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What Drivers Road Infrastructure Spending?

James Alm
Tulane University
jalm@tulane.edu

Trey Dronyk-Trosper
Amazon.com, Inc

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Keywords: Infrastructure, state and local governments
JEL codes: H72, R42, H41

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James Alm and Trey Dronyk-Trosper*

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It is widely believed that basic infrastructure in the United States has been seriously underfunded in recent years. We examine this broad issue by focusing on two specific questions. First, how has subnational government spending on infrastructure changed over the last half-century, focusing especially on transportation spending? Second, what factors have driven these spending changes? To answer these questions, we collect data on local, state, and combined state and local government spending on roads and other expenditure categories from 1957 to 2013. With these data, we first demonstrate that infrastructure spending has increased on average in real per capita terms across all states, even while it has declined significantly across all states as a percentage of government spending. Second, we also examine empirically several causal factors that help explain what has driven these changes in transportation spending over time, using several estimation methods and robustness tests. We find suggestive evidence that it is primarily changes in government spending on welfare programs that have driven these sizeable changes in transportation spending. Indeed, we calculate that, if state governments were spending the same percentage of their budgets on transportation in 2013 as they had been in 1957, then state government spending on transportation across all states would increase in total by an additional $133.5 billion in 2013, an amount equal to an additional $422 per capita.

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* Tulane University and Amazon.com, Inc. Please address all correspondence to James Alm, Department of Economics, Tulane University, New Orleans, LA 70118 (email jalm@tulane.edu).We are grateful to Richard Bird, Robert Ebel, Barry Hirsch, Kim Rueben, Arash Farahani, and Yameng Wang for helpful discussions. We are also grateful to the Editors and to several anonymous referees for especially insightful suggestions. Earlier versions of the paper have been presented at the 2017 National Tax Association Annual Conference on Taxation and the Government Accountability Office.

INTRODUCTION

Over the past half-century, state and local governments in the United States have altered their budget priorities in quite significant ways. Total real *per capita* spending has risen on average across all states by more than 5 times over the 1957-2013 period, increasing from $506 to $2724 per capita in state government spending (in constant dollars), reflective of significant increases in real absolute levels over this period. This upward trend is also shown for most specific categories of state government spending, especially for welfare spending, and indeed some of these specific categories of state government spending have even increased dramatically as a *share* of government spending over this period. For example, the average state government in 1957 spent 7.20 percent of its total budget on public welfare, and by 2013 this had risen to 23.11 percent, with the share if state government spending on welfare increasing over this period in every state but one (Missouri).

However, many other categories of state budgets have necessarily shrunk as a percentage of state budgets over the same time span, even they have increased in real per capita terms. The largest percentage point decrease in average state government spending has been on transportation, which has fallen from 20.36 percent of the average state government budget in 1957 to only 4.86 percent in 2013, despite increasing in real per capita terms from $103 to $132.[1] [2] These averages mask enormous variation in individual state choices, and some states have diverged in important ways from the "average" state government. Even so, every state government has decreased its relative (or share) spending on transportation – even while its absolute (or per capita) spending on transportation has increased. Similar patterns are found for

[1] Transportation expenditures include monies spent on roads and highways, water transportation, parking, and air transportation.
[2] State spending on public safety has also fallen significantly over this period, from 5.6 percent of the average state budget in 1957 to 1.7 percent in 2013.

local governments and for combined local plus state governments, again with quite heterogenous experiences by individual states. In particular, the share of transportation spending has generally fallen, and fallen dramatically, for local governments and for local plus state governments, even while their per capita levels of transportation spending have risen. Indeed, in the specific transportation category of roads and highways spending, the share of combined state and local government transportation spending has dropped from 17.3 percent of combined state and local total spending in 1957 to 4.5 percent in 2013. See Table 1.

These changes in state and local government spending on transportation seem to be at least partially reflected in the widespread belief that basic infrastructure – especially roads and highways infrastructure – in the U.S. has been seriously underfunded in recent years. For example, the American Society of Civil Engineers (ASCE) publishes every four years an "Infrastructure Report Card", which grades the current state of national infrastructure on a scale of A (best) through F (worst), and the grade since 1998 has been a D across most all categories.[3] In its most recent Infrastructure Report Card (American Society of Civil Engineers (ASCE) (2021), there is evidence of some progress in restoring our nation's infrastructure, as indicated by an improvement in the overall grade to C-, the first time in 20 years that this grade is out of the D range.[4] Even so, ASCE estimates an overall annual infrastructure investment gap needed to

[3] See American Society of Civil Engineers (ASCE) (2021) for the most recent report card, available online at http://www.infrastructurereportcard.org/); see also EDP US and American Society of Civil Engineers (ASCE) (2021) for a comprehensive discussion of broader issues surrounding failure to invest appropriate amounts in infrastructure, available online at https://infrastructurereportcard.org/wp-content/uploads/2021/03/FTA_Econ_Impacts_Status_Quo.pdf . For alternative and more optimistic perspectives, see the RAND Corporation report by Knopman et al. (2017) (available online at https://www.rand.org/pubs/research_reports/RR1739.html) and the analysis by Duranton, Nagpal, and Turner (2021), who conclude that much U.S. transportation infrastructure is not crumbling, with the exception of subways.

[4] The 2021 grades range across 17 categories from a B in Rail to a D- in Transit, with eleven category grades in the D range (Aviation, Dams, Hazardous Waste, Inland Waterways, Levees, Public Parks, Roads, Schools, Stormwater, Transit, and Wastewater) and only six categories in C- or higher range (Bridges, Drinking Water, Energy, Ports, Rail, and Solid Waste).

improve the grade of each category to a B at $260 billion (or a 10-year gap of $2.59 trillion). There are also many articles and op-eds in the popular press that emphasize the need for more infrastructure spending.[5] The Global Infrastructure Outlook and Oxford Economics group has developed an online tool that forecasts infrastructure needs for 50 countries (including the U.S.) and several sectors (including 4 transport-related sectors) for the next two decades (https://outlook.gihub.org/), which concludes that there is a U.S. infrastructure investment gap of $3.8 trillion through the year 2040, most all of which (or $3.4 trillion) is due to road transport. Indeed, then-President Barack Obama's $787 billion stimulus bill in 2009 emphasized rebuilding America's infrastructure, increases in infrastructure spending figured prominently in then-President Donald Trump's 2018 State of the Union address, and the new Biden Administration has recently announced plans for its American Jobs Plan in which it proposes $2.3 trillion in infrastructure investments as part of its pandemic relief proposals, in part to create jobs and in part to improve the quality of infrastructure. Department of Transportation Secretary Pete Buttigieg said at his January 2021 Senate confirmation hearings that there was now "a generational opportunity to transform and improve America's infrastructure".[6] Even so, these

[5] There are countless opinion pieces on infrastructure by people such as Larry Summers (http://larrysummers.com/?s=infrastructure) and Paul Krugman (https://www.nytimes.com/2014/07/04/opinion/paul-krugman-build-we-wont.html). See also articles and analyses on websites such as *The Upshot* (https://www.nytimes.com/2015/05/14/upshot/amtrak-crash-and-americas-declining-construction-spending.html), *FiveThirtyEight* (https://fivethirtyeight.com/features/what-is-driving-growth-in-government-spending/?ex_cid=538email), the Center on Budget and Policy Priorities (https://www.cbpp.org/research/state-budget-and-tax/its-time-for-states-to-invest-in-infrastructure), The Brookings Institution (https://www.brookings.edu/blog/up-front/2017/01/03/the-hutchins-center-explains-public-investment/?utm_campaign=Brookings+Brief&utm_source=hs_email&utm_medium=email&utm_content=40029088), and *Vox* (https://www.vox.com/policy-and-politics/2018/2/22/17034558/trump-infrastructure-plan). These listings are far from exhaustive.

[6] See https://beta.documentcloud.org/documents/20460843-final-pete-buttigieg-confirmation-hearing-testimony. For details of the Biden Administration plans, see: FACT SHEET: The American Jobs Plan | The White House; Biden Details $2 Trillion Plan to Rebuild Infrastructure and Reshape the Economy - The New York Times (nytimes.com); https://www.washingtonpost.com/us-policy/2021/03/31/what-is-in-biden-infrastructure-plan/; Biden's Infrastructure Plan Visualized: How the $2.3 Trillion Would Be Allocated - WSJ

suggested increases were not and have not yet been implemented despite seemingly widespread public support.

In this paper we focus on one aspect of infrastructure expenditures, or government spending on the nation's transportation system. We examine two main questions. First, how has subnational government spending on infrastructure changed over the last half-century, focusing especially on transportation spending? Second, what factors have driven these spending changes?

To answer these questions, we gather 57 years of data from the U.S. Census Bureau *Survey of State and Local Governments* and the yearly FHWA Highway Statistics publication, in order to track local and state government spending on transportation as reflective of overall spending on infrastructure. After briefly reviewing some relevant previous work, we discuss the data that we are using, defining the specific expenditures included in the various categories, especially the transportation classification. We then document the many ways that local and state government transportation spending has changed over the period 1957 to 2013. We look initially at how the "average" *local* government sector across all states changed transportation expenditures, by combining all local governments within each state and across all state governments into an overall average; we then focus on the individual local government experience of each state by examining all local governments within each state to see how each state performed over this period. We perform the same exercise at the *state* government level, looking at the experiences both of the "average" state government sector across all states and of the individual state governments for each state, and we then repeat the same exercise for the *combined state and local* government sector.[7] In all cases we examine changes both in per capita measures of government spending and in the shares of government spending. Overall, our

[7] From here on, all combined state and local government numbers have duplicative intergovernmental expenditures removed.

calculations indicate enormous changes in subnational government transportation spending over the last half-century, although with significant variation across the individual states.

We also examine some potential causal factors for these many changes, which builds upon the existing literature on the determinants of per capita government spending, Our estimation results provide suggestive evidence across several estimation methods and numerous robustness tests that the main drivers in the changes in transportation spending over time are the corresponding changes in a single other category of state and local expenditures: spending on public welfare. Indeed, as we discuss in the conclusions, we calculate that, if state governments had spent the same percentage of their budgets on transportation in 2013 as they did in 1957, then total state government spending on transportation across all states would increase by an additional $133.5 billion each year, an amount equal to an additional $422 per capita.

Our paper makes several contributions. We are able to document the aggregate trends in the nation's transportation spending for the combined state and local government sector over the last half-century, using a single consistent data set. We are also able to document similar trends at the aggregate levels for the separate local government sector and the state government sector, and we are able to identify the individual experiences of all 50 states over this period. Of perhaps more importance, our empirical analysis is able to provide suggestive evidence of the main driving factors in these government choices over this period of history, an analysis that suggests that the significant increase in subnational government spending on welfare programs has been a major factor in the decline in the share of infrastructure spending on transportation; even when looking at per capita spending, we find some evidence that expansions of welfare spending pre-1979 were associated with per capita lower transportation spending. In particular, we are able to provide suggestive evidence that attempts to answer the question, "Where has all the money

gone?" (Alm and Dronyk-Trosper, 2022); that, is when governments face budget constraints, where do states choose to trade-off their expenditures? This is of special interest given that many portions of state budgets (e.g., Medicaid) are non-discretionary and difficult to cut at will.

PREVIOUS WORK ON STATE AND LOCAL GOVERNMENT CAPITAL SPENDING

State and local government spending on infrastructure – including capital spending more broadly and transportation spending more specifically – has been the subject of somewhat uneven attention in the academic literature over the years.[8] Much of the early research on capital spending focused on interstate or interlocal differences in capital spending, including several papers that applied the standard median voter model to estimate the determinants of state or local government choices of capital spending (Holtz-Eakin and Rosen, 1989; Bumgarner, Martinez-Vazquez, and Sjoquist, 1991; Eberts and Fox, 1992; Temple, 1994). These studies generally found significant differences in capital spending across states and localities, differences that were driven by such factors as income, previous capital spending, and demographics. Other work focused on the effects of fiscal rules and institutions on capital spending, again often using a median voter framework. For example, Poterba (1995) found that states with separate capital budgets spent more on capital than state without these rules, but that pay-as-you-go rules were associated with lower capital spending. Still other work examined the ways in which federal and state tax and transfer policies affected the costs of state and local government debt finance; see especially Feldstein and Metcalf (1987), Holtz-Eakin and Rosen (1989), Metcalf (1991, 1993), Holtz-Eakin (1991), and Man and Bell (1993). There is an especially large literature on the impacts of public infrastructure on growth, most all of which demonstrates substantial effects of

[8] For a useful survey of much of this literature, see Marlow (2012). For a more recent collection of papers, see the volume edited by Glaeser and Poterba (2021), especially the paper by Brooks and Liscow (2021).

public capital on state economic growth (Aschauer, 1989; Munnell, 1990; Garcia-Mila and McGuire, 1992; Holtz-Eakin and Schwartz, 1995).[9]

These four themes – the determinants of state or local government choices of capital spending, the roles of fiscal institutions, the effects of federal and state policies on financing costs, and the growth impacts of capital spending – have continued in more recent research. Fisher and Wassmer (2015) expand the traditional median voter model of government choice to estimate the determinants of state capital expenditures during the first decade of the 2000s, focusing especially on the effects of recessions on capital expenditures. Wang, Hou, and Duncombe (2007), Wang and Hou (2009), Afonso (2015), Chen (2016), and Wang and Wu (2018) use voting models to estimate the effects of various fiscal institutions (e.g., pay-as-you-go financing, earmarking, infrastructure banks, tax and expenditure limitations, debt limits) on capital projects. Bruce et al. (2007) examine the spatial aspects of capital spending by modeling the effects of "infrastructure expenditure competition" on state capital expenditures. Srithongrung (2008) estimates the effects of management practices on state economic growth.[10]

There are numerous valuable insights from these (and other) previous studies. Even so, most of this work has focused on capital spending broadly, with relatively little attention on transportation infrastructure spending. There is also no work that presents detailed information over the last half-century on the aggregate trends in the nation's transportation spending for each of the *local*, the *state*, and the *combined state and local* government sectors, along with detailed information on the individual state experiences. Further, there is no work that estimates the

[9] For older but still useful surveys of work on public infrastructure spending and economic growth, see Winston (1991), Munnell (1992), Gramlich (1994), and Fisher (1997). For more recent surveys, see Irmen and Kuehnel (2009), Marlow (2012), Pereira and Andraz (2013), and Bom and Ligthart (2014).

[10] There is also research on that demonstrates that voters unhappy with politicians' infrastructure decisions may vote these politicians out of office. See MacManus (2004).

determinants of state government transportation spending over this extended period of time, in order to identify the main driving factors in these government choices over this period. Our work builds on these previous studies in an attempt to fill these gaps.

DATA AND DEFINITIONS

We use data largely from two sources, supplemented with several other data sets. To answer our first question ("…how has subnational government spending on infrastructure changed over the last half-century, focusing especially on transportation spending?"), we use government spending and revenue data from the U.S. Census Bureau, which provides state and local government spending via its *Survey of State and Local Government Finances* (referred to as the "Survey"). The Census Bureau conducts a full census every five years (years ending in '2 and '7), with annual samples used to estimate the intervening years. The data include information on a variety of expenditure items, including education[11], transportation[12], public welfare[13], and public safety[14], among other categories.[15] In addition, the data also provide revenue information, such as collections from property taxes, sales taxes, income taxes, and other forms of revenue generation. The first year for which the Survey provides data at both the aggregated local and at the state level is 1957, and the years 1958, 1959, and 1960 only have combined state and local data.[16] See Table 1 for some descriptive statistics from the Survey on local, state, and combined

[11] Education expenditures largely consist of school expenditures, both primary and secondary education, as well as libraries.
[12] Transportation includes spending on roadways, airports, water ports, and parking.
[13] Public welfare includes both cash assistance and Medicaid expenditures.
[14] Public safety includes fire, police, and corrections spending.
[15] For the aggregate state and local expenditures, there are over 50 different budgetary items.
[16] Additionally, in sample years until 1977, local expenditures are missing intergovernmental expenditure totals, introducing a minor error in total expenditure and total revenue values only. Based on the full census numbers, this should only amount to about half a percent in underestimation of these two numbers.

state and local expenditures over the 1957-2013 period, where all dollar units there (and elsewhere) are measured in constant 1984 dollars.

Besides the Survey finance data, we collect highway and road information from the Federal Highway Administration (FHWA) yearly highway statistics publication. These annual publications provide a wealth of data on the nation's highway and roadway system aggregated at the state level, including valuable information on existing mileage in the U.S. Much of these data include breakdowns of the existing mileage by managing authority (whether local, state, or federal), as well as itemizations of the amount of the mileage under each managing authority's control in urban or rural locations. Additionally, information from the FHWA includes state level collections of fuel taxes and automobile fees.

Table 2 provides some descriptive statistics on the roadways network over the sample period of 1957-2013. Since 1957, the national road network has increased in mileage by just over 14 percent. While this may seem like a small increase, particularly considering the introduction of the Interstate Highway System, roughly 80 percent of the capacity expansion has been driven by roadway expansion (e.g., additional lanes) and not by increased mileage (National Research Council of the National Academies, 2005). Roadway expansion has been fairly heterogeneous across the states, but on average much of the increase has stemmed from roads administered at the local level. Note that some states have shifted administration units for certain roads, moving formerly state-administered roads, to local control and vice versa.

To answer our second question ("…what factors have driven these spending changes?"), we collect demographic and political control variables from the *Statistical Abstract* of the United States. These data include dummy variables indicating Republican (or Democratic) party control

of upper and lower state houses, governor, and U.S. presidential voting outcomes, as well as decennial percentages of older individuals (over 64), white, black, and urban populations.

We derive several additional variables from the National Association of State Budget Officers (NASBO). In our empirical work, it is important to control for the relative ability of states to expand revenue generation. To the extent that there might be a difference in political will toward revenue expansion, the political variables should control somewhat for this effect. Additionally, however, constitutional and legislative limitations may make it more difficult for some states to expand revenue collections. We use data provided by the NASBO *Budget Processes in the States* (2015) to construct three dummy variables for categorizing state level tax and expenditure limitations (TELs). One variable indicates whether the state has a TEL in a given year. A second variable indicates whether the TEL limits growth to a specific growth rate not tied to population, inflation, or income. A third variable classifies the vote share requirements to implement or change state tax rates. This variable runs from 0 indicating a simple majority requirement, to a value of 3 for states that require three-fourths majority votes.

Transportation spending is generally directed at spending on roads and highways, water, air, and parking, of which spending on roads and highways is by far the largest share.[17] Because of the relative importance of roads and highways spending in both state and local government budgets, we concentrate on explaining roads and highways expenditures in our empirical work, rather than on the other three transportation categories, as we discuss later.

[17] For example, the average state spent 98.8 percent of its transportation spending on roads in 1957 and 96.5 percent in 2013. Local government transportation spending on roads is on average somewhat smaller, at 89.2 percent in 1957 and 72.1 percent in 2013. Local government transportation spending on air is the largest of the other categories (6.8 percent in 1957 and 21.5 percent in 2013).

In the next section, we use these data to present information on the experiences of local, state, and combined state and local governments over the period 1957-2013. In the following section, we use these data to estimate the determinants of government transportation spending.

RESULTS (1): HOW HAS GOVERNMENT SPENDING CHANGED OVER TIME?

Local Government Spending[18]

At the local level, average local government spending for most expenditure categories (including health and hospitals, transportation, education, intergovernmental expenditures, insurance trust, public welfare, and "other"[19]) have tended to rise over time in real per capita terms, reflecting an overall increase in average real per capita local government spending over our sample period. Indeed, real per capita local government spending on transportation has nearly doubled over this period, increasing by 77 percent. Even so, as a percentage of local government spending, most expenditure categories have seen relatively little movement as expenditure shares, with some notable exceptions. The shares of expenditures on transportation and education for local governments have fallen over time, with transportation exhibiting the largest percentage decline health and hospital spending has seen the largest percentage increase.

The average experience across all local governments hides the quite varied experiences of local governments in each individual state, both in per capita terms and, especially, as a share of local government spending. In some states, local governments have seen relatively little change in transportation spending as a share of local government spending. For seven states, local spending shares on transportation fell by less than two percentage points: California, Delaware,

[18] Figures that demonstrate the per capita and share patterns for local governments are available upon request.
[19] Note that the category "other" for local governments includes employee retirements, unemployment compensation, fire, police, correctional facilities, parks, housing, and natural resources.

Kentucky, North Carolina, New Mexico, Nevada, and West Virginia. Local governments in another six states saw the largest decline in transportation spending shares, with reductions by more than ten percentage points (Alabama, Iowa, Mississippi, Oregon, Vermont, and Wisconsin). For those states that enacted the largest decreases in local infrastructure spending shares, most of these changes occurred by the mid to late 1970s.

State Government Spending

Unlike local government spending, state level expenditures have changed by a far greater amount since 1957, and state governments have also generally had more year-to-year volatility than their local counterparts. See Figure 1 for the average real per capita expenditures by spending category for all state governments and Figure 2 for the individual state experiences; Figures 3 and 4 show the aggregate and individual state government experiences for the shares of state government spending.

These figures demonstrate several major trends. In real per capita terms, nearly all categories of expenditures have increased at the aggregate state level (Figure 1), with one notable exception: transportation spending has increased on average across all states by 28 percent, or well less than 1 percent per year. The largest per capita change in expenditures is for public welfare, which has increased from $25 to over $600; intergovernmental transfers and insurance trust expenditures also exhibit large per capita changes. There is enormous variation by state, as shown in Figure 2. For transportation spending in particular, many states have seen relatively little changes in transportation real spending per capita, with more rural states as obvious outliers (Alaska, West Virginia, and Wyoming)

For the shares of aggregate state government spending (Figure 3), the two dominant changes over time have also been for public welfare and transportation. Public welfare

expenditures have increased dramatically as a percentage of state government expenditures, on average nearly doubling as a share of all state level expenditures. In contrast, transportation spending as a proportion of state expenditures has dropped to a third of its 1957 levels. Much of the changes in public welfare spending and transportation expenditures started in the mid-1960s and moved in concert, inversely, with each for several years.

These two spending categories in particular deserve additional discussion. The increase in public welfare spending can largely be attributed to Medicaid expenditures. While the federal government matches each dollar spent on Medicaid with between $1 and $4 of federal spending (depending on the Federal Medical Assistance Percentages (FMAP) algorithm), these expenditures are largely predetermined and difficult to change given the political difficulty in committing to Medicaid rescissions. In addition, the matching funds are effectively unlimited, allowing states to provide a service that many see as quite valuable at relatively low cost, at the expense of taking on a service over which the state has effectively little control. On the other hand, while transportation spending may also provide a service that is seen as valuable, projects can much more easily be cancelled or deferred. In addition, federal grants for highway expenditures are limited, and states readily request and generally receive nearly all grants that are allowed each year. This feature makes transportation spending a spending category that effectively has diminishing returns from federal funds after all federal grants have been allocated and received each year.

The shares of state transportation expenditures at the individual state level are again quite variable (Figure 4). In percentage point terms, only three states reported single digit drops in transportation spending (Pennsylvania, Washington, and Wisconsin), while there were three states with reductions greater than 25 percentage points in total (Connecticut, Kansas, and

Nevada). Notably, Nevada's state level spending reduction was one of the largest drops in transportation spending, even while local government spending in Nevada faced one of the smallest cutbacks of all states.[20] Wisconsin's state government spending also fell by one of the lowest amounts as a portion of total expenditures, and Wisconsin's local spending reductions were also some of the highest.

Combined State and Local Government Spending[21]

Given the relative sizes of state and local budgets, state expenditures changes have driven a large portion of the change in combined spending, both for real per capita measures and for share measures. Even so, the large variation in individual state experiences demonstrated both by local governments and by state governments tends to even out at the state plus local government level. Indeed, state and local transportation expenditure changes from 1957 to 2013 show a small and negative correlation coefficient, using either per capita or share measures. Effectively, large shifts in one government level tend to lead to smaller shifts in the other level of government, which in turn lead to reduced variance for combined state and level spending changes.

In general, education seems an important driver of total state and local government expenditures. However, transportation shows a declining share of spending over this period (even while increasing in real per capita terms), while public welfare spending has increased in absolute terms and also in relative importance.

Summary

Despite much variation across the states, the dominant changes in local, state, and combined state and local government spending over our sample period are two: there have been

[20] Local governments in Nevada were the only set of governments that increased transportation spending in per capita terms, in percentage point terms, and in relative spending of all states.
[21] Figures that demonstrate the per capita and share patterns for combined state and local governments are available upon request.

significant increases in the level and the share of government spending on public welfare, and there have been significant declines in the share of government spending on transportation, even while real per capita transportation spending has increased over time. The next section presents our methods and results that attempt to explain these changes, focusing especially on the changes in transportation spending by state governments.

RESULTS (2): WHAT FACTORS HAVE DRIVEN CHANGES IN ROAD SPENDING?

Methods

What are the main causal factors that have driven these changes in transportation spending? An obvious one is that the 1957 budget ratio for transportation was no doubt affected, positively, by the initiation in the 1950s of the federally funded interstate transportation system. This program led to a major increase in transportation spending especially for state governments, an increase that would not be maintained once the system was completed.[22] The federal government directly manages only about 3 percent of the nation's roadways, and only a quarter of all roadway miles are eligible to receive federal grants. Even so, there are other factors that have likely affected the spending choices of local and state governments. A major factor here seems likely to be the huge expansion in public welfare spending over this period, most of which has been mandated and/or subsidized by the federal government. Additional factors relate to economic and demographic changes in the states over this period, as well as factors that reflect political considerations of local and state government officials.

[22] As interstate funding dropped, general highway grants from the federal government increased, which has resulted in total federal highway grants to state and local governments remaining relatively stable in relation to state and local government spending.

To examine the factors that have driven these changes, we use our data on state government spending over our sample period. We start with a basic panel data model consistent with the standard median voter model of state government spending used in much of the previous literature on government spending, as specified in equation (1):

$$Transportation_{i,t} = \sum \gamma_j X_{j,i,t} + U_t + V_i + \varepsilon_{i,t}\,, \qquad (1)$$

where $Transportation_{i,t}$ is per capita transportation spending for state i in year t, a variable that includes spending in four budget areas, or roads, parking, airports, and seaports. Following the standard Borcheding and Deacon (1972) and Bergstrom and Goodman (1973) approaches, we measure transportation spending as per capita expenditures.[23]

The various control variables are captured in $X_{i,t}$. These include economic variables (e.g., Personal Income), demographic variables (Over 64 Population, White Population, Black Population, Urban Population), political factors (dummy variables for Republican Governor, Republican Lower House, Republican Upper House, Republican President), and legislative/institutional state-level differences (Existence of TEL, Vote Requirement, TEL Limitation), and other state-level differences (State Mileage, Fuel Receipts, Vehicle Receipts, CAFE Introduction). The variables that measure demographics and income capture differences in tax prices and citizen tastes that may affect citizen demand for public services. We also include year and state level fixed effects (U and V, respectively). The error term is denoted $\varepsilon_{i,t}$.

In order to capture the simultaneity of government spending decisions, we modify the basic specification of equation (1) for transportation expenditures, according to equation (2):

$$Transportation_{i,t} = \sum \beta_j S_{j,i,t} + \sum \gamma_j X_{j,i,t} + U_t + V_i + \varepsilon_{i,t}\,, \qquad (2)$$

[23] See Borcherding (1985) for a still useful, if somewhat dated, survey of the expenditure determinants literature.

where the various non-transportation categories of state spending are denoted by $S_{j,i,t}$, or the spending on category *j* in state *i* in year *t* for Public Welfare, Education, Health and Hospitals, Intergovernmental Transfers, and Employee Retirement.[24] Equation (2) is admittedly a somewhat ad hoc way of recognizing the jointly and endogenously determined nature of government spending decisions, and its estimation is complicated by the difficulty of dealing with this simultaneity. Accordingly, we estimate equation (2) using several approaches that attempt to account for these endogeneity issues.

In our first and preferred approach, we apply the Arellano and Bond (1991) Generalized Method of Moments (GMM) methodology, in which we use lagged changes in the dependent variables (e.g., the five non-transportation spending categories) to create GMM instruments to deal with possible endogeneity.[25] For our analysis we use a dynamic version of the Arellano and Bond estimator, and we treat each of the five spending categories as endogenous. We use a first-differenced equation (2) as our base model, where we include four periods of the lagged dependent variable[26] and instrument for the five spending categories using two periods of lagged values. In addition, we use robust clustered standard errors proposed by Windmeijer (2005) in all of estimates.

For our *Main Estimates*, we use the Arellano and Bond estimates with no spending categories (Model 1), only public welfare spending (Model 2), and all five spending categories (Model 3, our preferred model). These results are presented in Table 3.

[24] Note that public welfare spending includes assistance and subsidies, operation costs, and capital outlays for vendor outlays, federal categorical assistance programs, and cash assistance programs.
[25] See Arellano and Bond (1991) and Holtz-Eakin et al. (1988).
[26] We use four periods because this model satisfies the criteria for no autocorrelation beyond one lag. For verification, all tables using the Arellano and Bond estimates include the second lag test for autocorrelation.

Aside from the Arellano and Bond estimates, we have attempted to control for endogeneity by using a panel instrumental variable (IV) method in which we employ an instrument for public welfare, given that many of the results from our first approach suggest that public welfare spending is the main driver of transportation spending. Our (separate) instruments of choice are a variable termed the "Federal Percentages" (FP) rate or the "Federal Medical Assistance Percentages" (FMAP) rate[27] and a similar variable termed the "Federal Medical Assistance Percentages" (FMAP) rate.[28] Like most instruments, there are potential concerns with these instruments. Even so, the FP and the FMAP rates are determined through variables that are largely uncontrolled by state actions but that directly affect the amount of public welfare spending that occurs. This ensures that our instrument should be correlated with public welfare spending but uncorrelated with state level changes in spending. We have further attempted to control for potential endogeneity issues by first generating predicted values of all five categories of budgetary expenditures using all non-budgetary variables ($X_{i,t}$) as explanatory variables, and

[27] The Social Security Amendments of 1958 (SSA 1958) introduced a number of changes in the Social Security Act involving both coverage and financing methods. Besides expanding coverage disability, maternal, and childcare services, SSA 1958 also implemented state matching requirements that would become the precursor to the matching system used for Medicaid service payments. This system created the "Federal Percentages" (FP) matching algorithm, which calculated for each state a FP rate equal to [1 – 0.5 X (State Per Capita Income)^2 / (National Per Capita Income)^2], where both per capita income measures were calculated using the prior three year averages for each variable. In addition, the FP rates were held to be no more than 65 percent and no less than 50 percent of national per capita income. From 1958 until 1986 the FP numbers were recalculated every other fiscal year.

[28] The Social Security Amendments (SSA 1965) of 1965 updated the Social Security Act to include Title XIX, which created the Medicaid program. Under this program the federal government provides matching funds to states that implement a state Medicaid program. In 1966, 26 states had begun Medicaid programs, and by the end of 1970 48 states were running Medicaid programs. As part of SSA 1965, a new FMAP algorithm was created based on a very similar methodology to the FP calculation, replacing the 0.5 with a 0.45 multiplier, or [1 – 0.45 X (State Per Capita Income)^2 / (National Per Capita Income)^2]. As under the FP calculation, the FMAP calculation used personal per capita numbers from the prior three years with a minimum federal matching number of 50 percent. However, the maximum matching number was raised to 83 percent under the FMAP calculation. It should be noted that states were given the option to have their matching rate based on either the FP or the FMAP numbers, but the FMAP percentages have always been higher so states have since 1966 always chosen to use the FMAP percentage, regardless of whether the state had a Medicaid program in place. Neither the FP nor the FMAP calculation methods have changed since they were first implemented in 1958 and 1966. There have been several instances in which the published matching rates were changed, mainly in response to unexpected shocks such as Hurricane Katrina in 2005. Starting in 1987 both the FP and the FMAP rates have been updated every fiscal year.

then including these predicted values using standard panel methods. Of all of these approaches that deal with endogeneity issues, we report only the Arellano and Bond estimates. Our other results are comparable if less precisely estimated.

We also provide two other sets of *Main Results* in Tables 4 and 5. First, visual inspection of transportation share changes over time indicates that there may be two expenditure regimes in the data. Utilizing state-by-state Wald tests for an unknown statistical break, we find that 49 states exhibit evidence of at least one structural break in the data, with 1979 as the average year of these structural breaks. We therefore split the data into two periods, one before 1979 and one from 1979 to 2013, and we estimate equation (2) for these two separate periods using the Arellano and Bond approach. These results are reported in Table 4.[29] Second, since road-based transportation spending may be split into two types of spending, or capital and maintenance, we employ capital and maintenance spending as separate dependent variables to identify whether there are differential effects on these types of transportation spending. The Census survey data do not break down roadway spending into capital and maintenance spending. However, the FHWA data do have this breakdown, so we use the FHWA data to calculate the percentage of spending for each state-year dedicated to capital and maintenance spending, respectively.[30] We then use these percentage measures to calculate each state's spending on the two areas of roadway spending. These results are reported in Table 5.

[29] We also tested for statistical breaks using per capita spending, and we find similar evidence of a break, even if slightly later (1982) and even if much more variable (with 12 states exhibiting a break after 1995 and 6 states exhibiting a break before 1971). When we use 1982 as the break, our Arellano and Bond estimation results of equation (2) are similar to our estimates for a 1979 break that are reported in Table 4. However, given that the evidence of a statistical break using per capita spending is so variable, we chose to use the 1979 break in our results in Table 4. All results are available upon request.

[30] The FHWA listed state level spending on roads does not match the Census data well. For example, in 1957 the FHWA numbers are twice the Census data levels. We believe that the Census data are likely to be more accurately reported, so we assume the capital and maintenance spending ratios are correct in the FHWA data. Note that the use of the FHWA totals does not alter our final results.

We have also estimated many other specifications as *Robustness Tests*. We have estimated our basic equation (2) with pooled OLS methods and standard panel methods, but without controlling for endogeneity issues; these results are reported in Table 3 as Model 4. We have estimated modifications that limit transportation expenditures to road-based expenditures only, that use outcome transportation expenditures per mile of roads, and that use FHWA expenditure data instead of the state and local government survey data. We have included in some specifications controls for public sector employee union power[31] and dummy variables indicating years in which gas tax rates were increased and decreased from the FHWA database.

Although we focus largely on these per capita results, we also use relative spending on budget areas (or spending by category as a percent of total spending) as an alternative measure of government spending, rather than per capita measures. Indeed, there is a long (if smaller) tradition of estimating equation (1) in share terms rather than per capita terms, in part because: per capita measures may not account fully for heterogeneity in demographics, driving rates, transportation policies, and road types; they may be susceptible to large changes when states are working on new capital expenditure projects; and they may have difficulty capturing the inherent tradeoffs in government spending (e.g., spending a larger share on one category of spending requires spending a smaller share on some other categories).[32] We report the share results in

[31] For these unionization variables, we use data from the Freeman and Valletta (1988) public sector labor law dataset, generously provided by Kim Rueben and available at http://www.nber.org/publaw/. To this, we add information from Sanes and Schmitt (2014) to update the database through the end of our data, through 2013. We use this information to generate three dummy variables for whether state employees are prohibited from engaging in collective bargaining, whether they are prohibited from striking, and whether the state has a right-to-work law.

[32] For example, see Tresch (1975), Heller and Diamond (1990), Hewitt (1992), Gupta, de Mello, and Sharan (2001), and Sanz and Velázquez (2004, 2006), often with a focus on specific functional categories. This share approach has also been applied to taxes (Kenny and Winer, 2006). See Creedy and Moslehi (2011) for a detailed discussion and analysis of various approaches of studying government expenditure decisions and Facchini (2018) for a recent survey of much of this literature.

Table 6, using both the Arellano and Bond estimates (Models 1', 2', and 3') and OLS estimates (Model 4').

Overall, these many robustness tests largely confirm the basic Arellano and Bond estimation results in Tables 3, 4, and 5, and (with the exception of the OLS results in Table 3 and the share results in Table 6) we do not report them. All results are available upon request.

Main Results

We present Models 1, 2, and 3 in Table 3, emphasizing Model 3 results in particular. Not surprisingly, these results indicate a strong positive correlation between per capita transportation expenditures and lagged transportation spending, demonstrating the sizable effect of past spending iterations on future expenditure choices. Most other variables show little correlation with transportation spending, with the exception of several political variables (Vote Requirement, Existence of TEL, TEL Limitation, CAFE Introduction, and Republican President), along with the demographic variable Black Population.

Table 4 presents the Arellano and Bond estimates for the two separate periods, reflective of two possible expenditure regimes in the data with a structural break in 1979. Using this split sample, we find evidence of a structural break, as the magnitudes of the impacts of all spending categories shrink from Model 5 to Model 6. We also find a statistically significant and negative relationship between per capita public welfare expenditures and per capita transportation spending. This relationship only holds prior to 1979 with little correlation after 1979, which implies that the relationship between public welfare spending and transportation spending has decreased over time.

In a further effort to understand how these transportation spending changes have been implemented, we estimate our econometric models using the per capita expenditures on capital

and maintenance road expenditures as the dependent variables, as reported in Table 5. We continue to find negative and statistically significant correlations between public welfare spending and capital and maintenance expenditures. Of some interest, these impacts are not homogeneous for capital and maintenance spending; that is, the impact of changes in public welfare spending on capital transportation expenditures is almost three times larger than its impact on maintenance spending.

Note that we include a variety of other potential drivers of transportation expenditures in Tables 3 to 5. For some of these, such as the introduction of the CAFE standards and the implementation of TELs, our results suggest some significance, as noted earlier for Table 3. The CAFE standards are largely associated negatively with per capita transportation spending, possibly indicating the importance of increased vehicle efficiency reducing revenues normally earmarked for transportation expenditures. TEL limitations exhibit a positive correlation with transportation spending, which implies that more stringent limitations on total budget expenditures may dampen increases in non-transportation areas or, alternatively, that they may lead to increased transportation spending compared to other budget items. Other possible explanatory variables such as political or demographic data show far less consistent results. There appears to be little relationship between political party control or demographics that explain the changing importance of per capita transportation expenditures, with some exceptions.

Robustness Tests and Other Results

Our various robustness tests largely confirm these main results, and most of these results are not reported here. For example, the FMAP IV results indicate a negative impact of public welfare spending and per capita transportation spending, but no statistically significant relationship between transportation spending and spending on education or on health and

hospitals expenditures. The FMAP IV results for the pre-1979 and post-1979 sample split show negative and statistically significant effects from changes in public welfare expenditures in most specifications. Before 1979, public welfare exhibits a strong negative impact on per capita transportation spending. However, after 1979 we find an effect of public welfare on transportation that is no longer statistically significant. Other expenditure categories (e.g., education, health and hospitals, intergovernmental transfers, employee retirement) do not in general have consistent impacts on per capita transportation spending. In addition, the FMAP IV results for the state budget spending on capital transportation expenditures and on maintenance expenditures indicate that only public welfare affects capital or maintenance spending.

In robustness tests that we do report, we find that OLS estimates are largely the same as the Arellano and Bond estimates; see the results in Table 3 for the OLS results for Model 4 versus the results for Models 1, 2, and 3. We also report our share estimates in Table 6. These estimates again demonstrate the large and statistically significant coefficients on the lagged value of transportation spending on the share of transportation spending; see the results in Table 6 for the Arellano and Bond estimates for Models 1', 2', and 3' and the OLS estimates of Model 4'. Of perhaps more interest, Table 6 shows that the various expenditures categories are statistically significant and negatively correlated with transportation spending shares. When accounting for just public welfare expenditures, we find a significant and negative effect on the share of transportation spending, and, when considering all five state budgetary areas, we find similar significant and negative impacts across each spending category. For example, an increase of 1 percentage point in public welfare spending is associated with a reduction of 0.212 percentage points of transportation spending, or roughly a pass-through rate of one-fifth (Model 3' in Table 6). Further, while education spending and intergovernmental transfers both have the largest

estimated coefficients in Model 3' in Table 6, over this period of time public welfare increased by a much larger share amount (and indeed a much larger per capita amount) than any other expenditure category. As a result, while the *relative* impact of a unit change in public welfare is smaller than these two other spending categories, the *total* impact of public welfare on transportation (given the size of the underlying change in public welfare from 1957 through 2013) results in public welfare spending having the largest impact on transportation expenditures. Indeed, in all but ten states we find that changes in the public welfare expenditure share have the largest predicted impact on transportation shares, and in four states (Pennsylvania, Wisconsin, Maryland, and New York) increases in public welfare expenditures explain more than half of the reduction in transportation expenditures shares.

It must be acknowledged that these calculations on the importance of public welfare spending in changes in relative levels of transportation spending provide mainly suggestive evidence on the role of welfare as a driver of transportation spending; they do not provide firm causal evidence for the role of welfare. In addition, while increases in public welfare spending appear to be a significant driver of transportation spending, it is not the only driver, and for some states it may be of lesser importance than other drivers. Even so, we believe that these are suggestive results on the likely impact of public welfare spending on transportation spending.

CONCLUSIONS

Our results provide stark evidence on the huge changes in transportation expenditures, however measured, across sub-national governments over the last half-century. Across most all levels of subnational governments, we find that the average government sector now spends considerably more on transportation in real per capita terms in 2013 than in 1957, even while the

average government sector now spends far less on the share of transportation in total government expenditures than the same average government in 1957. Our estimation results for potential causal factors for these many changes provide suggestive evidence that a main driver is the increase in public welfare spending over time, which has largely required a decrease in relative transportation spending over the same period; we also find evidence that, at least prior to 1979, public welfare spending also led to reduced spending on transportation in per capita terms. Finally, we find evidence that other budget items are important drivers of transportation spending levels and shares, although not as significant as public welfare changes. These results are robust to a variety of alternative specifications and estimation strategies.

All of these results provide one possible explanation for the perceived – and the actual – decline in the quality of transportation infrastructure; that is, even while real per capita spending on transportation has steadily increased over time, state and local governments are spending far less in relative terms on transportation, in large part because they are spending far more in relative terms on other expenditure categories, especially public welfare. It is of course natural to question the decline in the quality of transportation infrastructure in the face of increasing real per capita transportation spending. However, while per capita spending by state governments has increased by 28 percent in real terms over this time, and while spending by local governments and state plus local governments) has also increased significantly over time (77 percent and 48 percent, respectively), the cost per mile of construction has vastly outpaced this. Just between the 1960s and the 1980s per mile construction and maintenance costs tripled (Leah and Liscow, 2019, 2021), and over the entire period per mile constructions costs have increased by an even greater amount. It seems clear that one dollar of transportation spending in 2013 does not go nearly as far as one dollar in 1957.

In order to illustrate both the magnitude and the potential impact of these changes in government spending, we project what each state would have spent in 2013 if, for each state, the state government had maintained its 1957 share of transportation spending over time as applied to total 2013 state government spending.[33] This counterfactual calculation indicates how much more (or less) a state government would be spending on transportation if its transportation priorities had not changed over time. We find that the difference between actual 2013 transportation spending and counterfactual 2013 transportation spending is enormous, a difference that goes far in explaining the perceived and the demonstrated decline in the quality of U.S. road infrastructure, given especially the dramatic increased costs of road construction and maintenance. Indeed, if state governments were spending the same percentage of their budgets on transportation in 2013 as they had been in 1957, total state government spending across all states would increase by an additional $133.5 billion each year, or an amount equal to an additional $422 per capita on transportation.[34] Given that actual total state government spending on transportation in 2013 was only $41.8 billion, this counterfactual indicates that states would have spent over $4 for every $1 actually spent in 2013 if they had maintained their 1957 relative spending on transportation. Note also that this estimate is only for a single year (2013). The cumulative impact over all years from 1957 to 2013 is obviously a far greater number. Similar

[33] Note that conducting this counterfactual for real per capita transportation spending makes little sense.

[34] Averages mask some of the larger magnitude changes that have occurred by state. For example, transportation spending in Connecticut generated the single largest change across all spending categories and all states. In 1957 Connecticut was spending 48.5 percent of all state government expenditures on transportation-related budget items, and by 2013 this percentage had fallen to 3.8 percent. Under the counterfactual condition, Connecticut would be spending more than $1500 dollars per person, or what amounts to a ten-fold increase over its actual spending. Other states with the largest changes in per capita transportation expenditures are Wyoming, Massachusetts, New Mexico, and Kansas. States with the smallest change in transportation expenditures are Georgia, Pennsylvania, Wisconsin, Washington, and Tennessee. Even for these states, there are still economically significant changes. For example, Georgia's $205 drop in per capita transportation spending is equivalent to a reduction in total transportation expenditures of more than $2 billion per year.

counterfactual calculations for local governments and for combined state and local governments generate comparable and striking results.[35]

These results lead naturally to the question of what might be done about closing the significant gap between our counterfactual and our actual expenditure calculations.[36] For example, given that many vehicle and gas tax collections are earmarked for transportation expenditures, increases in these collections could perhaps be used. However, our calculations indicate that governments would be required to increase total vehicle and gas tax revenues by an average of 5.5 times their 2013 collections to fund our estimated gap. A related strategy would be to increase various user charges to finance infrastructure improvements. A transition to user charge finances would increase revenues as well as lead to lower infrastructure utilization, thus reducing necessary expenditures. Indeed, over the past 20 years user charges have grown steadily but relatively slowly as a percentage of total state and local own-source revenues, from 17.7 to 21.1 percent (Ebel and Wang, 2017). However, continuing political opposition has made it difficult for state and local governments to enact widespread and significant user charges beyond those already in place. Still another option would be for states to increase revenues from more general sources, such as income, corporate, or sales taxes. Again, however, the current political environment makes this strategy unlikely. Another strategy might be for states to make use of their rainy day funds. However, even if each state were to use its entire rainy day fund to finance transportation spending, these funds would only amount to about $42 billion of the $133 billion

[35] For example, transportation spending for local governments has exhibited the largest relative counterfactual expenditure change across all expenditure categories. If local governments had maintained their 1957 transportation spending over time, they would be spending in 2013 $38.9 billion more in total and $123 more per person on transportation. For combined state and local government spending, the single largest counterfactual change across all expenditure categories is once again for transportation spending, reflecting a decrease of about $157.9 billion in total and $499 per capita.

[36] See Bird and Slack (2017) for detailed discussions of various ways of paying for infrastructure.

state government gap for just a single year.[37] Finally, it is also certainly likely that a decline in other spending categories would free up resources that could be used to fund infrastructure. For example, the U.S. currently has the highest per capita spending on health care services in the world, 38 percent higher than the next highest country of Switzerland.[38] If the U.S was able to reduce its average health care expenditures to the level of Switzerland, then we estimate that states could increase their transportation expenditures by 3.5 percentage points, or an increase each year of $30 billion in state-level infrastructure spending. Even so, the size of the infrastructure gap makes it virtually impossible for state and local governments to close it on their own. Given these difficulties facing states, there may well be a place for the federal government to assist the states and localities.

Ultimately, any attempt to reduce the estimated gap in infrastructure spending will face difficult challenges in finding the revenues required to finance the spending, and no one-size-fits-all strategy will likely succeed. Given these challenges, we must admit to much pessimism about the prospects for state and local government infrastructure spending to return to the levels needed to maintain our transportation infrastructure, let alone to improve it. Indeed, it seems likely that the next time the American Society of Civil Engineers (ASCE) issues its report card on U.S. infrastructure, we will once again see a failing grade.

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[38] See the Organisation for Economic Co-operation and Development (2015), available online at https://doi.org/10.1787/health_glance-2015-en, and also the Centers for Medicare and Medicaid Service (2018), available online at https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/Downloads/Tables.zip

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Table 1. Government Spending by Level of Government, Expenditure Category, and Year

	Real Per Capita ($)		Share (percent)	
Expenditure Category	**1957**	**2013**	**1957**	**2013**
Total Expenditures				
State	$506.37	$2724.09	100%	100%
Local	648.91	2306.49	100	100
State + Local	1155.28	5030.59	100	100
Transportation				
State	103.11	132.32	20.36	4.86
Local	68.98	121.91	10.63	5.29
State + Local	172.09	254.31	14.90	5.06
Public Welfare				
State	36.46	629.53	7.20	23.11
Local	34.66	71.66	5.34	3.11
State + Local	71.09	701.19	6.15	13.94
Education				
State	48.77	372.27	9.63	13.67
Local	245.70	818.00	37.86	35.47
State + Local	294.47	1190.27	25.49	23.66
Health and Hospitals				
State	34.52	156.40	6.82	5.74
Local	32.25	188.11	4.99	8.16
State + Local	66.87	344.51	5.79	6.84
Intergovernmental Transfers				
State	155.44	663.71	30.70	24.36
Local	6.27	20.19	0.97	0.88
State + Local	161.71	683.90	14.00	13.59
Insurance Trust				
State	48.33	397.42	9.54	14.59
Local	9.11	61.07	1.40	2.64
State + Local	57.44	458.49	4.97	9.11
Other				
State	79.74	372.44	15.74	13.67
Local	251.94	1025.55	38.83	44.46
State + Local	331.68	1397.99	28.70	27.79

Notes: Averages are population weighted. Combined state and local dollar figures remove duplicative intergovernmental transfers.

Table 2. Road and Highway Summary Statistics (miles)

	1957		2013	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**
Existing Mileage under State Administration	15,459	16,146	15,585	17,412
Existing Mileage under Local Administration	55,661	39,676	63,654	46,836
Existing Mileage under Federal Aid system	16,211	10,561	20,116	14,674
Existing Mileage not under Federal Aid system	55,703	35,072	62,163	40,162

Table 3. Effect of State Budgets and Other Variables on Per Capita Transportation Expenditures

	Model – Arellano-Bond			Model - OLS
	(1)	(2)	(3)	(4)
Variable	**Transportation**	**Transportation**	**Transportation**	**Transportation**
Lagged Transportation	0.590***	0.628***	0.642***	0.615***
	(.095)	(0.097)	(0.096)	(0.047)
Public Welfare		-0.012	-0.001	0.010
		(0.014)	(0.009)	(0.010)
Education			0.027*	0.020
			(0.016)	(0.049)
Health and Hospitals			0.025	0.029
			(0.034)	(0.028)
Intergovernmental Transfers			-0.006	-0.002
			(0.008)	(0.018)
Employee Retirement			0.020	0.001
			(0.020)	(0.054)
Personal Income	0.001*	0.001	0.000	0.003***
	(.000)	(0.001)	(0.001)	(0.001)
State Mileage	-0.000**	-0.000***	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Existence of TEL	-10.030*	-3.929	-3.417	-3.850*
	(5.322)	(2.672)	(2.736)	(2.248)
Vote Requirement	-6.342	-4.694	-4.503**	-4.680
	(8.243)	(2.929)	(1.927)	(4.334)
TEL Limitation	32.020**	10.400**	8.546**	10.779***
	(14.440)	(4.957)	(4.291)	(3.270)
Fuel Receipts	0.058	0.044	0.051	0.052
	(0.056)	(0.042)	(0.046)	(0.053)
Vehicle Fee Receipts	0.035	0.035	-0.023	-0.039
	(0.058)	(0.050)	(0.039)	(0.048)
CAFE Introduction	-19.310***	-18.680***	-17.820***	-79.951**
	(4.715)	(4.196)	(4.802)	(34.296)
Over 64 Population	0.428	1.004	1.195	3.782***
	(0.973)	(0.923)	(1.087)	(1.231)
White Population	-0.280	-0.223	-0.249	-0.495***
	(0.292)	(0.210)	(0.168)	(0.183)
Black Population	3.466**	1.419	1.051*	0.147
	(1.522)	(0.909)	(0.612)	(0.141)
Urban Population	-0.150	-0.249	0.014	0.060
	(0.428)	(0.296)	(0.334)	(0.476)
Republican Governor	2.259	2.098	1.603	1.997
	(1.727)	(1.603)	(1.338)	(1.227)
Republican Lower House	5.427	5.008	5.028	5.022**
	(4.396)	(3.351)	(3.366)	(2.357)
Republican Upper House	0.975	-1.952	-1.879	-1.550
	(2.404)	(2.293)	(2.281)	(2.152)
Republican President	-7.335**	-4.578*	-4.548	0.086
	(3.287)	(2.404)	(2.289)	(1.846)
Observations	2197	2197	2197	2448
Second Order Autocorrelation p-value	0.6825	0.8226	0.7928	-

Notes: * p<0.10, ** p<0.05, *** p<0.01. Robust standard errors are in parentheses and clustered at the state level. Models include controls for recession years and year fixed effects. Arellano-Bond estimates use four lags for the dependent variable two lags for the endogenous spending categories.

Table 4. Effect of State Budgets and Other Variables on Per Capita Transportation Expenditures, Pre-1979 and Post-1979 Periods

	Model	
	(5)	(6)
Variable	**Transportation – Pre-1979**	**Transportation – Post-1979**
Lagged Transportation	0.381**	0.679***
	(0.157)	(0.061)
Public Welfare	-0.037**	-0.007
	(0.021)	(0.008)
Education	-0.014	0.028
	(0.114)	(0.016)
Health and Hospitals	0.789	-0.008
	(0.600)	(0.026)
Intergovernmental Transfers	-0.007	0.017
	(0.037)	(0.011)
Employee Retirement	0.366	0.032
	(0.678)	(0.046)
Personal Income	-0.011*	0.001
	(0.006)	(0.000)
State Mileage	-0.001	-0.000**
	(0.001)	(0.000)
Existence of TEL	0.623	-3.283
	(0.402)	(2.273)
Vote Requirement		-4.258***
		(1.442)
TEL Limitation	1.180	5.439
	(0.944)	(4.067)
Fuel Receipts	0.040	.0141**
	(0.043)	(0.055)
Vehicle Fee Receipts	0.339	0.000
	(0.548)	(0.046)
CAFE Introduction	-0.932***	
	(0.243)	
Over 64 Population	1.744	0.271
	(1.906)	(1.117)
White Population	-0.056	-0.308*
	(0.954)	(0.174)
Black Population	0.986	0.257
	(1.906)	(0.807)
Urban Population	0.428	0.116
	(0.994)	(0.239)
Republican Governor	7.726*	0.706
	(4.374)	(1.491)
Republican Lower House	10,850	3.522*
	(8.547)	(2.082)
Republican Upper House	16.570	-2.212
	(13.580)	(1.793)
Republican President	-15.060*	2.891*
	(8.985)	(1.715)
Observations	648	1449
Second Order Autocorrelation p-value	0.1730	0.5876

Notes: * p<0.10, ** p<0.05, *** p<0.01. Robust standard errors are in parentheses and clustered at the state level. Models include controls for recession years and year fixed effects. Arellano-Bond estimates use four lags for the dependent variable two lags for the endogenous spending categories.

Table 5. Effect of State Budgets and Other Variables on Per Capita Capital and Maintenance Expenditures

	Model	
	(7)	(8)
Variable	**Capital**	**Maintenance**
Lagged Capital	0.738***	
	(0.041)	
Lagged Maintenance		0.516***
		(0.034)
Public Welfare	-0.024***	-0.009***
	(0.007)	(0.004)
Education	-0.003	0.011
	(0.015)	(0.008)
Health and Hospitals	-0.018	0.002
	(0.027)	(0.011)
Intergovernmental Transfers	-0.010*	0.011
	(0.006)	(0.009)
Employee Retirement	0.052**	-0.020
	(0.023)	(0.014)
Personal Income	0.000	-0.001**
	(0.001)	(0.000)
State Mileage	-0.000**	0.000
	(0.000)	(0.000)
Existence of TEL	-2.516	1.236
	(1.591)	(0.882)
Vote Requirement	-4.565***	0.712
	(1.067)	(0.729)
TEL Limitation	1.384	0.782
	(3.272)	(1.712)
Fuel Receipts	0.026	0.001
	(0.019)	(0.008)
Vehicle Fee Receipts	-0.036	-0.007
	(0.035)	(0.015)
CAFE Introduction	-4.829**	-4.793***
	(1.926)	(0.926)
Over 64 Population	1.456**	-0.346
	(0.581)	(0.257)
White Population	-0.014	-0.119
	(0.118)	(0.075)
Black Population	-0.323	0.305
	(0.319)	(0.188)
Urban Population	0.137	-0.119
	(0.188)	(0.118)
Republican Governor	1.121	0.400
	(0.930)	(0.351)
Republican Lower House	2.783	-0.369
	(1.693)	(0.640)
Republican Upper House	-.763	0.169
	(1.296)	(0.722)
Republican President	-1.768	-0.119
	(1.083)	(0.118)
Observations	2166	2166
Second Order Autocorrelation p-value	.1275	0.2601

Notes: * p<0.10, ** p<0.05, *** p<0.01. Robust standard errors are in parentheses and clustered at the state level. Models include controls for recession years and year fixed effects. Arellano-Bond estimates use four lags for the dependent variable two lags for the endogenous spending categories.

Table 6. Effect of State Budgets and Other Variables on the Share of Transportation Expenditures

	Model – Arellano-Bond			Model – OLS
	(1)'	(2)'	(3)'	(4)'
Variable	**Transportation**	**Transportation**	**Transportation**	**Transportation**
Lagged Transportation	0.736***	0.732***	0.629***	0.636***
	(0.041)	(0.039)	(0.035)	(0.026)
Public Welfare		-0.038***	-0.212***	-0.159***
		(0.014)	(0.033)	(0.014)
Education			-0.323***	-0.197***
			(0.034)	(0.025)
Health and Hospitals			-0.253***	-0.169***
			(0.076)	(0.030)
Intergovernmental Transfers			-0.258***	-0.186***
			(0.031)	(0.014)
Employee Retirement			-0.203**	-0.160***
			(0.083)	(0.032)
Personal Income	0.000	0.000	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
State Mileage	-0.000**	-0.000	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)
Existence of TEL	-0.186	-0.035	-0.046	-0.010
	(0.162)	(0.113)	(0.130)	(0.107)
Vote Requirement	-0.070	-0.027	-0.145*	-0.071
	(0.275)	(0.204)	(0.078)	(0.194)
TEL Limitation	1.004**	0.408*	0.373*	0.398**
	(0.461)	(0.226)	(0.209)	(0.179)
Fuel Receipts	0.003	0.002	0.000	0.000
	(0.003)	(0.002)	(0.001)	(0.001)
Vehicle Fee Receipts	-0.003	-0.002	-0.003	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)
CAFE Introduction	0.356	0.322	-0.341	-4.155***
	(0.298)	(0.295)	(0.254)	(0.926)
Over 64 Population	0.247***	0.160***	0.200***	0.217***
	(0.069)	(0.055)	(0.042)	(0.046)
White Population	-0.026**	-0.025***	-0.020**	-0.025***
	(0.011)	(0.009)	(0.008)	(0.007)
Black Population	0.061	0.056	0.002	0.001
	(0.055)	(0.042)	(0.034)	(0.006)
Urban Population	-0.001	-0.002	0.006	-0.025
	(0.011)	(0.011)	(0.040)	(0.019)
Republican Governor	0.075	0.089	0.063	0.034
	(0.070)	(0.056)	(0.060)	(0.056)
Republican Lower House	0.108	0.175	0.022	0-.009
	(0.158)	(0.120)	(0.116)	(0.084)
Republican Upper House	0.099	0.033	0.062	0.011
	(0.089)	(0.081)	(0.096)	(0.093)
Republican President	0.002	-0.004	-0.003	-0.013
	(0.117)	(0.089)	(0.089)	(0.084)
Observations	2197	2197	2197	2448
Second Order Autocorrelation p-value	0.5614	0.5529	0.9518	-

Notes: * p<0.10, ** p<0.05, *** p<0.01. Robust standard errors are in parentheses and clustered at the state level. Models include controls for recession years and year fixed effects. Arellano-Bond estimates use four lags for the dependent variable two lags for the endogenous spending categories.

Figure 1. All State Government Expenditures (per capita expenditures by category)

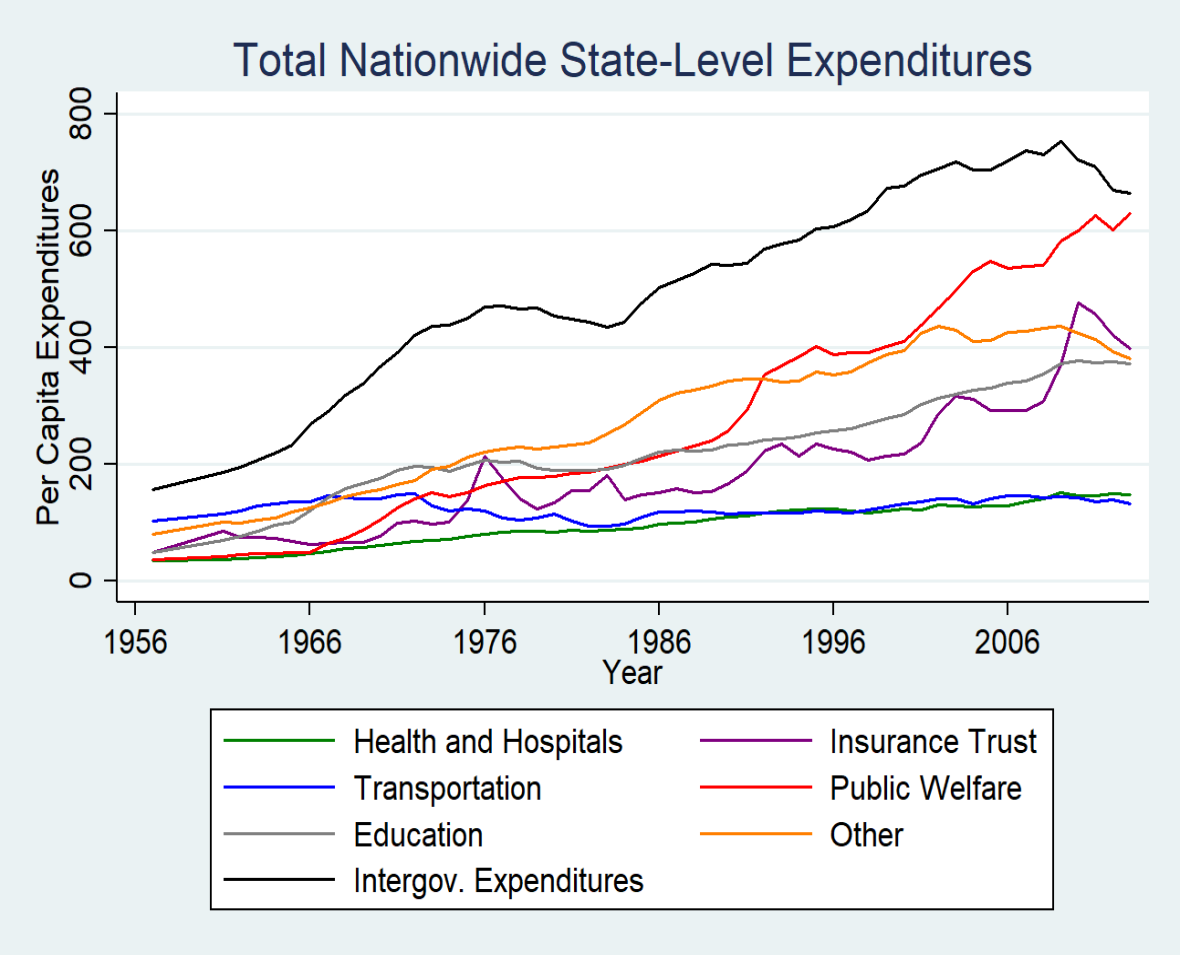

Figure 2. State Government Expenditures by State (per capita expenditures by category)

Figure 3. All State Government Expenditures (percent of expenditures by category)

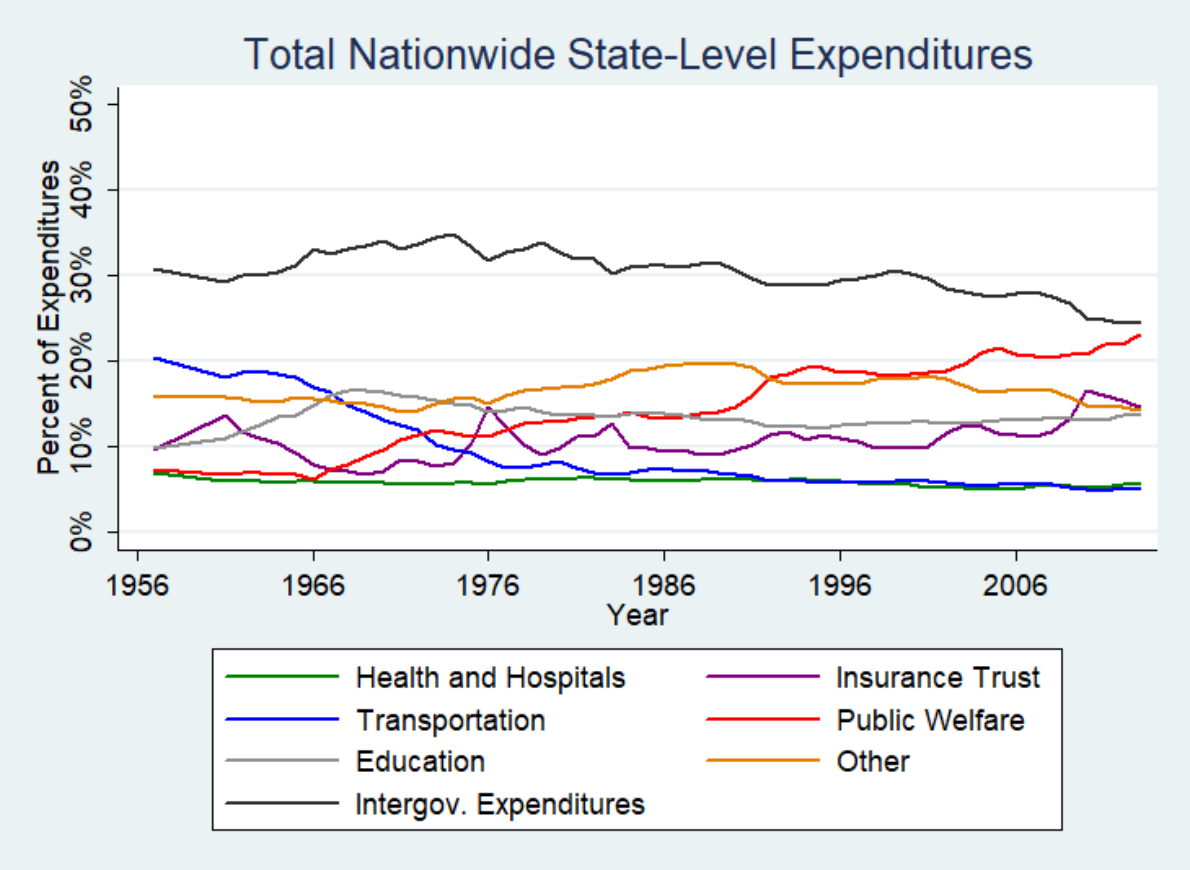

Figure 4. State Government Expenditures by State (percent of expenditures by category)