Parties, Divided Government, and Infrastructure Expenditures: Evidence from U.S. States*

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Abstract

This paper examines the impact of divided government in U.S. states on infrastructure expenditures for transportation, education, and social services. As infrastructure investments, in particular for transportation, are a bi-partisan issue, we hypothesize that divided governments expand infrastructure spending compared to governments under true Democratic or Republican control. We test this hypothesis using U.S. state-level data over the period 1970 to 2008 and find that divided governments indeed increase expenditures for transportation. This finding holds both for split-legislature and split-branch governments, and the impact is most pronounced for capital outlays. In contrast, expenditures for education and social services are characterized by more partisan patterns.

Keywords: Infrastructure, Public Expenditures, Partisanship, Divided Government, Political Competition
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1 Introduction

In recent years, America's allegedly 'crumbling infrastructure' has been a prominent topic of public debate. As part of the American Recovery and Reinvestment Act following the financial crisis, large amounts have been spent on infrastructure maintenance and upgrades. Still, the American Society of Civil Engineers graded America's infrastructure only as D+ in their latest national report card issued in 2017.

In 2018, President Donald Trump has reinforced that infrastructure investments are a key priority also under his presidency. According to his infrastructure plan unveiled in February 2018, USD 200 billion in federal money should generate total investments of USD 1.5 trillion by leveraging local and state taxes and private investment for repairing and upgrading America's infrastructure.

Investments in key infrastructure such as transportation are often considered a bi-partisan priority, in contrast to other government policies such as public welfare which are subject to partisanship. Therefore, government expenditures for infrastructure may be particularly high in situations of divided government, when at least one chamber of the legislature is not controlled by the party that holds the governorship. In this situation, parties are not able to implement their preferred policies, but need to find a consensus with the opponent party (see, e.g., Alesina and Rosenthal, 1995, 1996). Higher investments in infrastructure may be one potential outcome from this balancing of policies between the opposing parties. Likely, the effect is more pronounced for transportation infrastructure than for education and social services infrastructure, which have a more partisan character.

We test this hypothesis based on U.S. state-level data on infrastructure expenditures over the period 1970-2008 from the U.S. Census Bureau. We focus on three types of infrastructure with relevant expenditures at the state level: transportation, education and social services infrastructure such as hospitals, parks and recreation facilities. Applying a panel regression set-up with state and year fixed effects, we exploit changes in true party control of government within the different states over time. We also control for a state-specific linear time trend and a number of state- and time-specific variables, including contributions from the federal government. Particularly for transportation, intergovernmental transfers from the federal government are an important funding source for expenditures at the state level.

The results suggest that divided governments indeed increase expenditures for transportation infrastructure by around 3 percent compared to true Democratic or Republican control. In contrast, we do not find a statistically significant effect of divided government on education or social services expenditures. However, in line with partisanship preferences, education and social services expenditures tend to be lower under true Republican control.

The observed increase in transportation expenditures under divided control seems to stem from a net increase in government expenditures, rather than from a redistribution across expenditure types. Since the effect is confined to transportation infrastructure, however, the overall level of state expenditures does not materially increase. The absence of a substantial increase in overall state expenditures also confirms that the rise in transportation expenditures is not simply the result of divided governments' inability to manage the budget.

We test the robustness of our main results in several ways. We verify that the increase in transportation expenditures is driven both by episodes during which the state legislature is split (both chambers of the state legislatures controlled by different parties) and in episodes during which the government is split between the executive and the legislative branch. We also estimate the impact of divided government on infrastructure expenditures in a dynamic panel framework, where we find smaller, but still economically and statistically

significant effects. The results also hold when aggregating the observations at the level of two- and four-year election cycles, as well as when controlling for the level of debt and deficit or political business cycles. Finally, we also perform inference via placebo tests, in which we randomly vary the order of government types within the states. Confirming that our findings are not spurious, the estimates from the true order of government types are at the extremes of the distribution of the placebo estimates.

Our study contributes to the literature on the political economy of government expenditures with a systematic account of party influences on infrastructure expenditures in the U.S. Studies so far have mainly focused on the impact on total government spending, with mixed findings (see, e.g., Besley and Case, 2003, for an overview), or they have used total capital outlays as a crude measure of infrastructure investments. Our paper is the first that examines the impact of political characteristics on specific—and more or less partisan—infrastructure types.

In addition, our findings inform the current debate about the benefits and drawbacks of divided government. In recent years, and at the latest since the government shutdown in the U.S. in fall 2013, the challenges related to divided government have regained attention in the public discourse. Commentators often argue that divided governments lead to political gridlock as parties block each other in the political process. Several theoretical and empirical studies have investigated this issue, again with mixed findings (see Burden and Kimball, 2004). Our analyses suggest that higher investments in transportation infrastructure are one specific channel how divided governments may at least arrive at some political compromise that may be beneficial for the economy[1].

The remainder of this paper is organized as follows. Section 2 provides an overview of the relevant literature. Section 3 outlines the empirical strategy. Section 4 introduces the data. Section 5 presents the main results for the different infrastructure expenditure categories. Section 6 investigates the robustness of the findings and contains additional results. Section 7 concludes.

2 Literature Review

2.1 Impact of Political Parties on Government Policy

Whether differences in government policies are directly influenced by political parties is an old and heavily disputed question in the political economy literature. According to the median voter theorem formalized by Downs (1957), in a two-party system both parties should implement the policy that is favored by the median voter. In such a theoretical framework, a change of the political party in power should not have an impact on government policies. Consistent with this hypothesis, several authors report that the party label has little explanatory power when investigating policy differences across U.S. states. Garand (1988), for instance, concludes that differences in the growth of government size cannot be explained with political parties. Similarly, Gilligan and Matsusaka (1995) find only weak evidence that political parties influence the overall level of government spending.

However, over the last decades several authors have shown that parties may have more explanatory power than the median voter model predicts. The empirical results come from analyses at different political levels and focus on the following two questions:

1. Do parties have an impact on the *amount* of government expenditures?

[1]Another channel may be that divided governments are more likely to adopt welfare reforms than unified governments, see Bernecker (2016).

2. Do parties have an impact on the *composition* of government expenditures?

For the U.S. state level, the literature tends to answer both questions in the affirmative. Overall, Republican governments seem to spend less than Democrats, and on other purposes. We review the literature on both questions in turn. For our analysis, the resulting net effect on infrastructure provision is of primary importance.

A number of authors provide evidence that Democratic governments tend to have a higher level of expenditures and taxes than Republican governments. In an early study, Alt and Lowry (1994) find that expenditures and taxes tend to be higher in states controlled by Democrats. Besley and Case (2003) confirm this finding. Based on fixed effects panel regressions, they report that in particular the fraction of Democrats in the state lower house is positively correlated with a higher level of taxation and spending per capita. In contrast, the effect of a Democratic governor seems to be less clear. Reed (2006) comes to a very similar conclusion. He also finds that taxes are higher when Democrats are in control of the state legislature, and that the party of the governor seems to be of minor importance[2]. Additional studies by Denk (2009), Warren (2009), Besley, Persson and Sturm (2010), and Johnson, Mitchell and Yamarik (2012) confirm that state governments tend to be bigger when controlled by Democrats[3].

Political parties do not only affect the size of government expenditures, but also their composition. Various studies document these differences between Democratic and Republican governments, some of which are directly linked to infrastructure expenditures. Gilligan and Matsusaka (1995), for example, report that "Democratic control of both the executive and the legislative branches leads to significantly higher welfare expenditure than Republican control, and significant lower highway expenditure" (p. 385). Similarly, results by Besley, Persson and Sturm (2010) suggest that Democratic governments controlling both the state house and the senate spend less on infrastructure, measured as capital outlays in percent of total state government expenditure.

Johnson, Mitchell and Yamarik (2012) investigate the same question in even more detail. In their working paper, they analyze the impact of political control on five state revenue and five expenditure policies over the period 1970-2010. They define a state to be controlled by Democrats or Republicans if one party controls both the legislature and the governorship. They find strong evidence for policy differences between the two parties. When Republicans are in control, they tend to reduce general and welfare spending and to increase capital outlays. In contrast, Democrats increase spending on welfare and reduce capital outlays.

Watkins (2012) conducts a similar analysis of state government spending for the period 1971-2001. He analyzes how party control at the state level affects growth of total government expenses as well as the share of expenditures for specific types of expenditures, such as education, healthcare, or transportation. He controls for a large set of factors including policy decisions of the nearest neighbor states. His results suggest that Democratic governments spend more on education and welfare than their Republican counterparts, but less on public safety. In contrast, Watkins finds only very weak evidence that Republicans spend more on transportation than Democrats.

With regard to infrastructure expenditures, the review of the literature suggests that Republicans tend to spend more on capital outlays than Democrats, both in percent of government budget as well as in per-capita terms, despite their preference for a lower government share overall.[4]

[2]Similarly, Ferreira and Gyourko (2009) find in an analysis based on city-level data from the U.S. that the party affiliation of the mayor has no effect on the size of the government, the composition of public spending, or crime rates.

[3]Using a regression-discontinuity design, Pettersson-Lidbom (2008) provides evidence for similar expenditure and tax patterns across local governments in Sweden.

[4]The same pattern does not necessarily hold outside the U.S. In a panel for 13 OECD countries over the period 1963-1996,

2.2 Impact of Political Competition on Government Policy

One of the topics that has attracted considerable attention in recent years is the effect of political competition on policy outcomes. Besley and Case (2003), for instance, find that party competition in the legislature has a statistically significant effect on the level of total taxes per capita and workers compensation across U.S. states. Both taxation and workers compensation are lower when competition between parties is higher. In contrast, political competition does not seem to affect total spending per capita.

More recently, Besley, Persson and Sturm (2010) exploit the substantial variation in political competition across and within U.S. states in the 20th century. They find evidence that higher political competition between Republicans and Democrats made state governments adopt more growth-enhancing policies, e.g., in the form of lower taxes and higher spending on capital outlays (expressed as share of government budget).[5]

Relatedly, there is also a growing literature on the causes and consequences of divided government. In their classical contributions on the causes of divided government, Alesina and Rosenthal (1995, 1996) argue that divided government "is not an accident, but the result of the voters' desire for policy moderation" (1995, p. 2). As such, divided government may lead to an intended balancing of policies between the different parties. Other authors, such as Burden and Kimball (2004), challenge this claim and maintain that divided government is the by-product of other factors, such as the competitivenes of congressional elections.

With regard to the consequences of divided government, the literature has pointed out several drawbacks, such as legislative gridlock, increased interbranch conflict, slower reactions to shocks, and reduced government accountability (see Burden and Kimball, 2004, for an overview). In contrast, empirical evidence on beneficial effects of divided government is still scarce. A recent example is Bernecker (2016), who shows that in contrast to the common gridlock argument, divided U.S. state governments are approximately 25 percent more likely to adopt a welfare reform than unified governments. No evidence is provided so far on the role of divided government for infrastructure expenditures.

3 Empirical Strategy

To test whether divided government affects infrastructure spending, we estimate regressions of the following form:

$$\ln(\mathit{InfraExp}_{s,t+1}) = \mathit{DividedGovt}'_{s,t}\,\beta + \ln(\mathit{FedTrans}_{s,t+1})'\,\gamma + \mathit{Controls}'_{s,t}\,\Gamma + a_s + d_t + \theta_s\,t + \varepsilon_{s,t}, \qquad (1)$$

where the index s denotes the state, and t denotes the year. Equation (1) includes state fixed effects a_s, time fixed effects s_t, and a state-specific trend $\theta_s\,t$.[6] The error term is denoted $\varepsilon_{s,t}$. Given this specification, the effect of divided government on infrastructure expenditures is identified via the within-state variation of these variables over time.

In the main specification, we test whether divided governments invest more in infrastructure. More specifically, the hypothesis is that Democrats and Republicans find compromise in investing in the relatively

for instance, Darby, Li and Muscatelli (2004) find support for the notion that right-wing governments invest less, both as share of GDP and as share of total government spending.

[5] Again, this finding applies to the U.S. In contrast, Man (2014) finds that for a cross-section of 187 countries, including many non-democracies, the overall relationship between political competition and growth tends to be negative. Bohn (2007) and Darby, Li and Muscatelli (2004) show that political uncertainty may lead to lower public investment and greater public consumption.

[6] We perform unit root tests following Levin, Lin and Chu (2002) to check whether the inclusion of time dummies or state-specific trends leads to stationary expenditure series. For either adjustment and for each of the expenditure measures we consider, we reject the null hypothesis of the panel containing unit roots at least at the two-percent level.

non-partisan transport infrastructure, but less so in the education and social infrastructure. We measure infrastructure spending by the log total real expenditures in these three broad areas. Because the government typically passes, in any given year t, the budget for next year $t+1$, we regress next year's expenditures on this year's government characteristics (and controls).[7]

We classify divided governments via a simple specification that exploits whether or not one party (Democrats or Republicans) is in true control of the government and can thus unilaterally decide on the budget. According to Klarner (2013), there are two possibilities of one party being in full control. Either the party controls both houses and the governor or it has veto-proof majorities in both houses (in which case the party affiliation of the governor is irrelevant). Consequently, the government is divided when there is no party with full control.[8] Our main specification estimates the effect of divided governments on infrastructure expenditures by adding an indicator variable for whether or not the government is divided to the empirical model (1). However, we also contrast divided governments with governments that are fully controlled by Democrats or Republicans, respectively, and check whether different types of divided governments—split legislatures (upper and lower house controlled by different parties) or split branches (governor and both houses controlled by different parties)—are associated with different effects on infrastructure spending.

In all empirical specifications, we control for federal transfers for the respective categories of state government expenditures. Federal transfers are an important source of funding, in particular for the transport infrastructure where a significant share of highway spending is co-financed by federal funds.[9] The inclusion of these federal contributions as an explanatory variable in model (1) rests on the assumption that they are not driven by state-level expenditures. One may worry that this is a strong assumption, as federal transfers are only allocated to states if they co-finance projects enacted by state governments. However, each state's grant apportionment—or the share of the apportionment that is actually available to be obligated—constitutes an upper limit for the federal funds available. Historically, states have always fully utilized the available obligations[10], so that changes in federal apportionment can be considered largely exogenous to state-level expenditures.[11]

Concerning the remaining control variables, we follow specifications from the literature. As Besley and Case (2003)—but adjusted for the log dependent variable—we control for the log state population, the share of the population older than 65 years of age, the share of the population aged 5 to 17, and log real state personal income per capita. We also control for population growth, the urban population share, and

[7]Gilligan and Matsusaka (1995) point out that, in most states, the fiscal year t covers the time from July $t-1$ to June t, so that the budgeting process has indeed to be completed in $t-1$.

[8]Besley and Case (2003) note that both the governor as well as the state legislative have an influence on the budget. Consequentially, the literature has explored various ways to incorporate party control into empirical models. The used measures include the fraction of Democrats in the lower and upper house, a dummy variable whether the governor is a Democrat, Democratic or Republican control of the lower and upper house (separately or jointly), and the Democratic vote share. Using the fraction of Democrats in the legislative seems problematic as the effect of a percentage point increase is likely to be nonlinear, but may depend, e.g., on whether the party has a majority in one or both houses. Moreover, continuous measures may pick up effects that are related to political competition in addition to political control. For these reasons, exploring the correlations of a simple measure of divided government with government decision making seems a worthwhile task.

[9]Leduc and Wilson (2013), for instance, note that for so-called federal-aid highways, states are often reimbursed for 80 percent of the cost of construction or improvement, up to a certain limit. This limit is set through grant apportionment formulas which are based on indicators such as a state's share of the national interstate highway network or vehicle-miles traveled on interstate highway. For Europe, Kappeler and Välilä (2008) find a significant positive impact of capital transfers on investment in infrastructure, hospitals and schools, as well as public goods.

[10]Kimberly Monaco of the Formulation & Apportionments Team of the Federal Highway Administration (FHWA) has kindly provided this information on our request. On average, 92% of the apportionments (the portion of the federal-aid program provided directly to the states) are available to be obligated.

[11]Some authors have argued that federal grants to states depend on the distribution of political power in the U.S. Congress (Albouy, 2013) or in Congressional committees (Zhu and Brown, 2013). Controlling for federal transfers thus also controls for the relationship between the state and the federal government.

the unemployment rate. As Gilligan and Matsusaka (1995) point out, population growth may lead to an increased demand for infrastructure expenditures, and infrastructure needs may differ between urban and rural areas (see Randolph, Bogetić and Heffley, 1996). The unemployment rate, in turn, controls for the potential correlation of government expenditures with the business cycle.

4 Data

In general, our sample covers 47 states. It includes all variables on fiscal expenditures and transfers for the years 1971 to 2008, the last fiscal year before the Great Recession, and all other variables for the years 1970 to 2007.[12] We exclude the states of Alaska and Hawaii due to their remote location and lack of data. Nevada is excluded because politicians do not affiliate with parties, so that our independent variable of interest, the measure of divided government, cannot be constructed.

In the following, we describe the data sources for the measures of infrastructure expenditures, the political variables, and all control variables.

4.1 Infrastructure expenditures

The data on state infrastructure expenditures and intergovernmental revenues received from the federal government come from the State Government Finances database compiled by the U.S. Census Bureau. We group expenditures into the categories transport, education, and social services expenditures. Transport expenditures comprise of total highway, transit, air transport, and water transport expenditures, and social services expenditures include total expenditures for libraries, parks and recreation, hospitals, and housing and community development (there is only one category for education expenditures). The measures for intergovernmental revenues are aggregated accordingly. We transform all nominal expenditures into real year 2000 USD using the consumer price index (CPI) for all urban consumers from the U.S. Bureau of Labor Statistics.

Figure 1 displays the mean of the yearly log real expenditures within the three different categories of transportation, education, and social infrastructure across U.S. states. It shows that education expenditures are generally the biggest spending item, followed by transport expenditures and social services. Moreover, all expenditures seem to exhibit an increasing trend. This could simply reflect population growth. In the empirical strategy, we adjust for the trend via controlling for population, year fixed effects, as well as state-specific linear trends.

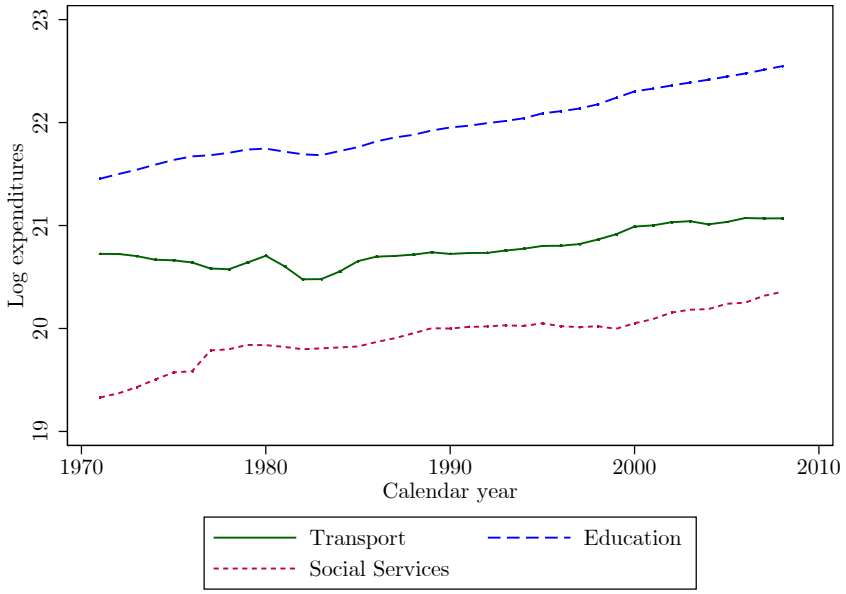
4.2 Political variables

All party and election related variables are obtained from the State Partisan Balance Data prepared by Klarner (2013). Klarner measures the degree of control Democrats and Republicans have over the upper and lower house as well as the party of the governor. Based on this information, we classify each state year as either being in full Democratic or Republican control or as having divided government. In addition, for divided governments we also encode whether the legislature is divided (*split legislature*) and whether the governor belongs to a different party than the one that controls both the upper and the lower house (*split branch*). See Section 3 above for more details on these classifications.

Figure 2 illustrates the identifying variation in the degree of government control. It displays, for each year between 1970 and 2007, the share of divided governments as well as the share of governments in full

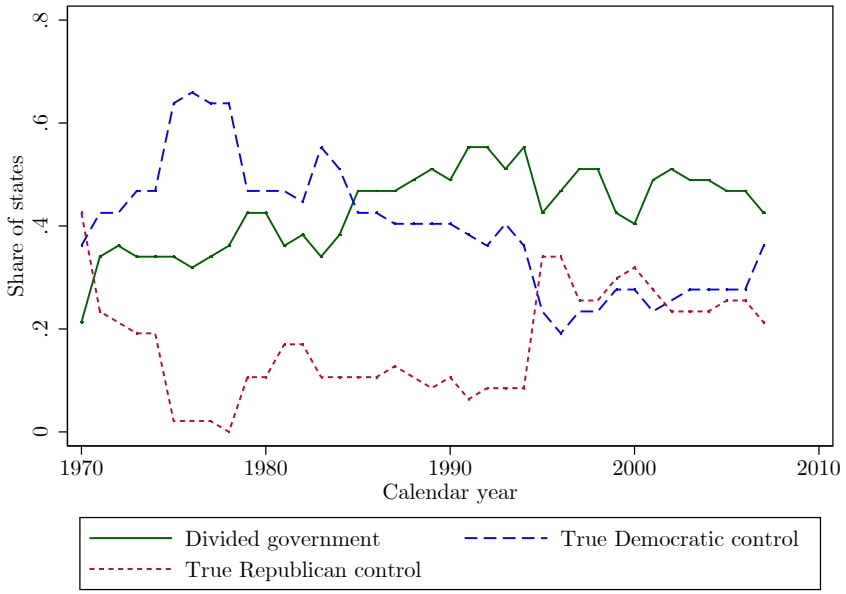
[12] Recall that the empirical model (1) includes the expenditures and transfers with a one-year lead.

Figure 1: Average log infrastructure expenditures



Notes: This figure shows the average of the log real infrastructure expenditures in year 2000 USD across all U.S. states except Alaska, Hawaii and Nevada over the sample period. Infrastructure expenditures are grouped into expenditures for transport (highways, transit, air transport, water transport), education, and social services (libraries, parks and recreation, hospitals, housing and community development).

Figure 2: Share of states with divided government and true Democratic / Republican control



Notes: This figure shows the share of states with divided government, true Democratic, and true Republican control over the sample period.

Democratic or Republican control. Evidently, there is substantial variation in the relative distribution of true Democratic, true Republican and divided governments over time. Between 1971 and 1985, pure Democratic control has been the most frequent form of government, while divided governments were most frequent thereafter, suggesting that political competition increased over time. Note also that we observe relatively few state governments with true Republican control, which account for below 25 percent of state governments for (almost) the entire observation period.

4.3 Control variables

Of the main economic variables, state income per capita and population size stem from the data collection by Besley, Persson and Sturm (2010) and are updated with the data from the original sources, the Bureau of Economic Analysis and the U.S. Census Bureau. We deflate current income using the consumer price index to obtain real income per capita in year 2000 USD terms. The unemployment rate is from Watkins (2012), who compiled the time series based on data from the U.S. Census Bureau, the Labor Department, and the Bureau of Labor Statistics. We have updated the variable with data from the Bureau of Labor Statistics.

Data on population demographics—the share of people aged 65 or above and the share of people between 5 and 17—are compiled by List and Sturm (2006) and updated with data from the U.S. Census Bureau, which is also the source of the original data. The share of urban population stems from the U.S. Census Bureau and is measured at 10-year frequency only. We have interpolated missing years in a linear manner.

Data on debt and deficit is obtained from the State Government Finances database, the same source used for the data on expenditures. Debt is measured as the total debt outstanding, while the deficit is the difference between total expenditures and total revenues. When taking logs, we deal with negative deficits (surpluses) and negative debt levels (asset holdings) by computing the negative of the log surplus and asset holdings, respectively.

Finally, Table A.1 in Appendix A provides summary statistics for all variables used in this paper. Among the dependent variables, we also list the measures for total expenditures, the expenditure shares of spending on transport, education, and social services, as well as the capital outlays in these three groups. We use these additional measures for robustness checks and for gaining a better understanding of the main results.

5 Main Results

Table 1 presents the OLS estimates of the empirical model. The dependent variable in Columns (1) and (2) is the logarithm of total transport expenditures of the states in the following fiscal year. In Columns (3) and (4), the dependent variable is the log of education expenditures, and in Columns (5) and (6), the dependent variable is the log of expenditures for social services. All specifications include state and year fixed effects and control for federal transfers in the respective spending category (in the following fiscal year) as well as current log population levels and population growth, which may factor into the decisions at the state level of how much to invest in infrastructure. In addition, Columns (2), (4), and (6) control for the population by age group, state level income per capita, the unemployment rate, and the share of the urban population among the state's entire population. The latter columns also include a state-specific linear time trend.

The results show that divided governments tend to increase expenditures for transport infrastructure. Regardless of whether we estimate the parsimonious model in Column (1) or the demanding specification in Column (2), divided governments are associated with an increase in transport spending by about 3 percent compared to governments with true Democratic or Republican control. The estimate is statistically different

Table 1: The Effect of Divided Government on Infrastructure Expenditures

	F.Log Expenditures for					
	Transport		Education		Social Services	
	(1)	(2)	(3)	(4)	(5)	(6)
Divided government	0.029**	0.031**	0.008	0.012	0.052	0.036
	(0.013)	(0.012)	(0.010)	(0.009)	(0.035)	(0.022)
Log population	0.607***	0.475	0.775***	0.942**	0.818***	0.727
	(0.116)	(0.676)	(0.079)	(0.426)	(0.275)	(0.928)
Population growth	3.954***	−0.253	0.675	−0.607	1.440	−1.399
	(1.220)	(1.218)	(1.009)	(1.055)	(1.477)	(1.294)
Share aged 65+		−0.550		0.933		−2.930
		(3.377)		(1.855)		(3.562)
Share aged 5–17		−1.274*		1.555**		0.262
		(0.746)		(0.697)		(1.186)
Log income per capita		0.422*		0.533**		0.361
		(0.245)		(0.212)		(0.440)
Unemployment rate		−1.986***		−0.689		−1.905**
		(0.706)		(0.625)		(0.872)
Share of urban population		0.145		0.677		−0.435
		(0.925)		(1.068)		(1.449)
F.Log federal transport transfers	0.235***	0.179***				
	(0.047)	(0.038)				
F.Log federal education transfers			−0.014	−0.009		
			(0.043)	(0.038)		
F.Log federal social serv. transfers					0.054	0.110***
					(0.067)	(0.040)
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trends	No	Yes	No	Yes	No	Yes
Avg. expenditures (in $ M)	1473.05	1473.05	5241.35	5241.35	748.59	748.59
Observations	1786	1786	1786	1786	1786	1786

Notes: The dependent variables are the log of total expenditures for transport, education, and social services, respectively, for the following fiscal year. The federal transfers for the respective spending category are also measured with a one-year lead, as indicated by "F." in front of the variable name. The standard errors (in parentheses) are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

from zero at the five percent level and, for average yearly transport expenditures, amounts to an increase in spending of about USD 44.2 million (at year 2000 values).

In contrast, the estimated increase for education expenditures is smaller than for transport and we cannot reject, at the ten percent significance level, that these increases are actually zero. Social services spending also tends to be, on average, higher in states with divided governments, but the effect is imprecisely estimated. As a result, also these estimates are statistically indistinguishable from zero.

Taken together, the baseline results in Table 1 are consistent with the idea that divided governments find compromise in investing in the relatively unpartisan transport infrastructure, but are more ideologically divided regarding spending for education and social services.

In Table 2 we further investigate this hypothesis by estimating the same models as in Table 1, but now with divided government as the baseline category. Specifically, we estimate how expenditures of divided governments compare to expenditures of state governments with true Democratic and true Republican control, respectively.

The results in Columns (1) and (2) show that governments controlled by both Democrats and Republicans are associated with lower expenditures for transport infrastructure than divided governments, reinforcing the idea that the increase in spending of divided governments represents bi-partisan compromise.[13] Partisan policy preferences may help understand the results for education expenditures in Columns (3) and (4). Democratic governments tend, if anything, to spend more on education than divided governments, while Republican governments tend to spend less (which is statistically significant at the five percent level in the demanding specification in Column (4)). These differences in education spending may thus reflect that Democrats tend to value publicly financed education higher than Republicans.

For social services, finally, the results are somewhat mixed and differ between the parsimonious and the more demanding specification. The parsimonious specification in Column (5) suggests that social services spending may be another spending category akin for bi-partisan compromise. However, the coefficients are not precisely estimated, reflecting the imprecision already apparent in Table 1. In contrast, the demanding specification in Column (6) suggests that Republican governments apportion significantly fewer funds to social services spending than divided governments and true Democratic governments alike.

So far, we find that divided governments are associated with an increase in expenditures for transport infrastructure. But does this finding imply that divided governments, in general, have difficulties of keeping spending under control? Alternatively, is the spending increase confined to transport infrastructure, or even re-balanced across expenditure types?

Table 3 provides evidence to answer these questions. In Column (1), we estimate our main empirical specification with the full vector of controls, but this time with the log of total government expenditures as the dependent variable. The result shows that divided governments, on average, tend to have 0.2 percent higher budgets than governments under single party control, but this effect is statistically insignificant (the exact coefficient equals 0.00249). This suggests that divided governments do not increase spending substantially. Quantitatively, however, the estimated coefficient of the dummy variable *divided government* does not differ much from 0.0037, which is the value we would expect if the entire increase in transport expenditures would be purely financed out of a budget increase (as opposed to a re-balancing across budget items). See Appendix B for the calculations that lead to this conclusion.

In Columns (2) to (4), we investigate how the budget shares of the different infrastructure categories

[13] Note that only the coefficients for true Democratic control are statistically significantly different from zero at least at the ten percent level. This may be due to the limited identifying variation of governments with true Republican control evident in Figure 2.

Table 2: The Effect of True Government Control on Infrastructure Expenditures

	F.Log Expenditures for					
	Transport		Education		Social Services	
	(1)	(2)	(3)	(4)	(5)	(6)
True Democratic control	−0.028*	−0.045**	0.010	0.006	−0.056	−0.001
	(0.016)	(0.019)	(0.013)	(0.008)	(0.049)	(0.024)
True Republican control	−0.030	−0.014	−0.029	−0.033**	−0.048	−0.076**
	(0.024)	(0.019)	(0.021)	(0.016)	(0.046)	(0.030)
Log population	0.608***	0.449	0.782***	0.975**	0.816***	0.791
	(0.115)	(0.678)	(0.081)	(0.405)	(0.277)	(0.891)
Population growth	3.954***	−0.317	0.692	−0.532	1.436	−1.248
	(1.221)	(1.230)	(0.999)	(1.064)	(1.481)	(1.325)
Share aged 65+		−0.584		0.985		−2.829
		(3.314)		(1.870)		(3.484)
Share aged 5–17		−1.245		1.511**		0.177
		(0.751)		(0.681)		(1.185)
Log income per capita		0.434*		0.519**		0.333
		(0.251)		(0.205)		(0.427)
Unemployment rate		−2.023***		−0.642		−1.814**
		(0.723)		(0.629)		(0.867)
Share of urban population		0.205		0.607		−0.576
		(0.913)		(1.061)		(1.445)
F.Log federal transport transfers	0.235***	0.178***				
	(0.047)	(0.038)				
F.Log federal education transfers			−0.012	−0.007		
			(0.042)	(0.037)		
F.Log federal social serv. transfers					0.055	0.112***
					(0.066)	(0.040)
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trends	No	Yes	No	Yes	No	Yes
Observations	1786	1786	1786	1786	1786	1786

Notes: The dependent variables are the log of total expenditures for transport, education, and social services, respectively, for the following fiscal year. The federal transfers for the respective spending category are also measured with a one-year lead, as indicated by "F." in front of the variable name. The standard errors (in parentheses) are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: The Effect of Divided Government on Total Expenditures and Expenditure Shares

	F.Log Total Expenditures	F.Log Expenditure Share of Investments in		
		Transport	Education	Social Services
	(1)	(2)	(3)	(4)
Divided government	0.002	0.022*	0.004	0.026
	(0.005)	(0.012)	(0.009)	(0.022)
Log population	0.449*	−0.437	0.023	−0.212
	(0.247)	(0.545)	(0.293)	(0.757)
Population growth	−0.172	0.195	−0.171	−0.959
	(0.543)	(1.055)	(0.712)	(1.230)
Share aged 65+	−0.655	0.120	1.378	−2.278
	(1.093)	(2.766)	(1.226)	(2.947)
Share aged 5–17	−1.400***	−0.243	2.680***	1.388
	(0.435)	(0.794)	(0.850)	(1.192)
Log income per capita	0.219*	0.095	0.209*	0.035
	(0.128)	(0.205)	(0.114)	(0.347)
Unemployment rate	0.193	−1.860***	−0.549	−1.794**
	(0.284)	(0.647)	(0.496)	(0.705)
Share of urban population	0.536	−0.172	0.358	−0.733
	(0.334)	(0.823)	(0.577)	(1.248)
F.Log federal transfers	0.295***			
	(0.031)			
F.Log federal transport transfers		0.158***		
		(0.033)		
F.Log federal education transfers			0.016	
			(0.022)	
F.Log federal social serv. transfers				0.090**
				(0.038)
State fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
State-specific trends	Yes	Yes	Yes	Yes
Avg. expenditures (in $ M) / avg. share	16348.75	0.12	0.34	0.05
Observations	1786	1786	1786	1786

Notes: The dependent variable in Column (1) are the log total expenditures for the following fiscal year. The dependent variables in Columns (2) to (4) are the log of the expenditure shares for transport, education, and social services, respectively, also for the following fiscal year. The federal transfers for the respective spending category (and the total transfers in Column (1)) are also measured with a one-year lead, as indicated by "F." in front of the variable name. The standard errors (in parentheses) are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

change under divided government. Based on the findings of our baseline specification in Table 1 and the results for total expenditures in Table 3, one would expect a statistically significant increase in the budget share for transport and potentially for social services, but not so for education. The results in Table 3 are consistent with this expectation, with the increase in the log expenditure share of transport spending by 2.2 percent being the only statistically significant coefficient.

Moreover, the magnitude of the coefficients sheds additional light on the question whether the observed increase in infrastructure expenditures reflects an increase in the overall budget or rather a re-balancing of funds across spending categories within the budget. If the expansion of spending for transport, education, and social services were entirely financed through a budget increase, we would expect the coefficients of *divided government* to be smaller when using the log expenditure shares as the dependent variable than the respective coefficients in the baseline specification in Table 1[14] In contrast, if the spending increases were fully re-balanced with cuts in the budget elsewhere, the coefficient values in Columns (2) to (4) of Table 3 should exactly equal the ones in Columns (2), (4), and (6) of Table 1, respectively.

Apparently, the coefficients in Table 3 are indeed smaller than the ones in Table 1, suggesting that divided governments increase their budgets, at least to some extent, to finance additional infrastructure investments.

6 Additional Results and Robustness

This section presents additional results and shows that our findings are robust to a diverse set of alternative specifications of the empirical strategy. First, we demonstrate that divided governments increase transport expenditures, regardless of whether the government is split within the legislature or between the executive and the legislative branch. Second, we modify the empirical strategy to show that the effects are largely robust to how we handle timing. To do so, we include lagged dependent variables in the empirical model, aggregate observations at the level of election cycles, and show that the statistical significance of our results is confirmed by permutation tests. Third, we verify that the main results hold when using capital outlays instead of total expenditures as the dependent variable, and when controlling for debt, deficit, and the position of the fiscal year within the gubernatorial election cycle.

6.1 Divided Governments: Split Branch or Split Legislature?

So far, we have concentrated on estimating the average effect of divided government on infrastructure expenditures. However, there are two cases of divided government with potentially different effects on public spending. Governments can be divided between the executive and legislative branch, meaning that one party controls the governor and the other party controls both houses of the legislature. Alternatively, governments may be divided within the legislative branch, meaning that both parties control one of the two houses. Given that the political dynamics are different under the two forms of divided government, the impact of divided government on expenditures may also differ.[15]

Table 4 summarizes the findings of categorizing divided governments according to these two different types. The results show that transport expenditures significantly increase by between 2.4 and 3.9 percentage points, with the spending increase being slightly larger (but not statistically significantly so) if the two legislative chambers have to arrive at a compromise. This confirms the interpretation of our main result that

[14] For this case, Appendix B shows that the coefficients in Table 3 should equal the respective coefficients in Table 1 times one minus their average budget share.

[15] Alt and Lowry (1994) explain the difference between these two forms of divided government in terms of budgeting dynamics and report differential responses to state revenue shocks.

Table 4: Robustness: Split-Legislature vs. Split-Branch Governments

	F.Log Expenditures for		
	Transport	Education	Social Services
	(1)	(2)	(3)
Split branch	0.024*	0.022**	0.039*
	(0.013)	(0.011)	(0.022)
Split legislature	0.039**	0.001	0.032
	(0.014)	(0.011)	(0.030)
Full set of controls	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
State-specific trends	Yes	Yes	Yes
Observations	1786	1786	1786

Notes: The dependent variables are the log of total expenditures for transport, education, and social services, respectively, for the following fiscal year. Split legislature equals one if the upper and the lower house are controlled by different parties. Split branch equals one if one party controls the governor's office and one party controls both houses. All models include the full set of controls. The standard errors (in parentheses) are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

investing in transport infrastructure is a bi-partisan issue useful for finding common ground. For education and social services expenditures, in turn, the spending increases are more pronounced for split-branch than for split-legislature governments.

6.2 Modifications of the Empirical Strategy

Dynamic Panel Model The baseline specification of the empirical model accounts for potential autocorrelation of expenditures—and thus potential autocorrelation in the error term—by clustering errors at the state level. Nevertheless, given that investments are clearly correlated over time, it may be prudent to adjust for the autocorrelation of investments directly by including one lag of the dependent variable in the estimated model.[16] At the same time, the lagged expenditures are likely to be an inapt control in our setting. This is because the political process of interest—the passage of budgets by state governments—may be part of the reason for the autocorrelation of expenditures, in that newly passed infrastructure projects are financed through the budget for a number of years to come. The very budgeting process we seek to understand may hence explain parts of the autocorrelation in expenditures.[17] As a consequence, dynamic panel models are likely to underestimate the true effect of divided government on expenditures.

With this caveat in mind, we nevertheless explore how the inclusion of the lagged dependent variable affects our findings. Table 5 contains the results.[18] Evidently, the coefficient estimates of *divided government* drop significantly, with the drop being threefold for the least autocorrelated series of transport expenditures and sevenfold for the most autocorrelated series of social services expenditures. This is exactly what we would expect if the lagged dependent variable picks up parts of the true effect. Despite the strong decline

[16] In our data, standard tests do not reject the null hypothesis of no first-order autocorrelation. However, this does not necessarily mean that the inference is invalid. See, for example, Angrist and Pischke (2009), who argue that, in the presence of autocorrelation, 42 clusters are enough to conduct reliable inference with clustered standard errors.

[17] Stated differently, we are interested in the average increase in *total expenditures* due to divided government. In general, this is not equal to the average increase in the *expenditure shocks* that we obtain after filtering out the AR(1) process via a dynamic panel model.

[18] We remove the state specific trends from the set of controls, as the interpretation of a model with both lagged dependent variables and state specific trends is unclear.

Table 5: Robustness: Lagged Dependent Variable

	F.Log Expenditures for		
	Transport	Education	Social Services
	(1)	(2)	(3)
Divided government	0.010*	0.003	0.005
	(0.006)	(0.003)	(0.008)
Log transport expenditures	0.683***		
	(0.039)		
Log education expenditures		0.812***	
		(0.021)	
Log social services expenditures			0.896***
			(0.016)
Log population	0.059	−0.055	0.005
	(0.100)	(0.056)	(0.118)
Population growth	0.865**	0.528	0.341
	(0.385)	(0.323)	(1.086)
Share aged 65+	−0.288	−0.145	−0.011
	(0.750)	(0.315)	(0.804)
Share aged 5–17	0.340	0.552***	0.002
	(0.436)	(0.171)	(0.294)
Log income per capita	0.100	0.191***	0.062
	(0.083)	(0.046)	(0.093)
Unemployment rate	−1.441***	−0.734***	−0.947**
	(0.312)	(0.184)	(0.378)
Share of urban population	0.160	0.029	0.001
	(0.159)	(0.080)	(0.178)
F.Log federal transport transfers	0.102***		
	(0.020)		
F.Log federal education transfers		0.018*	
		(0.010)	
F.Log federal social serv. transfers			0.038**
			(0.015)
State fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
State-specific trends	No	No	No
Observations	1786	1786	1786

Notes: The dependent variables are the log of total expenditures for transport, education, and social services, respectively, for the following fiscal year. The federal transfers for the respective spending category are also measured with a one-year lead, as indicated by "F." in front of the variable name. The standard errors (in parentheses) are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

in the estimates, the coefficient of interest remains borderline significant at the 10 percent level at least for transport expenditures, where we expect the strongest effect based on the previous results. Note, moreover, that the AR(1) process of *log transport expenditures* and the estimated coefficient of *divided government* jointly imply that the average yearly increase in transport expenditures during a four-year period of divided government equals 0.018, almost twice as large as the effect on impact and almost two thirds of the average effect estimated in Table 1.[19]

Election Cycles The aggregation of observations over the election cycle constitutes an alternative way to (partly) account for both the autocorrelation of fiscal expenditures and the potential lag with which political decisions affect the budget. We compute these aggregates for two types of election cycles. First, we aggregate at the level of 2-year cycles starting in odd years, reflecting that many U.S. states hold house elections at the end of every even year and that some states pass biennial budgets (see Johnson, Mitchell and Yamarick, 2012). Second, we aggregate at the level of the gubernatorial election cycles to account for political shifts due to the election of different governors.[20]

The aggregates for each election cycle are computed as follows. We normalize the first year within the cycle—the year the new government takes office if there is a change in power—to be the year of the observation. The political variables are then coded as measured in that year. This guarantees a clean interpretation of the estimated coefficients, but comes at the cost of adding measurement error in case the political realities change during the cycle. Because decisions on the budget become reality with at least a one-year lag, all budget items are averaged for the period between the second year of the cycle and the first year of the new cycle. All other variables are averaged within each cycle. When appropriate, we compute the average values before taking logs. Based on these aggregated samples, we estimate the main empirical specification with the full set of controls, as before.

Table 3 summarizes the results. For the 2-year cycles in Columns (1) to (3), the effect of divided government on infrastructure expenditures is of similar magnitude as the baseline results in Table 1, with transport expenditures rising on average by 2.5 percent, and social services expenditures rising by 4.3 percent. For gubernatorial cycles, the estimates in Columns (4) to (6) are only slightly lower in magnitude, but much more imprecisely estimated, so that we cannot reject the null hypothesis that they actually equal zero.[21] Thus, while less clear-cut than our main results, these findings are nevertheless consistent with our main story that divided governments use infrastructure investments to find common ground.

Permutation Tests Finally, we investigate how strong the expansion of infrastructure expenditures at times of divided government is compared to a random assignment of divided government to state-years. To perform these placebo tests, we compute 2000 random permutations of the order of divided government within states, meaning that the fraction of years with and without divided government remains constant at the state level. For each permutation, we then estimate the effect of the placebo *divided government* on

[19] Table A.2 of Appendix A furthermore estimates the same model, but this time with the correction for Nickel Bias by Bun and Kiviet (2003). Interestingly, the coefficient estimate of *divided government* remains largely unaffected by the bias correction, in contrast to most other coefficient estimates. However, in the specification with *log transport expenditures* as the dependent variable, the coefficient of *divided government* drops slightly (not noticeable due to rounding) so that it is statistically significantly different from zero only with a p-value of 0.107.

[20] Most of the gubernatorial cycles last for four years, but there are some state-years with a two-year cycle. We adjust for the ensuing different number of observations across states by weighting with the inverse of the total number of observed cycles per state.

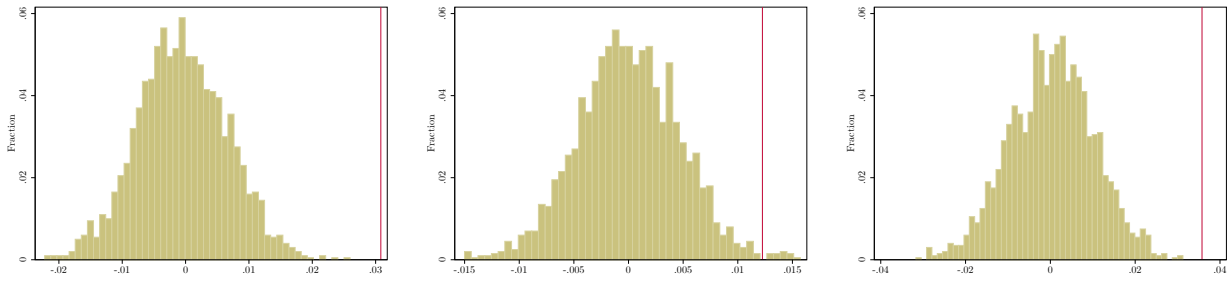
[21] Measuring the type of government in the first year of the cycle creates measurement error, so that the reduction in the coefficient may be due to attenuation bias. The lower precision is likely due to the loss of power by reducing the number of observation by a factor four.

Table 6: Robustness: Averages for 2-Year / Gubernatorial Election Cycles

	2 Year Election Cycles			Gubernatorial Election Cycles		
	F.Log Expenditures for			F.Log Expenditures for		
	Transport	Education	Social	Transport	Education	Social
	(1)	(2)	(3)	(4)	(5)	(6)
Divided government	0.025**	0.011	0.043*	0.021	0.013	0.038
	(0.011)	(0.010)	(0.025)	(0.016)	(0.012)	(0.031)
Log population	0.432	0.972**	0.376	0.364	0.828	0.231
	(0.758)	(0.443)	(1.138)	(0.869)	(0.496)	(1.295)
Population growth	−0.541	−0.611	−1.999	−0.373	−1.699	−2.897
	(1.595)	(1.407)	(1.742)	(2.118)	(1.767)	(2.481)
Share aged 65+	−0.669	0.973	−4.472	−1.779	0.874	−5.174
	(4.291)	(2.487)	(5.380)	(4.746)	(2.892)	(6.182)
Share aged 5–17	−1.483	2.051**	0.464	−0.667	2.807**	1.459
	(0.962)	(0.825)	(1.415)	(1.066)	(1.322)	(1.886)
Log income per capita	0.399	0.539**	0.385	0.299	0.629**	0.354
	(0.273)	(0.243)	(0.545)	(0.298)	(0.278)	(0.671)
Unemployment rate	−2.131***	−0.787	−2.250**	−1.978**	−1.245	−2.626**
	(0.750)	(0.732)	(0.961)	(0.869)	(0.825)	(1.225)
Share of urban population	−0.085	0.503	−0.732	0.150	0.296	−0.466
	(0.895)	(1.020)	(1.574)	(1.045)	(1.222)	(1.741)
F.Log federal transport transfers	0.241***			0.261***		
	(0.062)			(0.055)		
F.Log federal education transfers		−0.022			−0.024	
		(0.050)			(0.065)	
F.Log federal social serv. transfers			0.122***			0.125*
			(0.045)			(0.063)
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trends	Yes	Yes	Yes	Yes	Yes	Yes
Observations	893	893	893	490	490	490

Notes: The dependent variables are the log of the average total expenditures for transport, education, and social services, respectively, during the respective election cycle. Variables indicated by "F." in front of the variable name are averaged for the period between the second year of the current election cycle and the first year of the following cycle. All other variables are averaged for the years covering the respective cycle. Logs are taken after computing the average. Gubernatorial cycles start with the year the new governor takes office, and 2-year cycles start in every odd year. The dummy variable *divided government* reflects the political realities in the first year of the cycle. To reflect different cycle lengths across states, gubernatorial cycles are weighted with the inverse of the total number of cycles within the state. The standard errors (in parentheses) are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 3: Robustness: Permutation Tests of the Coefficient for *Divided Government*



(a) Transport (b) Education (c) Social

Notes: This figure shows the distribution of the coefficient of *divided government* for 2000 permutations of the order of divided government within states. In Panel (a), the dependent variable are the log of total expenditures for transport in the following fiscal year. In Panels (b) and (c), the dependent variables are the log expenditures for education and social services, respectively. The estimated models are identical to the ones in Columns (2), (4), and (6) in Table 1. The red vertical lines are the coefficient values for the true order of divided government as estimated in Table 1.

expenditures for transport, education, and social services according to the main empirical model in Table 1 with the full set of controls.

Figure 3 shows the distribution of the ensuing 2000 coefficients for each specification, and compares the placebo coefficient values to the estimate from the true model, given by the vertical red line. Consistent with the standard errors in Table 1, the true coefficient is farthest away from the main mass of the placebo coefficients when transport expenditures are the dependent variable, and it is closest for education expenditures. In general, however, the true coefficients are far to the right of the distribution of the placebo coefficients. This suggests that it is indeed current divided government that leads to the observed spending increases, in contrast to past or future periods when neither party is in true control of the government.

6.3 Capital Outlays as Spending Measure and Additional Controls

Capital Outlays The results presented so far are derived from using total expenditures for the three categories of infrastructure—transport, education, and social services—as the dependent variable. Given that current operational expenditures on infrastructure are largely driven by past investments, one might argue that capital outlays are the more relevant variable to measure infrastructure investments. While the latter may be true for transport infrastructure, the decision to maintain (or expand) the current level of education and social services, for which the bulk of spending are operational expenditures, may be interpreted as investment as well.

The results in Table 7 show that our main findings hold regardless of the fiscal measure used. Similar to our results for expenditures, divided governments tend to expand their capital outlays for transport infrastructure. The effect is even greater in magnitude than the baseline result in Table 1 and statistically significant at the five percent level. In contrast, the effect of divided government on capital outlays in education and social services equals zero. For education, this largely mirrors the baseline results. For social services, this is consistent with the idea that the level of services upheld via operational spending is more important for forging compromise than via boosting investments in buildings or equipment.

Additional Controls Finally, the question arises whether the effect of divided government on infrastructure spending is orthogonal to other measures that may affect the budget. For example, states may be able

Table 7: Robustness: The Effect of Divided Government on Capital Outlays

	F.Log Capital Outlays for		
	Transport	Education	Social Services
	(1)	(2)	(3)
Divided government	0.040**	0.000	−0.001
	(0.016)	(0.031)	(0.071)
Log population	0.898	1.285	−1.584
	(1.011)	(1.259)	(2.919)
Population growth	−0.509	2.886	9.867*
	(1.590)	(3.541)	(5.729)
Share aged 65+	0.589	1.838	0.815
	(5.627)	(7.311)	(17.322)
Share aged 5–17	−2.853**	4.189	−4.381
	(1.184)	(2.619)	(3.009)
Log income per capita	0.477	1.890**	1.240
	(0.380)	(0.714)	(1.039)
Unemployment rate	−2.911***	0.100	−1.396
	(0.874)	(1.823)	(3.526)
Share of urban population	0.621	0.031	2.100
	(1.713)	(3.295)	(3.877)
F.Log federal transport transfers	0.272***		
	(0.062)		
F.Log federal education transfers		0.095	
		(0.109)	
F.Log federal social serv. transfers			0.038
			(0.121)
State fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
State-specific trends	Yes	Yes	Yes
Observations	1786	1786	1786

Notes: The dependent variables are the log of total capital outlays for transport, education, and social services, respectively, for the following fiscal year. All models include the full set of controls. The standard errors (in parentheses) are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 8: Robustness: Additional Controls

	F.Log Expenditures for					
	Transport		Education		Social Services	
	(1)	(2)	(3)	(4)	(5)	(6)
Divided government	0.031**	0.031**	0.013	0.012	0.036	0.035
	(0.012)	(0.012)	(0.009)	(0.009)	(0.023)	(0.022)
Log state gov't debt	0.043		0.001		0.033	
	(0.029)		(0.023)		(0.046)	
Log state gov't deficit	0.000		0.001**		0.001	
	(0.000)		(0.000)		(0.001)	
Year 2 of gubernatorial cycle		0.000		0.004		−0.003
		(0.005)		(0.003)		(0.007)
Year 3 of gubernatorial cycle		0.011*		0.003		−0.000
		(0.006)		(0.003)		(0.006)
Year 4 of gubernatorial cycle		0.012*		0.006		0.013*
		(0.006)		(0.004)		(0.007)
Full set of controls	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State-specific trends	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1786	1786	1786	1786	1786	1786

Notes: The dependent variables are the log of total expenditures for transport, education, and social services, respectively, for the following fiscal year. All models include the full set of controls. In addition, in Columns (1), (3), and (5) we control for the log level of debt and the log deficit. In Columns (2), (4), and (6) we include indicator variables for the year of the gubernatorial election cycle (with the first year constituting the baseline). The standard errors (in parentheses) are clustered at the state level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

to expand the budget in particular at times when their current debt or deficit is low. If divided governments are particularly likely to occur at times of low debt levels or deficit, this may bias our coefficients upward. Also, there is a large literature on the political business cycle (see, e.g., Persson and Tabellini, 2000, Chapter 16), showing that governments are particularly likely to increase their spending prior to the election date in order to boost the economy and voter approval. If divided governments are more or less likely to do so, this also would bias our estimates up- or downward.

In Table 8 we account for these potential issues by controlling either for the current level of debt and the current deficit (in Columns (1), (3), and (5)) or for the year of the gubernatorial election cycle (in Columns (2), (4), and (6)). Evidently, neither of the additional sets of controls changes the coefficients estimates of *divided government* in magnitude or significance. Moreover, the past levels of debt and deficit seem to be largely uncorrelated with spending. In contrast, we do find evidence for the political business cycle. The effect is strongest for transport expenditures, which tend to increase in the last two years of the typical four-year gubernatorial election cycle. Interestingly, this is exactly the same salient spending category which is used, according to the results of this paper, to find compromise at times of divided government.

7 Conclusion

In this paper, we examine the impact of parties and divided government on infrastructure provision based on detailed government expenditure data from U.S. states over the period 1970-2008. Previous studies on the

political determinants of infrastucture investments have relied on aggregate measures of infrastructure—in particular total capital outlays—and therefore do not provide a granular picture of the role governments play in the process of provisioning infrastructure. We fill this gap by analyzing the expenditures for the three infrastructure categories transportation, education, and social services separately. Specifically, we hypothesize that divided governments find common ground in promoting investment in transportation infrastructure, for which there is typically bi-partisan support. Education and social services, in contrast, are expected to be more partisan and thus less suitable for arriving at a bi-partisan compromise.

In line with these hypotheses, the results of this paper show that divided state governments tend to increase their transport expenditures by around three percent. Divided governments spend more on transportation infrastructure than governments under true Republican and true Democrat control. This finding holds both for split-legislature and split-branch governments. In contrast, expenditures for social services and in particular for education are characterized by more partisan patterns. At the overall state budget level, we find no evidence for a material increase at times of divided government, which confirms that the observed increase in transportation expenditures does not simply reflect the inability of divided governments to keep total spending in check.

Our results highlight the possibility that some expenditure types are more likely to foster bi-partisan compromise than others. Still, we have little systematic evidence on the bargaining process and the trade-offs that lead to the promotion of infrastructure investment. Nor do we know whether the increase in spending is efficient, i.e., desired by the voters, or whether it reflects policies of last resort when no other, and perhaps more pressing, political issues can be addressed due to bi-partisan differences. These are interesting questions for future research, which become more important the more partisan the policy platforms of political parties become.

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References

Albouy, David, "Partisan Representation in Congress and the Geographic Distribution of Federal Funds," *The Review of Economics and Statistics*, 2013, *95* (1), 127–141.

Alesina, Alberto and Howard Rosenthal, *Partisan Politics, Divided Government, and the Economy*, Cambridge / New York / Melbourne: Cambridge University Press, 1995.

_ **and** _ , "A Theory of Divided Government," *Econometrica*, 1996, *64* (6), 1311–1341.

Alt, James E. and Robert C. Lowry, "Divided Government, Fiscal Institutions, and Budget Deficits: Evidence from the States," *The American Political Science Review*, 1994, *88* (4), 811–828.

Angrist, Joshua D and Jörn-Steffen Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton University Press, 2009.

Bernecker, Andreas, "Divided we reform? Evidence from US welfare policies," *Journal of Public Economics*, 2016, *142* (C), 24–38.

Besley, Timothy and Anne Case, "Political Institutions and Policy Choices: Evidence from the United States.," *Journal of Economic Literature*, 2003, *41* (1), 7–73.

_ **, Torsten Persson, and Daniel M. Sturm**, "Political Competition, Policy and Growth: Theory and Evidence from the US," *The Review of Economic Studies*, 2010, *77* (4), 1329–1352.

Bohn, Frank, "Polarisation, uncertainty and public investment failure," *European Journal of Political Economy*, 2007, *23*, 1077–1087.

Bun, Maurice J.G. and Jan F. Kiviet, "On the diminishing returns of higher-order terms in asymptotic expansions of bias," *Economics Letters*, 2003, *79* (2), 145–152.

Burden, Barry C. and David C. Kimball, *Why American Split Their Tickets: Campaigns, Competition, and Divided Government*, Ann Arbor: The University of Michigan Press, 2004.

Darby, Julia, Chol-Won Li, and V. Anton Muscatelli, "Political uncertainty, public expenditure and growth," *European Journal of Political Economy*, 2004, *20*, 153–179.

Denk, Oliver, "The Economic Effects of National Swings on Political Jurisdictions: Theory and Evidence from English Councils and US States," October 2009. Mimeo, London School of Economics.

Downs, Anthony, *An Economic Theory of Democracy*, New York: Harper Collins, 1957.

Ferreira, Fernando and Joseph Gyourko, "Do Political Parties Matter? Evidence from U.S. Cities," *The Quarterly Journal of Economics*, 2009, *124* (1), 399–422.

Garand, James C., "Explaining Government Growth in the U.S. States," *The American Political Science Review*, 1988, *82* (3), 837–849.

Gilligan, Thomas W and John G Matsusaka, "Deviations from constituent interests: The role of legislative structure and political parties in the states," *Economic Inquiry*, July 1995, *33* (3), 383–401.

Johnson, Noel D., Matthew D. Mitchell, and Steven Yamarik, "Pick Your Poison: Do Politicians Regulate When They Can't Spend?," Paper No. 12-53, Department of Economics, George Mason University 2012.

Kappeler, Andreas and Timo Välilä, "Fiscal federalism and the composition of public investment in Europe," *European Journal of Political Economy*, 2008, *24*, 562–570.

Klarner, Carl, "State Partisan Balance Data, 1937 - 2011," 2013.

Leduc, Sylvain and Daniel Wilson, "Roads to Prosperity or Bridges to Nowhere? Theory and Evidence on the Impact of Public Infrastructure Investment," *NBER Macroeconomics Annual*, 2013, *27* (1), 89–142.

Levin, Andrew, Chien-Fu Lin, and Chia-Shang James Chu, "Unit root tests in panel data: asymptotic and finite-sample properties," *Journal of Econometrics*, 2002, *108* (1), 1–24.

List, John A. and Daniel M. Sturm, "How Elections Matter: Theory and Evidence from Environmental Policy," *The Quarterly Journal of Economics*, 2006, *121* (4), 1249–1281.

Man, Georg, "Political competition and economic growth: A nonlinear relationship?," *European Journal of Political Economy*, 2014, *36*, 287–302.

Persson, Torsten and Guido Tabellini, *Political Economics: Explaining Economic Policy*, Cambridge / London: The MIT Press, 2000.

Pettersson-Lidbom, Per, "Do Parties Matter for Economic Outcomes? A Regression-Discontinuity Approach," *Journal of the European Economic Association*, 2008, *6* (5), 1037–1056.

Randolph, Susan, Željko Bogetić, and Dennis R. Heffley, "Determinants of Public Expenditure on Infrastructure: Transportation and Communication," Policy Research Working Paper 1661, The World Bank October 1996.

Reed, W. Robert, "Democrats, republicans, and taxes: Evidence that political parties matter," *Journal of Public Economics*, 2006, *90*, 725–750.

Warren, Patrick, "State Parties and Taxes: A Comment on Reed in the Context of Close Legislatures," March 2009. Mimeo.

Watkins, Miles Wingfield, "Party in the House? Examining the Effects of Political Control on State Government Spending," Bachelor's thesis, Wesleyan University, Middletown, Connecticut April 2012.

Zhu, Pengyu and Jeffrey R. Brown, "Donor states and donee states: investigating geographic redistribution of the US federal-aid highway program 1974-2008," *Transportation*, 2013, *40* (1), 203–227.

Appendix

A Additional Tables

Table A.1: Summary statistics

	Mean	SD	Min	Max	Observations
	Panel A: Dependent variables				
F.Log transport expenditures	20.78	0.86	18.72	23.13	1786
F.Log education expenditures	21.97	1.02	19.59	24.84	1786
F.Log social services expenditures	19.92	1.16	16.99	22.68	1786
F.Log total expenditures	23.08	1.02	20.73	26.05	1786
F.Log (transport exp.)/(total exp.)	−2.31	0.36	−3.35	−1.08	1786
F.Log (education exp.)/(total exp.)	−1.11	0.20	−1.83	−0.69	1786
F.Log (social services exp.)/(total exp.)	−3.17	0.43	−4.79	−1.64	1786
F.Log transport capital outlays	20.17	0.86	17.84	22.67	1786
F.Log education capital outlays	18.77	1.12	11.81	21.54	1786
F.Log social services capital outlays	17.03	1.41	11.85	20.54	1786
	Panel B: Political variables				
Divided government	0.43	0.50	0.00	1.00	1786
True Democratic control	0.40	0.49	0.00	1.00	1786
True Republican control	0.17	0.38	0.00	1.00	1786
Split branch	0.22	0.42	0.00	1.00	1786
Split legislature	0.21	0.41	0.00	1.00	1786
	Panel C: Control variables				
F.Log federal transport transfers	19.64	0.78	16.23	22.04	1786
F.Log federal education transfers	19.97	0.99	17.06	22.97	1786
F.Log federal social serv. transfers	18.92	0.99	16.35	22.08	1786
Log population	15.01	1.00	12.72	17.41	1786
Population growth	0.01	0.01	−0.06	0.07	1786
Share aged 65+	0.12	0.02	0.04	0.19	1786
Share aged 5–17	0.20	0.03	0.07	0.30	1786
Log income per capita	18.16	1.08	15.60	21.00	1786
Unemployment rate	0.06	0.02	0.02	0.18	1786
Share of urban population	0.69	0.15	0.32	0.95	1786
Log state gov't debt	22.23	1.21	18.65	25.32	1786
Log state gov't deficit	−14.68	14.29	−24.77	24.21	1786
Year 2 of gubernatorial cycle	0.27	0.44	0.00	1.00	1786
Year 3 of gubernatorial cycle	0.23	0.42	0.00	1.00	1786
Year 4 of gubernatorial cycle	0.23	0.42	0.00	1.00	1786

Notes: This table provides the summary statistics for all variables used in this paper. As specified in the empirical model (1), this table includes all variables on expenditures and transfers with a one-year lead, as indicated by "F." in front of the variable name. The variables with a one-year lead are measured between 1971 and 2008; all other variables are measured between 1970 and 2007.

Table A.2: Robustness: Lagged Dependent Variable (Bias Corrected)

	Total Infrastructure Expenditures for		
	Transport	Education	Social Services
	(1)	(2)	(3)
Divided government	0.010	0.003	0.004
	(0.006)	(0.003)	(0.007)
Log transport expenditures	0.719***		
	(0.017)		
Log education expenditures		0.853***	
		(0.016)	
Log social services expenditures			0.938***
			(0.013)
Log population	0.069	−0.070*	−0.043
	(0.074)	(0.041)	(0.087)
Population growth	0.868*	0.586**	0.426
	(0.463)	(0.236)	(0.531)
Share aged 65+	−0.192	−0.045	0.086
	(0.544)	(0.285)	(0.636)
Share aged 5–17	0.339	0.553***	−0.047
	(0.340)	(0.172)	(0.383)
Log income per capita	0.074	0.172***	0.069
	(0.073)	(0.038)	(0.084)
Unemployment rate	−1.424***	−0.716***	−0.929***
	(0.271)	(0.138)	(0.311)
Share of urban population	0.143	0.004	0.013
	(0.159)	(0.083)	(0.186)
F.Log federal transport transfers	0.098***		
	(0.009)		
F.Log federal education transfers		0.019*	
		(0.011)	
F.Log federal social serv. transfers			0.034***
			(0.011)
State fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
State-specific trends	No	No	No
Observations	1739	1739	1739

Notes: The dependent variables are the log of total expenditures for transport, education, and social services, respectively, for the following fiscal year. The federal transfers for the respective spending category are also measured with a one-year lead, as indicated by "F." in front of the variable name. The coefficient estimates account for Nickel bias following the approach by Bun and Kiviet (2003). The bias correction is initialized by the Arellano-Bond estimator. The bootstrap standard errors, computed via 500 repetitions, are reported in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B Approximation of the Budget and Spending Share Increases

The value of the estimated coefficients with log total expenditures as the dependent variable are mostly consistent with divided government leading to additional spending. To see this, let B (for budget) denote total government expenditures, and let H (for highways) denote transport expenditures. Moreover, ΔB denotes the change in the budget due to a divided government being in power; ΔH is defined analogously. Finally, $\beta = 0.031$ is the coefficient of *divided government* in the regression of $log(H)$ on the *divided government dummy variable* in Table 1.

Now, suppose that the transport spending is entirely financed via a budget increase. Then, we have

$$E\left[\frac{\Delta B}{B}\right] = E\left[\frac{\Delta H}{B}\right] \approx E\left[\frac{\beta \cdot H}{B}\right] = \beta \cdot E\left[\frac{H}{B}\right] = 0.031 \cdot 0.12 = 0.0037. \tag{2}$$

This should be approximately the value of the coefficient of *divided government* for total expenditures in Column (1) of Table 3 (under the premise that divided government only increases transportation spending). In fact, the coefficient estimate equals 0.0025 and is, thus, only slightly smaller than the approximate in equation (2).

Similarly, we can approximate the increase in the expenditure share of transport spending, if the entire increase in transport expenditures were purely financed out of budget increases. In this case, the change in the expenditure share of transport spending is predicted to approximately equal

$$E\left[\frac{H+\Delta H}{B+\Delta B} - \frac{H}{B}\right] \approx \beta \cdot \left(1 - E\left[\frac{H}{B}\right]\right) = 0.031 \cdot 0.88 = 0.0273.$$

This is, again, relatively close to the estimated coefficient of 0.022 in Column (2) of Table 3. (In contrast, if there were no increase in the budget, the increase in the transport share should exactly equal $\beta = 0.031$.)