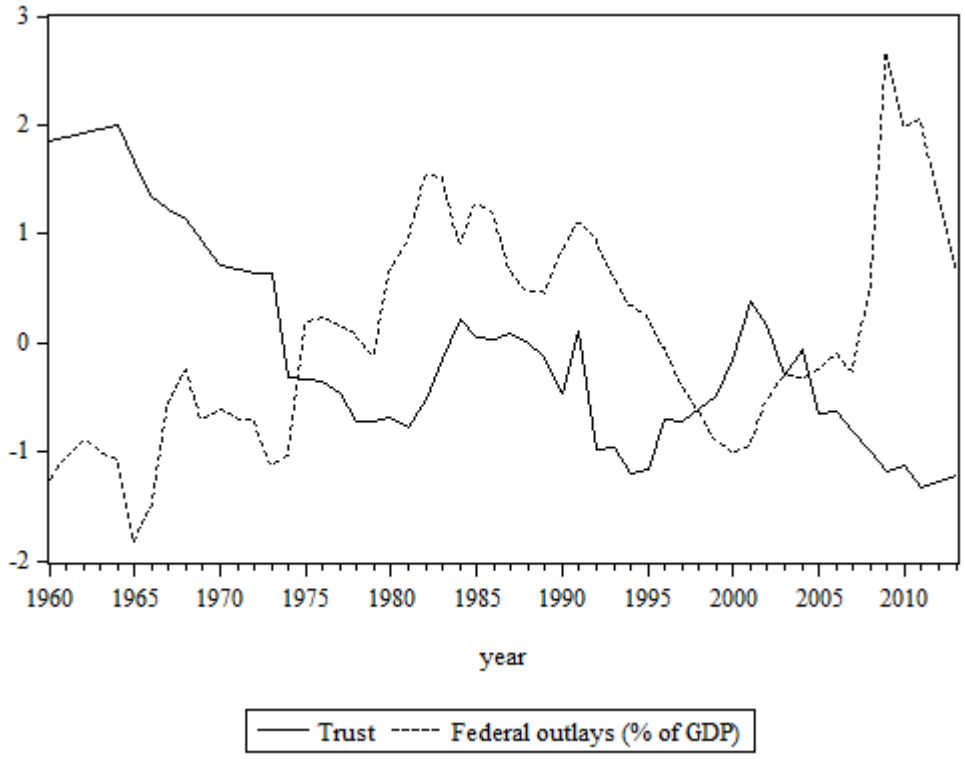
Note: Both trust and labor productivity have been normalized. Labor productivity is an index with a base year of 2009. It measures output per hour and comes from the Bureau of Labor Statistics (BLS).

Figure 4.6: Trust and the CFR



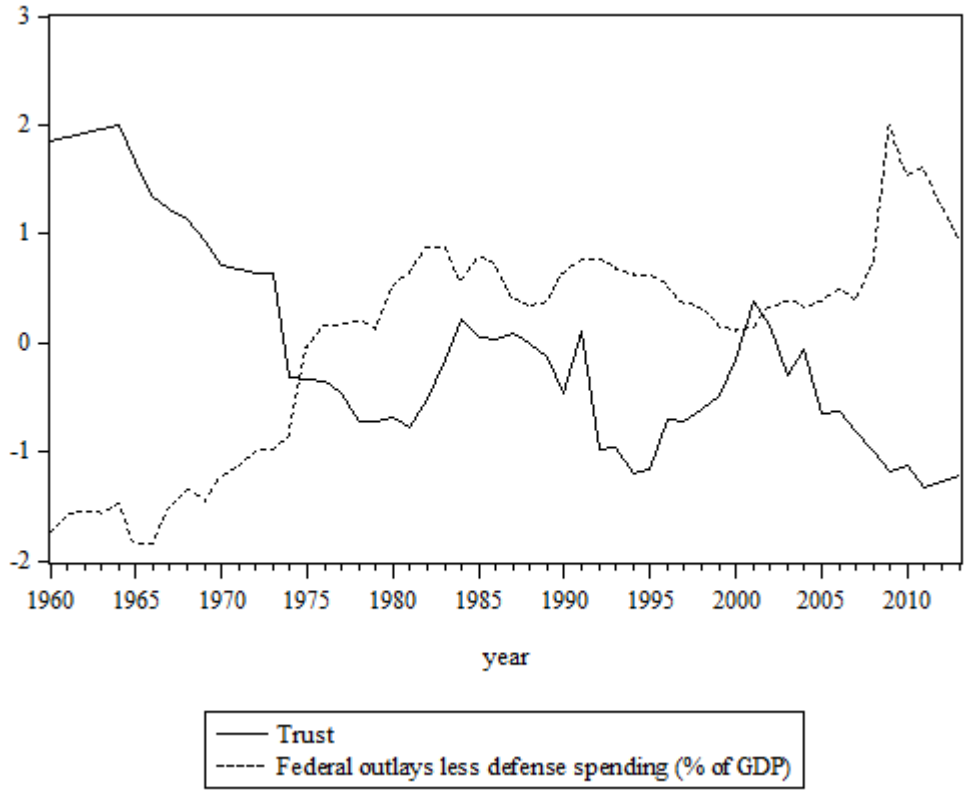
Note: Both trust and the Code of Federal Regulations (CFR) have been normalized to a mean of 0 and standard deviation of 1.

Figure 4.7: Trust and federal outlays as a percent of GDP



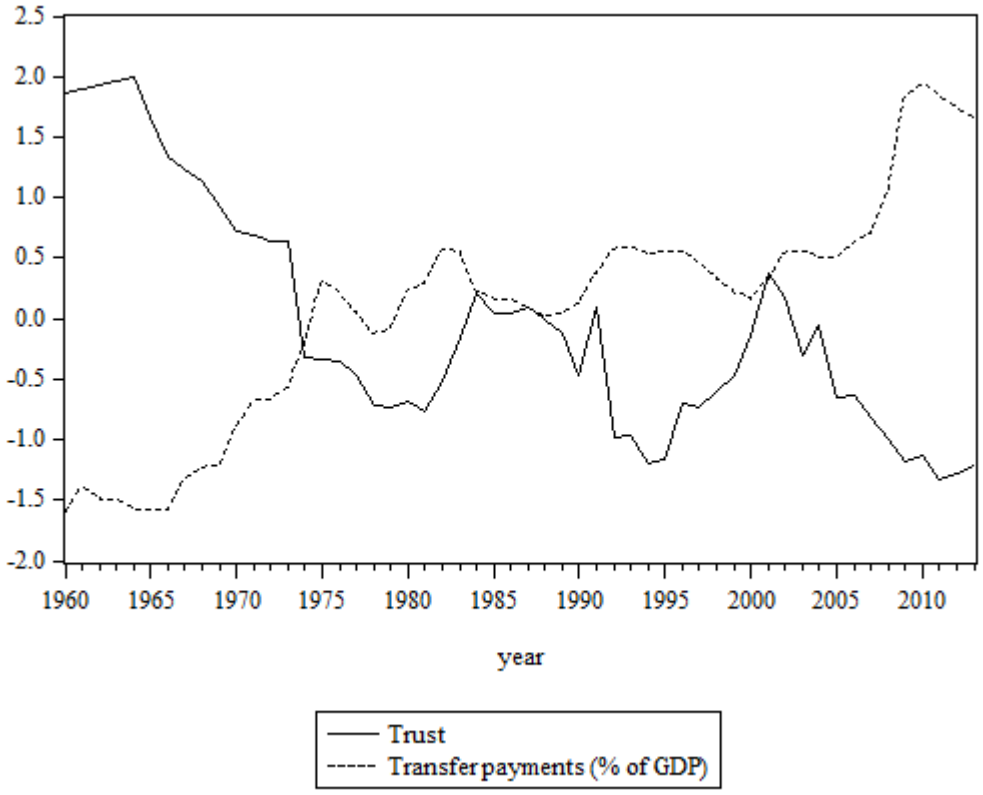
Note: Both trust and federal outlays have been normalized to a mean of 0 and standard deviation of 1. Federal outlays are as a percentage of GDP.

Figure 4.8: Trust and federal outlays less defense spending as a percent of GDP



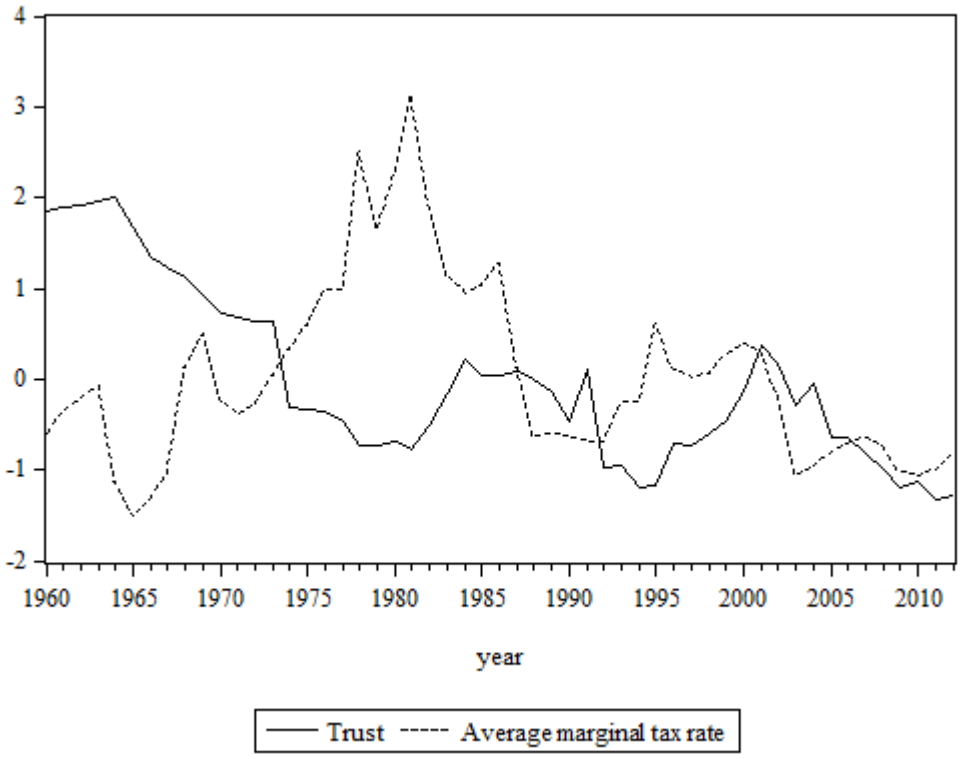
Note: Both trust and federal outlays have been normalized to a mean of 0 and standard deviation of 1. Federal outlays less defense spending are as a percent of GDP.

Figure 4.9: Trust and transfer payments as a percent of GDP



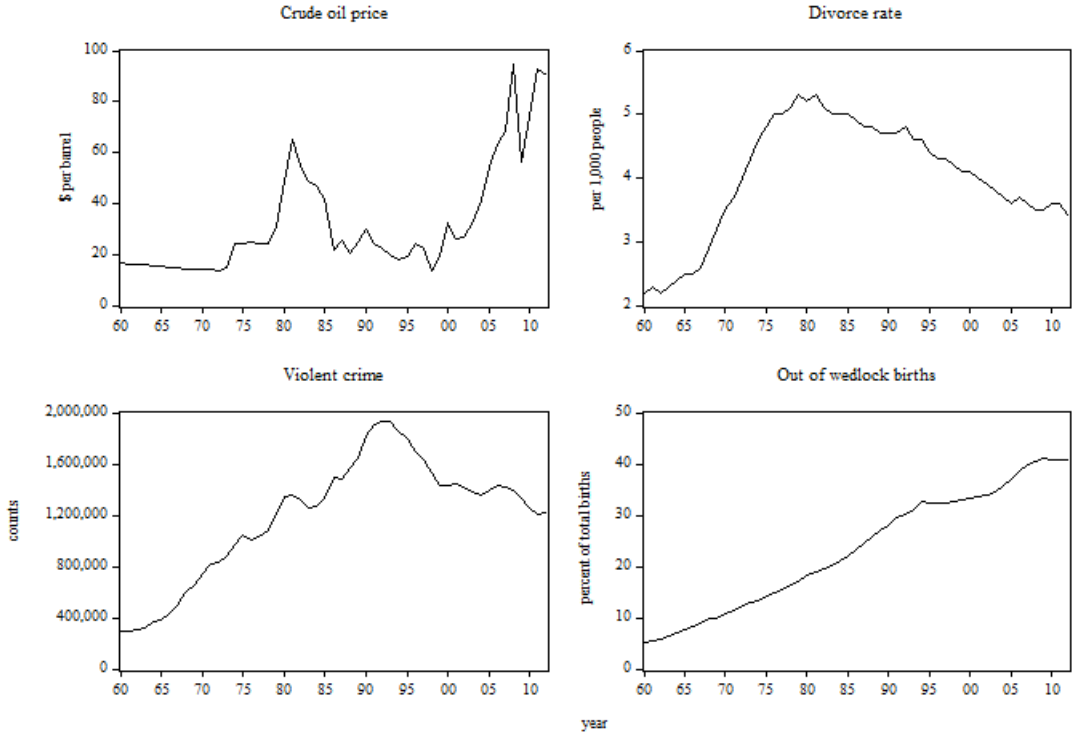
Note: Both trust and transfer payments as a percent of GDP have been normalized to a mean of 0 and standard deviation of 1.

Figure 4.10: Trust and the average marginal tax rate



Note: Both trust and average marginal tax rate (AMTR) have been normalized to a mean of 0 and standard deviation of 1. AMTR is weighted by AGI.

Figure 4.11: Exogenous control variables



Note: Violent crime rate data come from FBI's Uniform Crime Reports (UCR) database. Crude oil first purchase (U.S. domestic) price comes from Energy Information Administration (EIA). Divorce rate data for 1967 and before, and 2008-2012, are from the Center for Disease Control (CDC) National Vital Statistics System. Data for 1968-2007 are from the U.S. Census Bureau, Statistical Abstract of the United States: 2011. Out of wedlock births data come from the National Vital Statistics.

Table 4.1: Descriptive statistics

	Mean	Maximum	Minimum	Std. Dev.
Trust	41.30	76.60	18.60	16.61
Pol. orgs (payrolls)	45.36	73.49	31.82	11.75
Pol. orgs (employments)	0.06	0.11	0.04	0.01
Labor productivity	64.90	104.51	35.00	19.88
CFR	91,013	155,788	37,680	36,925
Sum of top 5 CFR titles	38,893	76,618	14,311	18,389
Transfer payments	0.07	0.11	0.04	0.02
Fed. outlays	0.19	0.24	0.16	0.02
Fed. outlays less defense	0.14	0.20	0.08	0.03
AMTR	24.94	32.50	21.20	2.47

Note: All variables in levels. Sample period is from 1960 to 2013 for all variables with the exception of the average marginal tax rate (AMTR) which is 1960 to 2012. The AMTR is in percent terms and weighted by tax payer AGI. Political organization payrolls as a percent of total payrolls is scaled by a factor of 1,000,000 and is a 2 year moving average. The labor productivity index base year is 2009 = 100. Government spending variables (federal outlays, federal outlays less defense, and transfer payments) are all as percentages of GDP. The Code of Federal Regulations (CFR) and the sum of the top 5 titles of the CFR are both raw counts of the number of pages.

Table 4.2: Correlation coefficients

	Trust	LP	Pol	TP	Fed	Fed-Def	CFR	AMTR
Trust	1.00							
Labor productivity	-0.73	1.00						
Political organizations	-0.52	0.89	1.00					
Transfer payments	-0.91	0.87	0.64	1.00				
Federal outlays	-0.65	0.47	0.16	0.75	1.00			
Federal outlays less defense	-0.89	0.77	0.51	0.96	0.84	1.00		
Code of Federal Regulations	-0.80	0.96	0.83	0.91	0.56	0.87	1.00	
Average marginal tax rate	-0.22	-0.28	-0.45	0.05	0.20	0.18	-0.15	1.00

Note: All variables in levels. Transfer payments, federal outlays, and federal outlays less defense spending are all as percentages of GDP. The construction of the average marginal tax rate (AMTR) variable followed the Barro and Sahasakul (1983) and Stephenson (1998) methodology.

Table 4.3: Unit root tests

	DF-GLS$_{i}$	DF-GLS$_{it}$	KPSS$_{i}$	KPSS$_{it}$	Perron$_{1}$	Perron$_{2}$
Trust	-0.70	-2.33	0.78	0.10	< 0.01	0.47
Political organizations (payrolls)	-0.60	-2.48	0.74	0.16	0.70	0.73
Political organizations (employments)	-1.61	-3.47	0.86	0.12	0.01	0.52
Labor productivity	1.24	-1.51	0.92	0.12	0.95	0.57
Code of Federal Regulations	1.49	-1.50	1.04	0.18	< 0.01	0.44
Sum of top 5 regulation titles	2.22	-1.54	1.06	0.13	0.01	< 0.01
Transfer payments	0.52	-1.61	0.81	0.19	0.61	0.68
Federal outlays	-1.31	-2.18	0.47	0.13	0.50	0.56
Federal outlays less defense	-0.33	-1.50	0.69	0.20	0.42	0.68
Average marginal tax rate	-1.77	-1.89	0.20	0.17	< 0.01	0.28

Note: The DF-GLS and Perron tests both have a null hypothesis of a unit root, while the KPSS test has a null hypothesis of stationarity (i.e. the lack of a unit root). Critical values for the DF-GLS test assuming level stationarity are -1.61 (10 percent), -1.95 (5 percent), and -2.61 (1 percent) respectively, and -2.87 (10 percent), -3.17 (5 percent), and -3.75 (1 percent) assuming trend stationarity. Critical values for the KPSS tests assuming level stationarity are 0.347 (10 percent), 0.463 (5 percent), 0.739 (1 percent) and 0.11 9 (10 percent), and 0.146 (5 percent) and 0.216 (1 percent) for trend stationarity. The Perron$_1$ and Perron$_2$ tests are based on the Perron (1989) unit root testing procedure with possible breakpoints and represent two different approachs for the selection of break dates: Perron$_1$ is the test with the selected break that yields the greates chance of rejecting the null hypothesis of a unit root, while Perron$_2$ represents the test where the most statistically significant break is chosen. Critical values for the Perron$_1$ and Perron$_2$ tests assuming trend stationarity with both trend and intercept breaks are -4.89 (10 percent), -5.18 (5 percent), and -5.92 (1 percent), and -4.28 (10 percent), -4.62 (5 percent), and -3.03 (1 percent) respectively. Subscripts "i" and "t" denote that the test specifications include an intercept or a trend, respectively.

Table 4.4: Cointegration tests

Government Variable	0	1	2
Transfer payments	0.0028	0.2391	0.5388
Federal outlays less defense	0.069	0.5811	0.5955
Federal outlays	0.0301	0.31	0.5242
Code of Federal Regulations	0.007	0.3125	0.3328
Sum of top 5 titles of the CFR	0.0759	0.4834	0.5048
Average marginal tax rate	0.0246	0.1019	0.1479

Note: Values displayed are from cointegration tests following the Johansen (1991) methodology. Each government variable is included in with the same set of endogenous variables: trust, labor productivity, and political organizations. Displayed numbers are p-values for the trace test statistics. Lag length was chosen based on Schwarz's Bayesian Information Criterion (SBIC) and is 1 lag for all series. All tests were specified with a linear trend in the data and an intercept only in the cointegrating equation.

Table 4.5: VECM: Transfer payments ($X = TP$)

Model						DV = ΔT				
	β_T	ν_1	β_{LP}	β_{POL}	β_{TP}	α_1	$\Gamma_{1,T}$	$\Gamma_{1,LP}$	$\Gamma_{1,POL}$	$\Gamma_{1,TP}$
(1)	1.00	-3.48	-0.59	1.10	0.71	-0.25	-0.06	1.59	0.36	-0.18
			[-1.16526]	[2.92387]	[2.39503]	[-2.47098]	[-0.40802]	[0.95826]	[0.90086]	[-0.50986]
(2)	1.00	-4.10	-0.07	0.67	0.67	-0.43	-0.01	2.08	0.44	-0.05
			[-0.22659]	[2.95482]	[3.39420]	[-2.92955]	[-0.07388]	[1.18339]	[1.07576]	[-0.12228]
(3)	1.00	-1354.67	185.01	29.12	-178.73	-0.01	-0.31	-0.99	0.13	-0.28
			[5.52706]	[1.98553]	[-8.12169]	[-2.60869]	[-1.96941]	[-0.55334]	[0.29450]	[-0.63637]

Note: All variables in logs. T- statistics in brackets.

Table 4.6: VECM: Regulations ($X = CFR$)

Model						DV = ΔT				
	β_T	ν_1	β_{LP}	β_{POL}	β_{CFR}	α_1	$\Gamma_{1,T}$	$\Gamma_{1,LP}$	$\Gamma_{1,POL}$	$\Gamma_{1,CFR}$
(1)	1.00	-16.22	-2.92	3.46	1.02	-0.12	-0.22	0.87	0.29	-2.22
			[-2.59022]	[5.04468]	[1.91731]	[-2.36176]	[-1.56888]	[0.58371]	[0.74189]	[-2.87943]
(2)	1.00	-11.72	-0.91	1.71	0.48	-0.32	-0.20	1.68	0.46	-2.51
			[-1.78284]	[5.13112]	[2.20964]	[-3.62311]	[-1.48073]	[1.10500]	[1.20761]	[-3.33318]
(3)	1.00	2.38	-0.45	1.34	-0.82	-0.53	-0.27	0.66	0.53	-2.64
			[-0.55049]	[4.17919]	[-1.76470]	[-3.80829]	[-1.88336]	[0.45279]	[1.49036]	[-3.09633]

Note: All variables in logs. T- statistics in brackets.

Table 4.7: VECM: Tax rate ($X = AMTR$)

Model					DV = ΔT				
	β_T	ν_1	β_{LP}	β_{POL}	β_{AMTR}	α_1	$\Gamma_{1,T}$	$\Gamma_{1,LP}$	$\Gamma_{1,POL}$	$\Gamma_{1,AMTR}$
(1)	1.00	4.81	0.46	0.09	-3.33	-0.15	-0.19	2.19	0.06	-0.51
			[0.65244]	[0.09077]	[-2.56999]	[-3.10432]	[-1.40985]	[1.34986]	[0.16628]	[-1.19877]
(2)	1.00	-9.16	0.41	0.89	0.14	-0.32	-0.10	1.67	0.35	-0.56
			[1.68634]	[2.98389]	[0.38368]	[-2.90092]	[-0.70076]	[0.97201]	[0.87260]	[-1.25328]
(3)	1.00	-4.15	0.29	1.19	-1.62	-0.70	-0.21	1.89	0.42	-1.19
			[0.44161]	[4.42726]	[-4.56650]	[-7.00095]	[-1.97100]	[1.40949]	[1.37512]	[-3.31362]

Note: All variables in logs. T- statistics in brackets.

Table 4.8: VECM: Federal outlays ($X = FED$)

Model					DV = ΔT				
	β_T	ν_1	β_{LP}	β_{POL}	β_{FED}	α_1	$\Gamma_{1,T}$	$\Gamma_{1,LP}$	$\Gamma_{1,POL}$	$\Gamma_{1,FED}$
(1)	1.00	-9.93	0.36	0.73	-1.27	-0.12	-0.10	1.02	0.20	0.09
			[0.55740]	[1.04904]	[-1.29549]	[-1.85316]	[-0.70294]	[0.61119]	[0.51088]	[0.19522]
(2)	1.00	-12.21	0.92	0.40	-1.98	-0.19	-0.10	0.78	0.24	0.29
			[2.56590]	[1.05034]	[-3.59932]	[-2.34312]	[-0.66205]	[0.45847]	[0.58422]	[0.61825]
(3)	1.00	-7.56	-0.27	0.25	-2.49	-0.23	-0.11	-0.47	0.28	0.22
			[-0.33260]	[0.63404]	[-5.40541]	[-1.86468]	[-0.68153]	[-0.25475]	[0.64895]	[0.39979]

Note: All variables in logs. T- statistics in brackets.

Table 4.9: VECM: Federal outlays less defense spending ($X = FEDDEF$)

Model						DV = ΔT				
	β_T	ν_1	β_{LP}	β_{POL}	β_{FEDDEF}	α_1	$\Gamma_{1,T}$	$\Gamma_{1,LP}$	$\Gamma_{1,POL}$	$\Gamma_{1,FEDDEF}$
(1)	1.00	-4.86	-0.73	1.51	0.74	-0.18	-0.07	1.27	0.40	0.05
			[-1.10519]	[2.73528]	[1.54081]	[-2.09160]	[-0.48074]	[0.75750]	[0.98301]	[0.12930]
(2)	1.00	-8.48	0.43	0.83	0.02	-0.28	-0.07	1.32	0.42	0.22
			[0.90746]	[2.14993]	[0.05792]	[-2.72524]	[-0.48903]	[0.76872]	[1.04793]	[0.55631]
(3)	1.00	-10.57	-0.65	0.72	-3.47	-0.27	-0.17	-0.86	0.12	-0.07
			[-0.71522]	[1.77871]	[-5.78923]	[-2.72823]	[-1.11451]	[-0.48303]	[0.28246]	[-0.15421]

Note: All variables in logs. T- statistics in brackets.

Table 4.10: VECM: Sum of top 5 regulation titles ($X = SUMTOP$)

Model					DV = ΔT				
	β_T	ν_1	β_{LP}	β_{POL}	β_{SUMTOP}	α_1	$\Gamma_{1,T}$	$\Gamma_{1,LP}$	$\Gamma_{1,POL}$	$\Gamma_{1,SUMTOP}$
(1)	1.00	-10.74	-2.09	3.11	0.38	-0.09	-0.17	0.59	0.27	-0.83
			[-1.26004]	[3.97409]	[0.47822]	[-1.81753]	[-1.22584]	[0.37353]	[0.68100]	[-1.67401]
(2)	1.00	-8.84	0.03	1.23	0.04	-0.27	-0.15	1.27	0.39	-0.84
			[0.03973]	[3.02162]	[0.12452]	[-2.92078]	[-1.04664]	[0.77819]	[0.98684]	[-1.73841]
(3)	1.00	-3.90	0.58	1.17	-0.63	-0.66	-0.11	0.75	0.66	-0.49
			[0.87664]	[3.90514]	[-1.31267]	[-4.19934]	[-0.75641]	[0.47506]	[1.75971]	[-0.92036]

Note: All variables in logs. T- statistics in brackets.

Chapter A:

A.1 Chapter 1 Appendix

Data Description

Federal competitive grants

The source for data on competitive grants comes from USAspending.gov, the official source for all data on government grants, contracts, and other assistance, providing data downloads going back to FY2000.[1] The database originated from the Federal Funding Accountability and Transparency Act of 2006, which mandated a replacement for the Census Bureau's Federal Aid to States (FAS) and Consolidated Federal Funds Report (CFFR). The data can be easily downloaded and sorted by organizational type, including local governments and state governments, through the use of included flags. Geographic data fields are also included which allows the researcher to match grants to geographic location using state, city, and zipcode.

A subset of local governments either did not have the flag marked correctly identifying them as such (marked as "All Other" instead), or had errors in the geographic identification fields. These errors prevented some earmarks from being matched to their corresponding grants. A report by the Government Accountability Office (GAO) in 2014 (United States Government Accountability Office, 2014) estimated the "consistency" (accuracy) rates of the various data fields from the data by comparing the data from USAspending.gov with agency data. The report found that the USAspending.gov data were consistent 83-90 percent of the time for the recipient city data field and 88-94 percent of the time consistent for the award amount data field, as well as 90-95 percent consistent for the recipient state and 88-94 percent consistent for the unique identifier (Dun and Bradstreet (DUNS) number) of the recipient. Additionally, the report found that agencies did not report grant data in a timely manner. I do not use 2015 data because at the time of this writing, it appeared that many agencies had not yet reported grant awards for FY2015. While discrepancies of any kind are not ideal, the ones in the USAspending.gov data appear to be random, and will thus only decrease the precision of my estimates rather than induce bias.

In order to mitigate the loss of data due to government grant observations not being marked as such, I performed a search through the "All Other" category of grant data for observations that were obviously governments. This search reduced the loss of usable grant data significantly. I also used the provided DUNS number in the grant data to match to the correct geographic information found in the System for Award Management (SAM) database, which provides geographic and other information by DUNS number. These procedures allowed for much of the geographic information in the USAspending.gov data files to be updated, which resulted in matches for the majority of earmarks.

Earmarks

Earmark reforms began in 2006, ending with a ban on earmarks taking effect in FY2011 (Doyle, 2011b). Before the ban took place, a Bush administration executive order (Executive order 13457) directed the Office of Management and Budget (OMB) to keep track of congressional earmarks contained in appropriations bills in order to improve earmark transparency.[2] This was intended to "establish a clear benchmark for measuring progress."[3]

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[1] See Gerli (2015) for a complete description of this data source.

[2] See https://www.gpo.gov/fdsys/pkg/FR-2008-02-01/pdf/08-483.pdf and https://www.whitehouse.gov/the-press-office/remarks-president-earmark-reform

[3] OMB, Press Release: New Features Added to Earmarks Database; available from: http://www.whitehouse.gov/sites/default/files/omb/assets/omb/pubpress/2007/07: accessed 10 July 2007.

For their collection efforts, the OMB defined earmarks as "funds provided by the Congress for projects, programs, or grants where the purported congressional direction (whether in statutory text, report language, or other communication) circumvents otherwise applicable merit-based or competitive allocation processes, or specifies the location or recipient, or otherwise curtails the ability of the executive branch to manage its statutory and constitutional responsibilities pertaining to the funds allocation process."

The advantage of the OMB earmark data over other earmark databases, such as those collected by nonprofit groups Taxpayers for Common Sense (TCS) and Citizens Against Government Waste (CAGW), is that the OMB required federal agencies to submit reports to them detailing their expenditures in relation to each earmark, which included a list of the recipients of these funds. The CAGW data do not list recipients, and the TCS data match earmarks to recipients by searching for the *intended* recipient in news releases for each earmark sponsor. For my purposes, the TCS data would be highly misleading since the intended recipient of each earmark is often only one of many recipients of the actual funds. However, the OMB data for FY2010 do not include the recipients, as the agency reports were evidently never received for that year.

Using the city of the recipient as reported in the OMB data, I matched the earmarks with the recipient cities listed in the USAspending.gov data.

Congressional variables

The congressional variables come from Charles Stewart's Congressional Data Page.[4] For the 109th Congress (2005-2006 data years), the Republicans outnumbered the Democrats 233 (25 freshmen) seats to 201 (16 freshmen) seats in the House, and 55 (7 freshmen) seats to 44 (2 freshmen) seats in the Senate. This reversed with the 110th Congress (2007-2008 data years), where Democrats had 233 (41 freshmen) and Republicans had 202 (13 freshmen) seats in the House and a tie at 49 (8 freshman Democrat, 1 freshman Republican, 1 freshman Independent) seats per party in the Senate.[5]

In terms of committee membership, the House Appropriations Committee (HAC) chairman was Jerry Lewis (R, CA) for the 109th Congress and David R. Obey (D, WI) for the 110th Congress. The HAC was reorganized in 2007, increasing the number of subcommittees to 12, which gave each chamber an identical committee structure.

For the Senate Appropriations Committee (SAC), the chair during the 109th Congress was Thad Cochran (R, MS), which changed to Robert C. Byrd (D, WV) during the 110th Congress.

[4]See: http://web.mit.edu/cstewart/www/data/codebook.txt

[5]The lone independent was Bernie Sanders of Vermont.

Theoretical Appendix:
Legislative Bargaining Model With Institutional Constraints

The earmark ban represented a change in the institutional rules (or "constraints") that govern the federal appropriations process. Specifically, the ban altered the ability for legislators with the power to propose appropriations legislation (i.e. members of the HAC and SAC) to allocate funding across districts and programs. In keeping with the distributive politics literature, I thus theoretically motivate the impact of the earmark ban on the distribution of federal grants within the framework of a legislative bargaining process.

The Baron and Ferejohn (1989) model forms the foundation for many empirical and theoretical contributions to distributive politics (Knight, 2005), (Knight, 2008), (Albouy, 2013). The simplest version of the model assumes a closed rule legislative process where a legislature of $N > 3$ legislators each representing districts indexed by d bargain over the allocation of the budget (normalized to 1) in a 2-period game. At the start of each period, a randomly selected proposer (chosen with probability $\frac{1}{N}$) must propose a distribution of budget shares across districts $(g_1, g_2, ..g_N)$, and a simple majority vote is required to pass the proposed distribution. If the proposer's distribution in the first period is rejected, then the budgetary shares are discounted by $\delta \in [0, 1]$ and the game advances to the second period, where another proposer is chosen. If the second proposal fails to pass, all members receive $g_d = 0$.

The model's equilibrium predicts that the proposer will offer a minimal amount of the budget $(\frac{\delta}{N})$ to exactly half of the members of the legislature (the "coalition" of $\frac{N-1}{2}$ members) and take the rest for himself. This leaves the other $\frac{N-1}{2}$ members (the "non-coalition") with zero.

I propose a model where N legislators compete in a similarly conceived 2-stage, non-cooperative game with the addition of a parameter $(\alpha \in [1, \alpha^*])$ to model a change in the institutional constraints that limit the size of the budget that the proposer may allocate to a fraction of the total budget: $(\frac{1}{\alpha})$. The equilibrium thus becomes:

$$g_p = \frac{1}{\alpha}\left[1 - \frac{\delta}{N}\left(\frac{N-1}{2}\right)\right] \tag{A.1}$$

$$g_c = \frac{\delta}{\alpha N} \tag{A.2}$$

$$g_{-c} = 1 - g_p - g_c\left(\frac{N-1}{2}\right) = 1 - \frac{1}{\alpha} \tag{A.3}$$

Where g_p is the proposer's share, g_c is the coalition's share, and g_{-c} is the non-coalition's share. Notice that the proposer's share is decreasing in α, as is the coalition's share, while the non-coalition's share is increasing in α. This result implies that some districts will see increases in funding while others will see decreases in funding as a result of a change in the institutional constraints.

In order to capture the fact that utility (vote) maximizing legislators care not only about the share of the budget they bring to their home districts, but also about "non-budgetary" resources such as ideological positions, I define legislator utility to be Cobb-Douglas such that:[6]

$$U(g_d, s_d, t) = \delta^t (g_d)^{1-\gamma_d} (s_d)^{\gamma_d} \tag{A.4}$$

where s_d is the level of "non-budgetary" resources owned by the legislator in district d. $\gamma_d \in [0, 1]$ is exogenously given and represents voter sentiment in district d regarding budgetary vs. non-budgetary resources.

An increase in γ_d leads to an increase in the marginal utility of non-budgetary resources and a decrease in the marginal utility of budgetary resources, as it can be shown that $\frac{\partial^2 U}{\partial s_d \partial \gamma_d} > 0$ and $\frac{\partial^2 U}{\partial g_d \partial \gamma_d}$

[6]In an examination of the vote buying activities of members of Congress, Alexander et al. (2016) find that legislators farther from the center in terms of political ideology received smaller budget

< 0. This implies that for an exogenous increase in γ_d, legislators will substitute non-budgetary resources for budgetary resources.

The result of this shift in terms of the distribution of the federal budget across districts can be seen by assuming that legislators "vote" for or against a change in institutional rules based on the sentiment of their constituents.[7] Thus, if voter sentiment shifts in enough districts so that the average legislator values non-budgetary resources more than budgetary resources, the result will be an increase in α.

Formally, I define α to be a function of γ_d such that:

$$\alpha(\gamma_d) = 1 \qquad if: \frac{1}{N}\sum_{d=1}^{N}\gamma_d < \frac{1}{N}\sum_{d=1}^{N}(1-\gamma_d) \tag{A.5}$$

$$\alpha(\gamma_d) > 1 \qquad if: \frac{1}{N}\sum_{d=1}^{N}\gamma_d > \frac{1}{N}\sum_{d=1}^{N}(1-\gamma_d) \tag{A.6}$$

$$\alpha(\gamma_d) = \alpha^* \qquad if: \frac{1}{N}\sum_{d=1}^{N}\gamma_d = 1 \tag{A.7}$$

As $\alpha \to \alpha^*$, the budget shares from Equations A.1-A.3 approach the point at which every district receives $g_d = \frac{1}{N}$.[8] Note that if $\gamma_d = 1$, then $\alpha = 1$. Substituting $\alpha = 1$ into Equations A.1-A.3 yields an equilibrium in budget shares identical to the Baron and Ferejohn (1989) equilibrium, where the proposer gets all of the budget except for what he must give to the coalition, while the non-coalition gets nothing.

The implication from the model is that an exogenous shift in constituent preferences (γ_d) incentivizes legislators to impose an additional institutional constraint on themselves (α), which in turn alters the geographic distribution of federal grants to be more equal across districts.

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shares.

[7] This is a simplification of the reality that the various earmark reforms and moratoriums were adopted by a subset of members (party caucuses and committees) and enforced through peer pressure (Doyle, 2011a), (White, 2014).

[8] α^* is a cubic function that monotonically increases in δ and can be approximated numerically. Analytical solutions give complex roots.

A.2 Chapter 2 Appendix

Data Description

Lobbying expenditures

The data on lobbying expenditures come from the Senate Office of Public Records (SOPR) database. The Lobbying Disclosure Act of 1995 (LDA 1995) mandated that federal lobbyists semi-annually report their activities to the Secretary of the Senate and the Clerk of the House of Representatives. All amounts of lobbying revenues greater than $5,000 were to be reported by lobbying firms, and lobbying expenditures greater than $20,000 for organizations with in house lobbyists ("self-filers"). The law was later amended with the Honest Leadership and Open Government Act of 2007 (HLOGA 2007), which altered the monetary threshold and frequency of the reporting requirements. Under the amended law, the threshold was lowered to $2,500 for lobbying firms and $10,000 for self-filers, and reports were required to be quarterly instead of semi-annually. Additionally, reports were required to be submitted through a single, electronic system through the SOPR. Prior to 2008, reports could be filed on paper or through two different electronic reporting systems, one for the House and one for the Senate. This presents the possibility for measurement error for data from the years prior to 2008.

LDA 1995 defines a lobbyist as "any individual who is employed or retained by a client for financial or other compensation for services that include more than one lobbying contact, other than an individual whose lobbying activities constitute less than 20 percent of the time engaged in the services provided by such individual to that client over a six-month period." Reports must be filed no later than 20 days after the lobbying-client relationship triggers one of several different requirements outlined by the law and must continue, regardless of the size of lobbying expenditures, until the relationship is terminated.

Lobbying reports are assembled by the SOPR staff into a database of records, where the name of the client, time period, and amount, in addition to other information, are all recorded. I matched the client name with Census FIPS codes. In some cases, there were clear mistakes in the record that were easy to correct, such as misspelled names. In a few cases, the record was not able to be matched. Records with missing amounts were given the value of zero, although they could technically be any amount less than $5,000. Clients that were listed as "multiple governments" were dropped from the analysis.

Figure A.1 shows that roughly 30 percent of lobbying expenditures were $50,000 or less.

Earmarks

In 2007, earmark reform began, ending with a ban on earmarks taking effect FY2011 (Doyle, 2011b). Before the ban took place, a Bush administration executive order directed the OMB to keep track of congressional earmarks contained in appropriations bills in order to improve transparency (Executive order 13457). This was to "establish a clear benchmark for measuring progress."[9] The OMB defined earmarks as "funds provided by the Congress for projects, programs, or grants where the purported congressional direction (whether in statutory text, report language, or other communication) circumvents otherwise applicable merit-based or competitive allocation processes, or specifies the location or recipient, or otherwise curtails the ability of the executive branch to manage its statutory and constitutional responsibilities pertaining to the funds allocation process."

For the years 2005, 2008, 2009, and 2010, information on the legislation citation, description, and amount of each earmark is available. Most importantly, for the years prior to 2010, the recipient of each earmark is also noted. The advantage of the OMB earmark data over other earmark databases, such as those collected by nonprofit groups Taxpayers for Common Sense (TCS) and

[9]OMB, Press Release: New Features Added to Earmark Database; available from: http://www.whitehouse.gov/sites/default/files/omb/assets/omb/pubpress/2007/07: accessed 10 July 2007.

Citizens Against Government Waste (CAGW), is that the OMB required federal agencies to send in reports detailing their expenditures in relation to each earmark and list the recipients of these funds. The CAGW data do not list recipients and the TCS data match earmarks to recipients by searching for the *intended* recipient in news releases by each earmark's sponsor. For my purposes, the TCS data would be highly misleading, since the intended recipient of each earmark is often only one of many recipients of the actual funds. However, the OMB 2010 data do not include the recipients, which prevents this year from being included in the analysis.

Using the name of the recipient as reported in the OMB data, I matched the earmarks with county and municipal governments. The decision to include only county or municipal governments was based primarily on the goal of consistency regarding the geographic boundaries of each observation. Special purpose governments and school districts often overlap county lines, and boundaries of the former are not available. Also, any earmark that listed multiple recipients was dropped.

Figure A.2 shows that nearly 80 percent of earmarks to county or municipal governments were $1 million or less, while figure A.3 shows that over half of the counties that received earmarks received 1 earmark or less.

Congressional variables

The Congressional variables come from Charles Stewart's Congressional Data Page.[10] For the 109th Congress (2005-2006 data years), the Republicans outnumbered the Democrats 233 (25 freshmen) seats to 201 (16 freshmen) seats in the House, and 55 (7 freshmen) seats to 44 (2 freshmen) seats in the Senate. This reversed with the 110th Congress (2007-2008 data years), where Democrats had 233 (41 freshmen) and Republicans had 202 (13 freshmen) seats in the House and a tie at 49 (8 freshman Democrat, 1 freshman Republican, 1 freshman Independent) seats per party in the Senate.[11]

In terms of committee membership, the House Appropriations Committee (HAC) chairman was Jerry Lewis (R, CA) for the 109th Congress and David R. Obey (D, WI) for the 110th Congress. The HAC was reorganized in 2007, increasing the number of subcommittees to 12, which gave each house an identical committee structure. The shift in party majority in the House and Senate was reflected in the party composition of the HAC; for the 109th Congress, Republicans outnumbered Democrats 38 to 29, while during the 110th Congress, Democrats outnumbered Republicans 37 to 30.

For the Senate Appropriations Committee (SAC), the chair during the 109th Congress was Thad Cochran (R, MS), which changed to Robert C. Byrd (D, WV) during the 110th Congress. During the 109th Congress there were 15 Republicans and 13 Democrats, while during the 110th Congress there were 15 Democrats and 14 Republicans.

I construct the "political competition" variable in an analogous way to Levitt and Poterba (1999). It is simply the absolute value of the difference between the percent Democrat vote in each county and the national average in the last presidential election. Thus, for years 2004-2007, the number is the absolute difference from 48.3, while for years 2008 and on, it is the absolute difference from 52.9.

[10]See: http://web.mit.edu/cstewart/www/data/codebook.txt

[11]The lone independent was Bernie Sanders of Vermont.

Figure A.1: Frequency of lobbying amounts

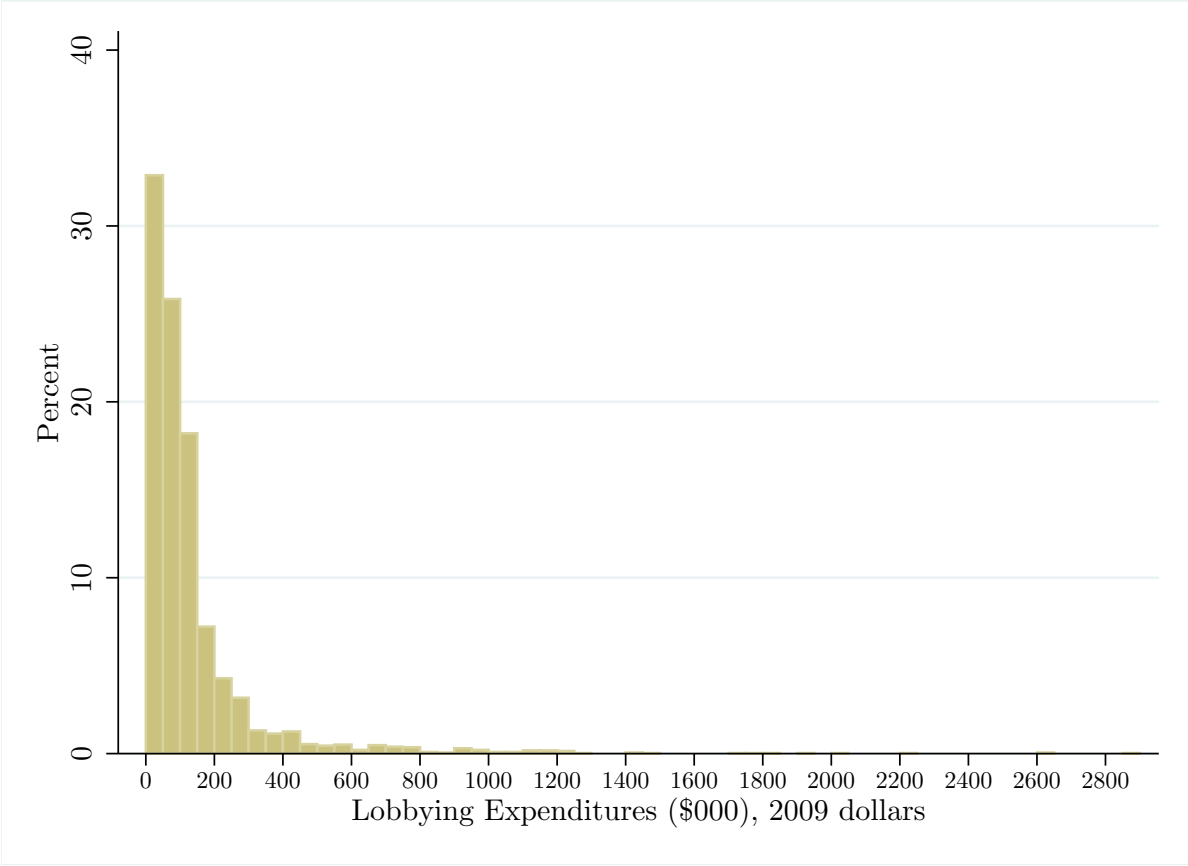


Figure A.2: Frequency of earmark amounts

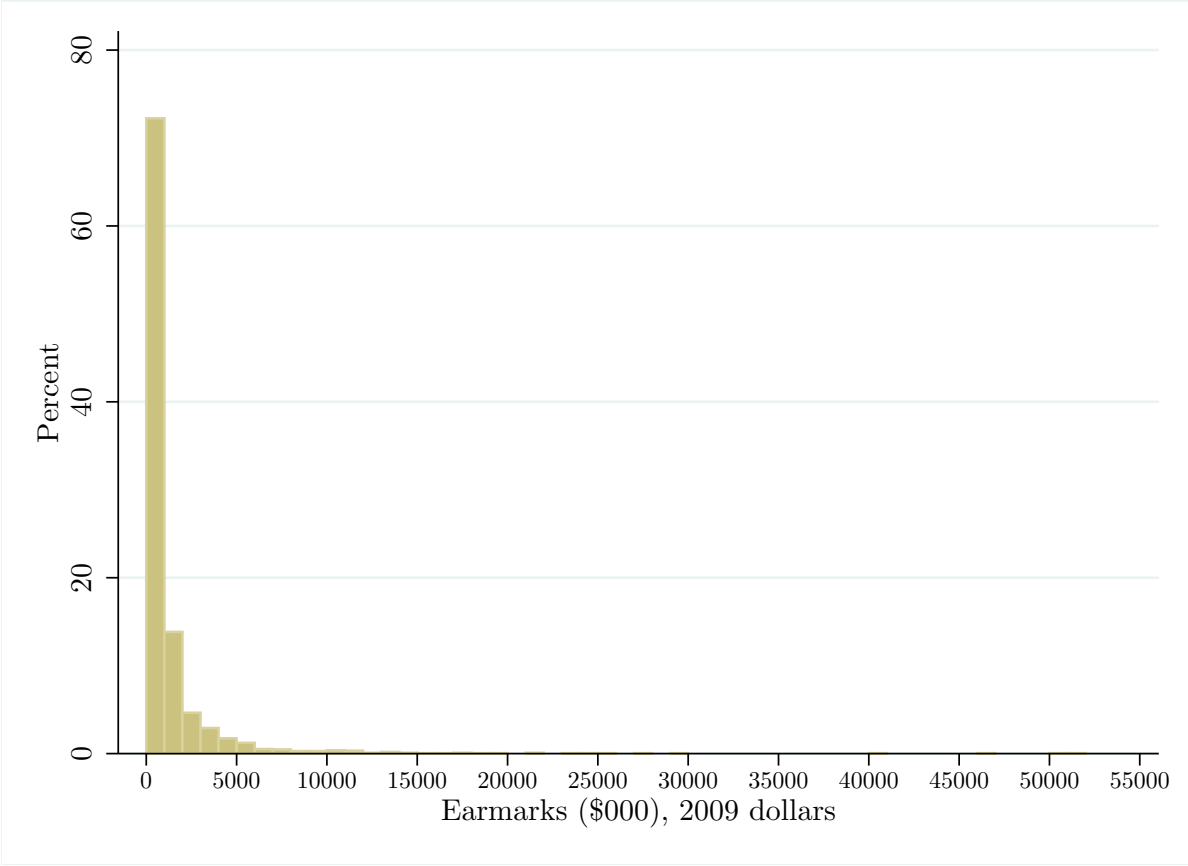
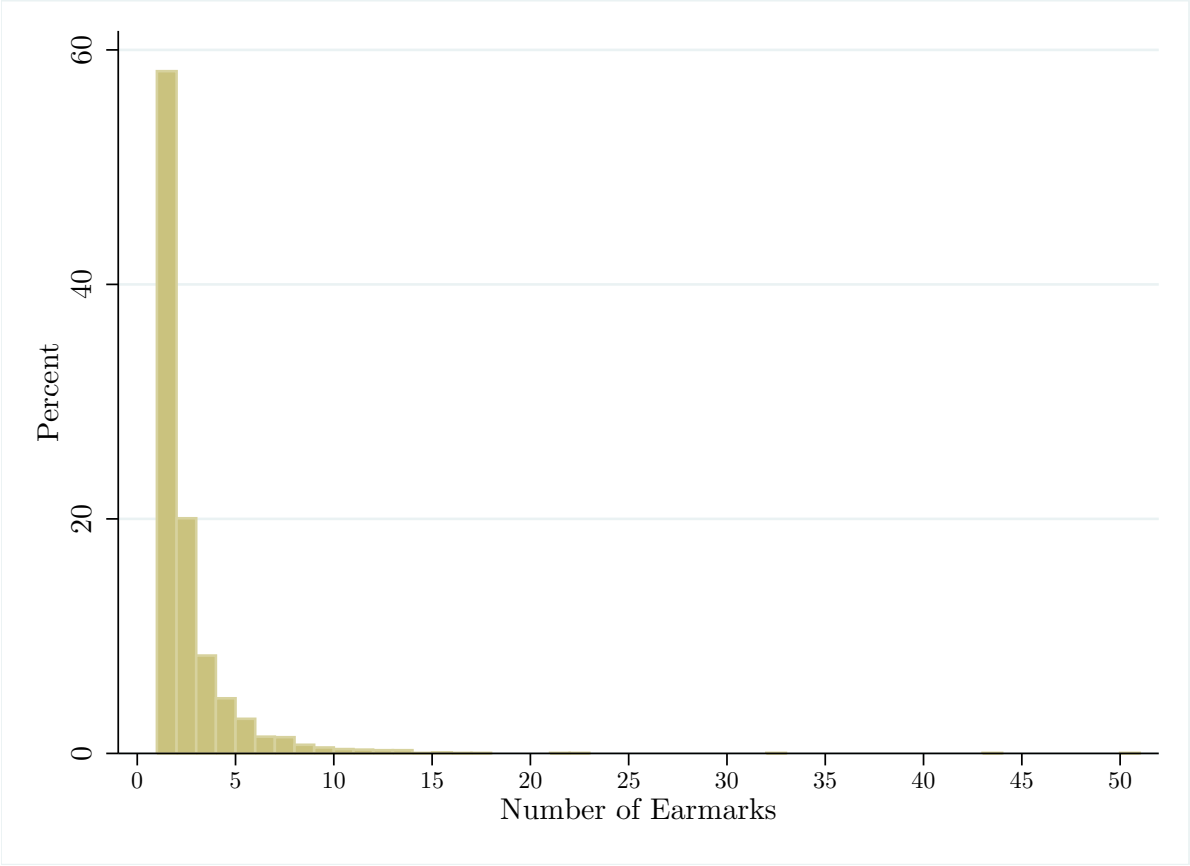


Figure A.3: Frequency of earmark counts



Theoretical appendix

Second order condition

The second order condition for the theoretical model discussed above is:

$$\frac{\partial^2 \pi_i}{\partial L_i^2} = \beta Z_i(\beta - 1)(B_i + Z_i L_i)^{\beta - 2} < 0 \tag{A.8}$$

Alternative model

In the alternative model, I motivate the impact of lobbying on earmarks along the *extensive* margin of earmark distribution. I assume that the risk averse local government lobbies to maximize its expected utility, given that lobbying increases the probability of receiving an earmark:

$$\pi_i = Z_i + ln(L_i) \tag{A.9}$$

where $\pi_i \in [0, 1]$ is the probability of local government i recieving an earmark, Z_i is a series of both observable and unobservable variables characterizing local government i, and L_i is the lobbying expenditure incurred by local government i. For the same reason as the model presented above, estimation of Equation A.9 will suffer from ommitted variable bias because L_i is correlated with unobserved elements in Z_i.

In order to derive an instrument, I follow a similar procedure as the previous model. Here, I assume that local governments seek to maximize their expected utility:

$$\max_{L_i} \{\pi_i U(W_1) + (1 - \pi_i) U(W_0) - cL_i\} \tag{A.10}$$

where the "good" state of the world is when the local government wins the earmark: $W_1 = R_i + E$, while the "bad" state of the world is when the local government receives only its own-source revenues: $W_0 = R_i$. The utility function is of the form $U(\cdot)^\beta$, where $\beta \in (0, 1)$. Finally, c is a constant marginal cost to lobbying. Substituting in from Equation A.9, the local government's maximization problem becomes:

$$\max_{L_i} \{\big[Z_i + ln(L_i)\big](R_i + E)^\beta + (1 - \big[Z_i + ln(L_i)\big])(R_i)^\beta - cL_i\} \tag{A.11}$$

Differentiating with respect to L_i yields the first order condition:

$$\frac{(R_i + E)^\beta}{L_i} - \frac{(R_i)^\beta}{L_i} - c = 0 \tag{A.12}$$

Solving for L_i gives the optimal lobbying expenditure:

$$L_i^* = \frac{(R_i + E)^\beta - (R_i)^\beta}{c} \tag{A.13}$$

A comparative static exercise is then performed, giving:

$$\frac{\partial L_i^*}{\partial c} = -\Big[(R_i + E)^\beta - (R_i)^\beta\Big] c^{-2} < 0 \tag{A.14}$$

$$\frac{\partial L_i^*}{\partial E} = \frac{\beta}{c}(R_i + E)^{\beta - 1} > 0 \tag{A.15}$$

$$\frac{\partial L_i^*}{\partial R_i} = \frac{\beta}{c}\left[\frac{1}{(R_i + E)^{1-\beta}} - \frac{1}{(R_i)^{1-\beta}}\right] < 0 \tag{A.16}$$

Equations A.14 - A.16 show that the optimal amount of lobbying expenditures (L_i^*) is decreasing in the cost of lobbying (c) and increasing in the size of the earmark lobbied for (E), while it is also decreasing in the size of own-source revenues (R_i).

The intuition behind this last result is that local governments, when faced with a shortfall in own-source revenues, will pay a cost (c) to lobby for an earmark of uncertain size, E. Equation A.16 thus implies a viable instrument in the size of own-source revenues, as R_i is predicted to be correlated (inversely) with lobbying, but not with the error term from Equation A.9.

As in the model presented above, assuming own-source revenues are a function of changes in the tax base ($R_i = \Delta B_i$) motivates my use of shocks to changes in the tax base as an instrument for lobbying expenditures (L_i).

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