# The Effects of Fiscal Decentralization on Highway and Transportation Spending in the United States

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## Summary

Fiscal decentralization is the focus of a vast body of academic literature of which the authors are largely divided about its effects on economic growth, efficiency of the public sector, and composition of public spending. However, much of the discussion has been theoretical in nature, while only a handful of papers have examined the effects of decentralization on real economic variables. Theory suggests that decentralization should increase the amount of spending on infrastructure if local governments place a higher priority on infrastructure than the national government. Anecdotal evidence explains why this should be the case. This paper will use panel data from all 50 US states to examine the impact that fiscal decentralization has had on aggregate public highway and transportation spending at the state level.

## Section 1: Introduction



The importance of infrastructure to a well-functioning economy is analogous to that of

grease in a bearing; the bearing may be able to function without the grease, but it will require a lot of additional energy (wasted effort) to do the same amount of work. Every day in the world, untold amounts of people, goods, energy, and ideas flow from one place to another by means of one form of infrastructure or another. Roads, bridges, ports, electrical grids, water and sewage, among other things, are the essential

fixed assets that allow the economy to operate at its full potential while requiring the least amount of energy.

One of the primary responsibilities of government is to provide, in an efficient manner as possible, the various public goods and services which help ensure that certain standards of health, safety, legal and human rights, and economic opportunity for its citizens are met. An adequate stock of durable, efficient infrastructure is one such public good that government are largely responsible for providing in order to help ensure that the economy can operate at its full potential. In 1960, public investment in the United States in core areas of infrastructure peaked at around 5% of GDP and has been steadily declining ever since. In 2007, spending on transport and water infrastructure amounted to just 2.4% of American GDP, compared to 5% and 9% in Europe and China, respectively. The Economist estimated that "deficiencies in roads, bridges and transport systems alone cost households and businesses nearly \$130 billion in 2010, mostly because of higher running costs and travel delays" (The Economist May 12th-18<sup>th</sup>). Besides the serious drag on potential economic growth caused by congested roads,

antiquated air traffic control systems, and clogged ports, persistent underinvestment in infrastructure can have even more serious, and sometimes deadly consequences for society. The breaching of New Orleans' water levees in 2005 shortly after being hammered by Hurricane Katrina and the collapse of the I-35W bridge in Minneapolis in 2007 from a lack of maintenance provided very sobering reminders that the condition of the nation's infrastructure is literally a life and death situation. Rising health care costs, mounting pension and debt obligations, and more recently, the world-wide financial crisis have constricted the amount of funding available for public investment at all levels of government.

While infrastructure spending may be declining nationwide, there is quite a lot of variation in public spending on highway and transportation related infrastructure across the 50 states. In 2007, expenditures on highways as a percentage of total state and local expenditures ranged from a low of 3.2% in Georgia to a high of 14.6% in lowa. Spending on transportation exhibits even more variance across states with a low of 5.4% of total expenditures in Georgia and a high of 23.6% in Kentucky. Different demographic and geographic factors are certainly responsible for some of the observed variance across states. However, on the surface, Georgia, Kentucky, and lowa are not so drastically different in terms of size, GDP per capita, or geographical location to warrant the huge differences in spending to these factors alone.

One trend that had been quite apparent since the 1970s is that state and local governments across the nation have been accountable for an increasing share of total spending on transportation. Between 1990 and 2007, state and local governments supplied on average 75% of total funding (36% of which came from local governments), up from an average of 68% during the 1960-1980 time period. The period from 2007-2012 brought about a reversal in this trend with states becoming more dependent upon federal aid for their highway and transportation expenditures. This can be attributed to the American Recovery and Reinvestment Act, created by the Obama administration to help stimulate the economy during the Great

Recession of 2008, which included more than \$48 billion for the Department of Transportation's (DOT) investment in transportation infrastructure (www.gao.gov). Due to the special circumstances of this period, it is difficult to analyze how the long run trend may have changed over the past five years. However, as the Recovery Act is phased out, local governments are likely to play an even greater role in funding highway and transportation expenditures as federal and state budgets remain severely constrained due to the sluggish recovery of the economy from the global financial crisis and ballooning costs of public service delivery which are outpacing the growth in government revenues. As more and more responsibility falls to the discretion of municipalities, towns, cities, and counties, governments at this level must be equipped with the appropriate revenue generating and financing capabilities that allow them to make critical investments to add to and improve upon the nation's existing infrastructure.

In their endeavor to supply acceptable levels of a broad spectrum of public goods and services to the citizens of their jurisdiction, governments are faced with three perennial problems; firstly, determining what society's demand for each public good or service is; secondly, identifying which level of government is capable of delivering each particular good or service most efficiently, and, lastly; equipping the designated level of government with the appropriate fiscal instruments necessary to fulfill their responsibilities. As an important side note, the solution to the second problem may not even be public delivery as the private sector has played an increasing role over the past few decades in providing goods and services that were traditionally thought of as solely the responsibility of government.

These difficult questions have been the catalyst behind a heated debate ongoing in the vast literature on fiscal decentralization theory stemming from the economic, public policy, and political science disciplines. There is general agreement that certain responsibilities should be the sole responsibility of the central government, for example, national defense and macroeconomic stability, for obvious reasons. Other goods and services are not such cut and

dry cases. Even when we consider only highway and transportation investment in the U.S., we find that states across the nation use myriad approaches to the issue of providing these goods as far as which level of government is responsible and which fiscal and financial instruments each level has at their disposal. This paper attempts to explain the relationship that fiscal decentralization has had with highway and transportation expenditure over the last two decades, examines the complexity of infrastructure funding in the United States, and makes a policy recommendation that could both increase the amount of funding available for infrastructure projects and afford a better understanding of the relationship between fiscal decentralization and public investment at the same time. Before discussing any theory or methodology, it is important to clarify here that there are seven basic types of government that can be found in the United States; federal, state, municipality, township, school district, and special district. This paper will frequently use the term local level of government, which refers to all sub-state levels of government.

The rest of this paper is structured as follows; Section 2 will provide an overview of the important fiscal decentralization literature and is broken into three subsections covering the fundamental theory, empirical findings of fiscal decentralization upon real economic variables, and finally, theoretical and empirical research that is directly related to infrastructure investment. The methods used for and problems associated with accurately measuring fiscal decentralization will be discussed in Section 3, adopting the approaches used in previous research. Section 4 will present the data and methodologies used for measuring the effects of fiscal decentralization on highway and transportation spending in the United States, concluding with a summary of the main findings. Section 5 is important for understanding some of the limitations of the data and methodologies used in this paper, and will use case studies from three states, Washington, New York, and South Carolina to highlight the complexity of the issue of highway funding in the United States. Finally, Section 6 will conclude by making some policy

recommendations and comment on the areas of potential future research that should be examined before more definite resolutions can be reached.

### Section 2: Fiscal Decentralization

The lion's share of the literature that has been presented on fiscal decentralization in recent decades has built on the seminal works of Tiebout (1956), Samualson (1954), Musgrave (1955), and Oates (1972). From the beginning, there was general agreement that the voter/taxpayer should by considered as a consumer and is, "in a sense, surrounded by a government whose objective it is to ascertain his wants for public goods and tax him accordingly" (Tieboutpg 417). If the voter/taxpayer really behaves as a consumer, the authors were intrigued at the possible existence of a market type solution to determining the appropriate level of expenditure on public goods (pg 416). The first publications presented by Musgrave and Samualson initially rejected the existence of such a solution, claiming that consumer/voters could not be forced to reveal their preferences, nor was there a mechanism in place that could identify their preferences independently. Tiebout followed up these authors in the subsequent year with his article, "A Pure Theory of Local Expenditures", which used a different set of assumptions to model consumer/voter behavior. The most important assumption his model made was that "consumer-voters are fully mobile and will move to that community where their preference patterns, which are set, are best satisfied" (pg 419). The logic behind the consumer/voter relationship began to materialize into something much more meaningful after this assumption was made since it was then possible to visualize voters "shopping" around for that community whose tax and expenditure patterns mirror their own preference patterns most closely, much as a consumer shops around for a car and eventually purchases that car whose brand, quality, performance, price, etc. is closely aligned to his/her preferences.

Tiebout's conclusion, in a nutshell, was that as long as the assumption holds that "consumers" are mobile between communities and local governments have sufficient incentive (tax revenue) to attract and maintain constituents, it follows that (local) government policies should be highly sensitive to the demands of its citizens otherwise dissatisfied citizens will exercise their option to move to another community which they find to be more favorable. Despite the obvious costs associated with moving from one community to another that renders mobility less than entirely perfect, as well as the fact that residents take several non-economic factors into consideration when choosing which community to reside in, such as proximity of friends and family or countless other personal preferences, the assumption of mobility can't be entirely dismissed. This assumption gains validity especially as we consider smaller and smaller jurisdictions (e.g. communities rather than states).

It's important to remember that businesses should also be thought of as mobile taxpayers who are seeking to maximize their welfare. In fact, businesses are even more mobile than residents, as there are numerous examples of companies relocating across state borders and, in some cases, even internationally to take advantage of more favorable regulation, tax policy, or local economic conditions, including infrastructure. In addition to not being constrained (in most cases) by as many non-economic factors in their decision of where to locate, the size of the potential tax revenues that businesses represent may send even stronger signals to local authorities than do individuals. Therefore, in a decentralized system, the voter/taxpayers "vote with their feet" by choosing to locate in the community whose tax and expenditure structure is most closely aligned to their preferences. Through this consumer-like behavior, the proper market signals are provided yielding the possibility for a market-type solution to the public-goods demand problem to exist.

Oates' *decentralization theorem*, as put forth in his 1972 article "Fiscal Federalism", expanded upon the earlier work of Tiebout. The theorem is founded upon two basic

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assumptions, both of which turn out to be reasonably valid. The first assumption is that of asymmetric information between individual communities and the central government which limits the ability of even the most ambitious central governments from addressing the needs of each community separately. Local governments, on the other hand, "are presumably much closer to the people and geography of their respective jurisdictions; they possess knowledge of both local preferences and cost conditions that a central agency is unlikely to have" (Oates pg 1123). To draw from an example consistent with the topic of this paper, consider the United States, which is comprised of tens of thousands of heterogeneous communities, each with their own demographical and geographical characteristics. The infinite factors that fall into these categories and work to make each community unique will certainly lead to an equally unique set of preferences of public goods for each community. The second assumption Oates makes is that even if it could somehow take each community's preferences into consideration, there are often constitutional barriers in place that limit (or prohibit) the central government from providing different levels of services across jurisdictional boundaries resulting in a "certain degree of uniformity in central directives" (Oates 1123). Although the federal government in the United States plays an important role in income redistribution by varying the degree of aid to state and local governments on a needs base, this is different from actually altering the amount or quality of public goods and services provided and, in most cases, intergovernmental grants actually work to equalize incomes by compensating for "perceived geographical inequalities", ensuring that minimum standards of public goods and services can be achieved in poorer regions (Oates pg 12).

Ultimately, Oates was convinced that in a state with numerous heterogeneous communities, each with its own unique set of preferences, the demand schedule for any public good is likely to differ between communities, sometimes substantially. Oates' claimed that "the spirit of the unitary solution to the provision of the public service would be to ensure a uniform

level of the service over both communities" (1972 pg 6). The best solution that the central government can offer to the expenditure problem, in other words, is to provide the average level of goods and services demanded across all communities. As a result, some communities may end up paying for services that they don't want, while others are unhappy with the level of service provided and would be willing to pay extra to increase the level.

The benefits of decentralization can be significant, but depend largely upon the extent of heterogeneity in people's demand for public goods and services across communities (Theissen 6). Theory predicts that the potential gains from decentralized provision will "vary inversely with the price elasticity of demand" (Oates 1123). Econometric evidence finds that the "demand for local public goods is typically highly price inelastic", suggesting that the benefits from decentralized provision could be quite high when demand differs across jurisdictions. If there are no economies of scale from centralized provision, diversifying outputs across communities in accordance with local demands is Pareto efficient and will increase welfare. If, on the other hand, preferences are more or less homogeneous across communities, the benefits from decentralized provision will be much smaller. For reasons outlined above, this is not likely to be the case in the United States. Sections 2.2 and 2.3 will build off of the theory presented above by summarizing some of the important empirical findings on the subject of fiscal decentralization, and whether these findings are consistent with the theory.

#### 2.1 Literature review

Akai and Sakata (2002) examine cross state data in the United States for the 1992-1996 time period and find evidence that fiscal decentralization has had a positive and significant effect on economic growth, although they do not make any comments as to how exactly fiscal decentralization might contribute to economic growth. The authors felt convinced that examining data from the United States was the best way to observe the effects of fiscal decentralization on

real economic variables, arguing that using cross-country data in which the cultural, historical, and institutional differences between countries very significantly, making it more difficult to isolate the effects of fiscal decentralization unless necessary adjustments are made to the data. Also, by using panel data, the authors are able to control for regional-specific effects although they found, contrary to their expectations, an insignificant coefficient for the dummy variable representing the Southern region.

Ulrich Thiessen (2001) with the German Institute for Economic Research conducted similar research for the OECD countries. He makes an acute hypothesis that the optimal system for economic growth may be neither a highly centralized or highly decentralized government, but a decentralized system with "adequate" central government interventions (10). Thiessen finds evidence that countries have indeed converged towards a medium level of decentralization over time but that countries with initially low levels of decentralization can most likely increase growth by devolving more authority to subnational levels of government. The rational behind this is that projects or public services that have significant positive externalities will be underprovided in a totally decentralized system since the cooperation between groups of local governments necessary to optimally provide goods characterized by such spill-over effects adds an additional layer of complexity to the provision. Also, some public services may have extremely high fixed costs, meaning that if service provision at the local level of government is too fragmented, these governments may not have the resources necessary to provide certain services.

Along these same lines, Andres Rodriguez-Pose and Anne Kroijer examined the impact that fiscal decentralization has had on economic growth in the CEE countries and found evidence that supports the claim of Thiessen that certain public goods will be underprovided in a totally decentralized system. Upon finding a negative relationship between fiscal decentralization and economic growth in these countries, the authors draw the conclusion that there are many institutional factors at play which keep the region from taking full advantage of

the benefits of decentralization proposed by the theory. Excessive fragmentation of municipalities, especially in the Czech Republic and Hungary, "where very small local governments are required to provide a broad range of services" were blamed as the leading cause of the negative effects of decentralization in these countries (Rodriquez-Pose and Koijer 11). In the transitioning economies of Central and Eastern Europe, the process of decentralization has failed to produce an optimal solution to the government's second fundamental problem; identifying which level of government is most capable of providing each public good or service most efficiently. Giving too much responsibility to very small jurisdictions of local governments could likely lead to a misalignment of expenditure and revenue authority as well, an issue that will be discussed in more detail in section 3.1 about quantitative measures fiscal decentralization. The following section will focus more on that theory and literature which has focused more attention to the issue of public infrastructure spending in a decentralized environment.

## 2.2 Fiscal Decentralization and Infrastructure Investment

The basic principle of fiscal decentralization is, according to Oates, "the presumption that the provision of public services should be located at the lowest level of government encompassing, in a spatial sense, the relevant benefits and costs" (pg 1122). The rest of the literature on fiscal decentralization stands largely in agreement, arguing that decentralization is the most effective method of service delivery "when the benefits of an infrastructure service are mostly local and there is little scope for economies of scale, as in solid waste management, urban transit, water supply, and roads maintenance" (Estache and Sinhapg 1). Unfortunately, there is very little theoretical literature which attempts to explain how fiscal decentralization might affect spending on individual categories of infrastructure. However, it is logical to expect that fiscal decentralization will increase aggregate expenditure on infrastructure services if,

collectively, "subnational governments rank infrastructure as a higher priority than did the federal government" (pg 2).

Returning to Tiebout's assumption of the mobile taxpayer/consumer presents some insight as to why local governments might put a higher priority on infrastructure than the federal government. The greater the mobility of voter/taxpayers between subnational jurisdictions, the more sensitive subnational levels of government will become to these market signals in their attempts to attract new residents and businesses or even retain existing ones. As a result, fiscal competition is introduced among same-level jurisdictions as they compete for a limited supply of residents, businesses and, ultimately, the tax revenues that follow them. One strand of the literature argues that this competition should affect the composition of public expenditures, inducing subnational levels of government to invest in those public goods which enter into the production functions of private firms and, likewise, into the preference functions of individuals (Keen and Marchand, 1997). The quality of ports or access to main transportation arteries (highways, railroads), for example, would carry a lot of weight for a manufacturing firm that needs to ship and receive bulk quantities of materials and finished goods as quickly as possible. Likewise, the quality of primary schools, extent and user-friendliness of public transportation, or even the number of parks and other public spaces could greatly influence their decision to reside in one community versus another.

Consistent with this argument, Estache and Sinha (1995) show some empirical evidence from cross-country data suggesting that decentralized countries tend to spend more (total and subnational) on infrastructure projects. In another study, De Mello concentrates specifically on the effect of fiscal decentralization on public investment in Latin America. Using data from OECD countries and six Latin American countries, the author attempts to compare the effects of fiscal decentralization on gross fixed capital formation in order to determine aggregate investment trends since more specific data on the sectoral composition of investment

(infrastructure or non-infrastructure) is hard to come by for many for the Latin American countries in the sample. De Mello chose to use a simple ratio of central to subnational government total revenue as an indicator of the degree of fiscal decentralization in each country. He found evidence that, while fiscal decentralization had increased the formation of gross fixed capital in the OECD countries, decentralization had had the opposite effect in Latin America. The author attributed these results to regulatory uncertainty, among other institutional deficiencies in the Latin American countries, suggesting that fiscal decentralization can have disparate impacts upon infrastructure spending depending on the institutional environment.

More recently, Kappeler and Valila (2008) report similar findings using European data, showing that infrastructure expenditure tends to account for a greater share of total expenditure in decentralized countries and attribute these results primarily to the increased fiscal competition that goes along with decentralization. It's worth emphasizing that these are country level results. It is no surprise that decentralization increases spending on infrastructure at the local level since the responsibility for providing these goods has fallen to the subnational levels of government. Most importantly, the increase in infrastructure spending at the subnational level has not been offset by a corresponding decrease in national infrastructure spending and, therefore, spending has increased at the aggregate level in these two studies. However, it's worth clarifying that the fiscal competition between same-level jurisdictions stemming from fiscal decentralization is not nearly as applicable to central governments since the mobility of citizens across national boundaries is much more restricted, severely dampening the ability of citizens to "vote with their feet" in this case.

## Section 3: Measuring Fiscal Decentralization

Fiscal decentralization is generally interpreted as the degree of devolution of authority of revenue and expenditure functions to the lower levels of government. This authority has been

"allocated on the basis of legal relationships between higher- and lower-levels of government" (Akai and Sakata pg. 95). The most significant challenge to analyzing the relationship that fiscal decentralization has upon real economic factors, including public expenditure on infrastructure, is to accurately measure quantitatively the degree to which the allocation of authority over both revenues and expenditures has been devolved to the subnational levels of government.

Akai and Sakata (2002) identify one of the more significant barriers to obtaining accurate measures of fiscal decentralization. It may be unclear from available accounting information exactly how local governments are financing their expenditures. At first glance, it may appear that a country is quite decentralized if the local government's share of expenditures accounts for a large portion of the country's total expenditures. However, this would not be the case if local governments are largely financed by intergovernmental grants from the central government. In such circumstances, "the share of expenditure in the total budget does not necessarily reflect the level of authority allocated to a lower-level government because, to some extent, its grant relates to expenditure authorized by a high-level government" (pg 95). Therefore, local expenditure as a percentage of total expenditure, on its own, is not a transparent enough indicator of fiscal decentralization.

To mitigate this problem, I will follow the methodology used by Akai and Sakata and use three measures of fiscal decentralization that deal with both the revenues and the expenditures of local governments in order to increase the chances of measuring the "true" level of decentralization. The data used for the calculations were obtained from the U.S. Census Bureau's online database of *Government Finance Statistics*, published annually. I have chosen to use just three years of data, 1993, 2000, and 2007, since the majority of the variables used do not exhibit significant variation over the short-run. Data is available for local, state, combined state and local, and federal levels of government and is broken down into more than 150 categories of revenue and expenditure. As mentioned above, all sub-state level data, which is

comprised of municipalities, townships, school districts, and special districts, is lumped into one category and represents one of the significant limitations in the data. The indicators of fiscal decentralization and their calculations are described below:

- 1) Revenue indicator (Indicator 1) The revenue indicator measures the ratio of local government revenues to combined state and local government revenues and is calculated for each of the 50 states. "This indicator corresponds to the most approximate measure of the allocation of authority when a local government has authority associated with its expenditure (the tax to be collected and the type of expenditure to be made), but all inter-governmental grants are conditional or matching grants" (Akai and Sakata pg 97). Therefore, grants from other levels of government are excluded from the calculation of revenue shares in this indicator.
- 2) Expenditure indicator (Indicator 2) The expenditure indicator measures the ratio of local government expenditure to combined state and local government expenditures and is defined for each state. "This indicator corresponds to the most approximate of the allocation of authority when a local government has authority associated with its expenditure (the tax to be collected and the type of expenditure to be made) implicitly considering that all inter-governmental grants are non-matching or lump-sum grants" (pg 97). Contrary to indicator 1, inter-governmental grants are included in the calculation of expenditure shares in this indicator.
- Composite indicator (Indicator 3) The revenue-expenditure indicator incorporates both revenue and expenditure shares and is defined as the average of indicators 1 and 2. That is, IND3=(IND1+IND2)/2.

The following graphs show the distribution of the indicators across states and time.





\*Minimum: Vermont 2007; Maximum: Florida 2007

## **Expenditure Indicator – IND2**



\*Minimum: Hawaii 2007; Maximum Nevada 2000

## **Composite Indicator – IND3**



#### \*Minimum: Hawaii 2000; Maximum New York 2000

## Section 4: Empirical Analysis

Two types of infrastructure have been chosen for examining the impact of fiscal decentralization on infrastructure investment: highways and transportation. These two types of infrastructure have been chosen specifically because they differ for one fundamental reason; highways are characterized by high spillover effects (externalities) since they typically span across more than one, if not several, subnational jurisdictions, especially at the local level. Theory tells us that spending on public goods with high externalities will be suboptimal if the responsibility of providing these goods falls to local level of governments since decentralized levels of government have little incentive to provide goods that benefit jurisdictions other than their own (Oates pg 1121). On the other hand, the benefits of transportation related goods, which include public transit and road maintenance, are mostly local and, therefore, the theory prescribes that optimal provision of these goods can only be achieved by the local government.

The two dependent variables of interest are as follows; STETE which is the ratio of combined state and local transportation expenditures to total expenditures and SHETE which is the ratio of combined state and local highway expenditures to total expenditures.

Contrary to intuition, it is necessary to examine aggregate state and local expenditures. Isolating local expenditures and examining the impact of fiscal decentralization on local highway and transportation expenditures does not generate meaningful results if, for example, the increase in local spending is offset by a decrease in federal or state spending. Of more interest is whether the devolution of revenue and spending authority to local levels of government increases, ceteris paribus, *aggregate* state and local spending on highways and transportation. Below are scatter plots of both dependent variables and the composite indicator (IND3).



Agg. Trans. Exp./total exp.



Agg. Highways exp./total exp.

## 4.1 Estimation Strategy

To estimate the effects of fiscal decentralization on transportation and highway expenditures, I have used a simple equation using panel data for all 50 states for the years 1993, 2000, and 2007. The equation is as follows:

1) 
$$EXP_{i,s,t} = \alpha_0 + \beta IND_{i,s,t} + X_{i,s,t} + \varepsilon_i$$

where  $EXP_{i,s,t}$  refers to type of expenditure ratio *i* (highway or transportation) in state *s* at time *t*, *IND*<sub>*j*,*s*,*t*</sub> refers to indicator *j* in state *s* at time *t*, and *X*<sub>*i*,*s*,*t*</sub> represents control variables for state characteristics, and  $\varepsilon_i$  is an error term. Equation 1) is estimated using the method of ordinary least squares (OLS).Regressions were estimated both with and without correcting for heteroskedasticity by using White covariance estimates, but the estimated coefficients were not different and only the estimations without the corrections are reported. Characteristics of the data can be found in Table 1, beginning with the three indicators of fiscal decentralization, followed by the expenditure ratios and control variables. One of the significant advantages of

using data from the United States to estimate the effects of decentralization on highway and transportation expenditures is that it is not necessary to control for drastically different cultural or historical factors, as would be the case for using cross-country data.

## Table 1

Variable	Mean	Standard Deviation	Definition
IND1	0.3957	0.0837	Ratio of local revenues to combined state and local revenues.
IND2	0.508	0.0919	Ratio of local expenditures to combined state and local expenditures.
IND3	0.4518	0.0837	Mean of indicators 1) and 2)
STETE	0.1174	0.0352	Ratio of combined state and local transportation expenditures to total expenditures.
SHETE	0.0693	0.0218	Ratio of combined state and local highway expenditures to total expenditures.
GSIZE	0.1904	0.0303	Ratio of combined state and local expenditures to state GDP to proxy for the size of the government.
PURB*	69.59	15.17	Percentage of total population living in urban centers defined as cities with more than 50,000 residents.
POPD*	180.23	246.65	Population density (inhabitants per square mile).
FTGDP	0.0356	0.0124	Ratio of federal transfers to the state and local level as a percentage of GDP.
PCREV	4.66	1.88	Aggregate own source revenue per capita.
South	0.34	0.47	Dummy variable indicating states location in the southern region; Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia.
Midwest	0.22	0.41	Dummy variable indicating states location in the Midwest region; Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin.
Northeast	0.18	0.38	Dummy variable indicating states location in the Northeast region; Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont.

West 0.26 0.44 Dummy variable indicating states location in the West region; Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming
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\*Variables are included in the regression in the logarithmic form.

## 4.2 Regression Results

Regression results for both highway and transportation expenditure and all three indicators of fiscal decentralization are reported below. Bold p-statistics indicate coefficients that are significant at the 10% confidence level or less.

1)

Dependent Variable: **STETE** Method: Panel Least Squares Sample (adjusted): 1993 2007 Periods included: 3 Cross-sections included: 50 Total panel (balanced) observations: 150

Variable	Coefficient	Std. Error	t-Statistic	Prob.
С	0.200723	0.053295	3.766294	0.0002
IND1	-0.068281	0.024581	-2.777812	0.0062
GSIZE	-0.429501	0.101339	-4.238236	0.0000
LNPURB	0.023807	0.013394	1.777438	0.0777
LNPOPD	-0.023248	0.002439	-9.531946	0.0000
FTGDP	0.498250	0.266510	1.869535	0.0636
SOUTH	0.016634	0.007121	2.335933	0.0209
MIDWEST	0.020442	0.006269	3.260651	0.0014
NORTHEAST	0.017478	0.008832	1.979043	0.0498
PCREV	-0.000849	0.001161	-0.731095	0.4659
R-squared	0.630257	Mean depende	ent var	0.117418
Adjusted R-squared	0.606488	S.D. dependen	it var	0.035238

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Dependent Variable: STETE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
С	0.213027	0.052040	4.093548	0.0001
IND2	-0.087446	0.023130	-3.780554	0.0002
GSIZE	-0.401172	0.099039	-4.050639	0.0001
LNPURB	0.026013	0.013011	1.999333	0.0475
LNPOPD	-0.023905	0.002401	-9.956857	0.0000
FTGDP	0.322224	0.265830	1.212143	0.2275
SOUTH	0.017366	0.006955	2.496898	0.0137
MIDWEST	0.021737	0.006136	3.542774	0.0005
NORTHEAST	0.015290	0.008564	1.785373	0.0764

PCREV	-0.000971	0.001131	-0.858131	0.3923
R-squared	0.646016	Mean depende	nt var	0.117418
Adjusted R-squared	0.623260	S.D. dependen	t var	0.035238

## 3)

4)

## Dependent Variable: STETE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
С	0.205528	0.052426	3.920326	0.0001
IND3	-0.087254	0.025077	-3.479414	0.0007
GSIZE	-0.417623	0.099706	-4.188555	0.0000
LNPURB	0.026369	0.013206	1.996815	0.0478
LNPOPD	-0.023688	0.002413	-9.816257	0.0000
FTGDP	0.407509	0.264492	1.540724	0.1256
SOUTH	0.017430	0.007020	2.482853	0.0142
MIDWEST	0.021616	0.006196	3.488713	0.0006
NORTHEAST	0.016856	0.008656	1.947270	0.0535
PCREV	-0.001001	0.001144	-0.874776	0.3832
R-squared	0.640928	Mean depende	ent var	0.117418
Adjusted R-squared	0.617845	S.D. dependen	t var	0.035238

# Dependent Variable: SHETE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
С	0.166941	0.028759	5.804774	0.0000
IND1	-0.046195	0.013265	-3.482616	0.0007
GSIZE	-0.282424	0.054686	-5.164487	0.0000
LNPURB	0.004452	0.007228	0.615933	0.5389
LNPOPD	-0.014779	0.001316	-11.22882	0.0000
FTGDP	0.354838	0.143816	2.467295	0.0148
SOUTH	0.011243	0.003843	2.925818	0.0040
MIDWEST	0.017068	0.003383	5.045131	0.0000
NORTHEAST	0.019103	0.004766	4.008403	0.0001
PCREV	-0.000677	0.000626	-1.079889	0.2820
R-squared	0.718719	Mean depende	ent var	0.069333
Adjusted R-squared	0.700637	S.D. depender	nt var	0.021802

## Dependent Variable: SHETE

Variable	Coefficient	Std. Error	t-Statistic	Prob.
С	0.174876	0.028599	6.114822	0.0000
IND2	-0.046206	0.012711	-3.635012	0.0004
GSIZE	-0.265030	0.054427	-4.869423	0.0000
LNPURB	0.004047	0.007150	0.565954	0.5723
LNPOPD	-0.015005	0.001319	-11.37249	0.0000
FTGDP	0.264965	0.146088	1.813735	0.0719
SOUTH	0.011167	0.003822	2.921493	0.0041
MIDWEST	0.017184	0.003372	5.096493	0.0000
NORTHEAST	0.017442	0.004706	3.706195	0.0003
PCREV	-0.000643	0.000622	-1.034379	0.3027

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R-squared	0.720710	Mean dependent var	0.069333
Adjusted R-squared	0.702756	S.D. dependent var	0.021802

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Dependent	Variable:	SHETE
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Variable	Coefficient	Std. Error	t-Statistic	Prob.
С	0.170611	0.028507	5.984797	0.0000
IND3	-0.051526	0.013636	-3.778635	0.0002
GSIZE	-0.274002	0.054216	-5.053882	0.0000
LNPURB	0.005053	0.007181	0.703655	0.4828
LNPOPD	-0.014968	0.001312	-11.40723	0.0000
FTGDP	0.303076	0.143820	2.107323	0.0369
SOUTH	0.011444	0.003817	2.997938	0.0032
MIDWEST	0.017432	0.003369	5.173918	0.0000
NORTHEAST	0.018443	0.004707	3.918302	0.0001
PCREV	-0.000709	0.000622	-1.140401	0.2561
R-squared	0.722638	Mean depende	nt var	0.069333
Adjusted R-squared	0.704807	S.D. dependen	t var	0.021802

The empirical findings can be summarized as follows. The primary finding is that the coefficients on all three indicators of fiscal decentralization are negative and significant at the 1% confidence level for both dependent variables. Contrary to what theory predicts, these results provide evidence that fiscal decentralization has a negative impact on aggregate highway and transportation expenditure as a share of total expenditures in the United States.

Of the control variables, each coefficient except per capita revenues (PCREV) is highly significant in regressions 1) through 3), while all but (PCREV) and the percent of urban population (LNPURB) are significant in regressions 4) through 6). Interestingly, the coefficient on GSIZE is negative and quite large in all six regressions, suggesting that aggregate expenditures on highway and transportation as a ratio of total expenditures are inversely related to the size of the government. The theory does not offer many clues as to why this relationship might hold. It could be that larger governments are less efficient in their expenditures and are likely to have a more re-distributive role than smaller governments.

In regressions 1) through 3), note that the coefficients on LNPURB and population density (LNPOPD) are positive and negative, respectively. This actually makes a lot of sense since urban areas have more surface area of roads per square mile and have a much greater capacity (and need) for public transportation services than rural areas, both of which would tend to increase spending on transportation. On the other hand, the population density is certainly not uniform across urban areas, for example, Boise, Idaho has a density of 2,913 people per square mile, compared to 27,532 in New York City, yet both are considered urban areas. The density of the population in New York City gives rise to significant economies of scale, since, for example, one bus route in N.Y.C may be able to service hundreds of thousands of people, while a bus route of the same length in Boise may only be able to service a few thousand. While the nominal cost of the bus route may be much greater in N.Y.C (more busses, bus stops, transit lanes, etc.), the cost per person of providing the service may be significantly less in densely populated areas. Therefore, transportation expenditure would take up less of the total budget, justifying the negative (and significant) coefficient on LNPOPD.

The effect of federal transfers as a percentage of GDP on transportation and highway expenditures was close to what could be expected. The effect was positive for highway expenditures, and statistically insignificantly different from zero for transportation expenditures. In the United States, both state and local governments derive part of their revenue for highway and transportation expenditures from excise taxes on gas/diesel, which are then transferred into one of two accounts of the Federal Highway Trust Fund; the Highway Account and the Mass Transit Account. In 2011, for example, precisely 84% of the funds were deposited into the Highway Account, with the remaining 16% going into the Mass Transit Account (United States to help finance either transportation or highway development and maintenance, explaining the positive relationship between FTGDP and SHETE. The much less significant relationship between

FTGDP and STETE is probably due to the highly uneven distribution of funds between the two accounts of the Trust which favors highway expenditures.

The coefficients for SOUTH, MIDWEST, and NORTHEAST are all slightly positive and very significant in regressions 1) through 6), indicating that spending on highways and transportation varies by region and is lowest in the baseline case, WEST. These results should be interpreted with care, however, since there are many intra-regional differences within the regions that are not captured by these four dummy variables and could be driving these results. For example, consider the region WEST, which lumps drastically different states, especially demographically speaking, into the same category. In Alaska and Montana, which are two of the largest states in the nation, the majority of the population lives in just a couple medium-sized towns (Billings, Missoula, and Great Falls in Montana; Juneau, Fairbanks, and Anchorage in Alaska). At the other extreme you have California, with 70 cities of at least 100,000 people. It goes without saying that California will have a much larger highway and transportation budget than Alaska or Montana.

While the econometric evidence presented here does suggest a negative relationship between measures of fiscal decentralization and spending on highways and transportation, there are a host of reasons why it would be unwise to take these findings at face value. Firstly, there are many limitations in the available data. Because data for municipalities, townships, school districts, and special districts have all been lumped by the Census Bureau into one category of "Local governments", it is impossible to determine exactly the effects of fiscal decentralization at each level of government, given the data used here. The results could be biased downwards, especially if transportation and highways are not the responsibility of one or more of these levels of government, which might be the case for special districts, depending on what these districts' mandates are, and is very likely to be the case for school districts which, obviously, is mainly responsible for revenues and expenditures related to education. In addition,

there are vast differences across states in terms of legislation and regulations which identify specific types and sources of funding that can be used by local governments and can even govern the distribution and use of these revenues as well. This legislation, by design, spells out the relationship that local governments have with centralized bodies (either State or Federal) by governing the taxing and spending autonomy of localities. Legislation can empower local governments with the authority to use various debt instruments to finance infrastructure projects and/or to collect and spend own-source revenue at their discretion. On the other hand, state legislation can significantly restrict the autonomy of local governments by imposing tax and/or expenditure limitations on them, discouraging or prohibiting the use of public-private partnerships (PPPs), debt instruments, or other methods of innovative finance (e.g. project finance). Each of these measures essentially makes local governments more dependent upon the central government for a substantial chunk of their revenue (grants and transfers). Understanding some of the differences that exist across state legislation in practice will be vital for interpreting the results of the empirical analysis, and will be discussed in the following section.

#### Section 5: State and local legislation

It is beyond the scope of this paper to present in detail the differences in legislation that exists across U.S. states. However, it is worthwhile to take a closer look at few states in order to demonstrate the vast differences in legislature that exists across states. Three states have been chosen arbitrarily in order to highlight these differences: Washington, New York, and Mississippi. These states represent three of the four major geographical regions in the United States; Washington in the West, Mississippi in the South, and New York in the Northeast. These three states are also very different in demographical terms as well. The table below displays a few of the important demographical and geographical differences between the three.

South Carolina	New York	Washington
30,109	47,214	66,544
\$151,703,000,000	1,105,020,000,000	310,279,000,000
\$31,103	46,364	41,203
4,424,232	19,254,630	6,287,759
1.95	0.34	1.46
62.05	88.22	79.51
146.94	411.38	97.15
139,549	242,769	174,731
	South Carolina 30,109 \$151,703,000,000 \$31,103 4,424,232 1.95 62.05 146.94 139,549	South CarolinaNew York30,10947,214\$151,703,000,0001,105,020,000,000\$31,10346,3644,424,23219,254,6301.950.3462.0588.22146.94411.38139,549242,769

#### Table 1) Demographic and geographic stats for case study states

\*Source: www.transportation-finance.org

Tables A.1 through A.3 in the appendix provide a breakdown of highway funding sources for the three states in 2007 and provide an interesting starting point from which to launch this case study. What stands out immediately is the difference in how these three states choose to fund their highway expenditures. South Carolina receives 36% of its highway funding from the Federal Government while New York and Washington only receive 15% and 19%, respectively. Meanwhile, local governments play a much larger role in highway funding in New York than in Washington, accounting for 41% of total funding as opposed to just 28% in the latter. The state level of government in Washington, on the other hand, contributes more to total funding (as a percentage of the total) than any other level of government (54%) in the other two states. State and local level governments in all three states collect similar shares of user revenue, which stems primarily from taxes on fuel and vehicle registration fees. The level of these fees and taxes are decided at the state level and vary drastically across the nation. According the American Petroleum Institute which collects data on gasoline and diesel tax rates in the U.S., New York currently (as of April 2012) has the highest gasoline tax in the nation at 69.6 cents per gallon (cpg) (www.api.org). Washington's gas tax is also quite high (55.9 cpg) compared to the national average of 49.5. South Carolina has one of the lowest gas taxes in the nation at 35.2

cpg. Registration fees also vary from state to state with Washington charging more to register an automobile (\$43.75) than in New York (\$24.85) or South Carolina (\$24) (fhwa.dot.gov).

There are two additional mechanisms through which governments can generate revenues for highway expenditures; road pricing and non-road pricing. Road pricing can be broken down into two subcategories; tolling and pricing. Tolling is the traditional method by which motorists pay a per-use fee to utilize a highway and are typically "fixed, distance-based tolls that vary by vehicle type" (www.fhwa.dot.gov). Pricing is a more recent innovation and can be thought of as variable tolling. One such method is congestion pricing, which imposes tolls or fees that vary by the level of vehicle demand for a particular stretch of highway. For example, tolls may vary by the time of day, exacting higher fees from users during peak times of use, such as rush hour. There are a vast number of methods through which non-road pricing can be implemented, but generally attempt to capture positive externalities that may disproportionately benefit certain people or business by charging additional fees or taxes on the beneficiaries. More traditional methods of tolling are not capable of capturing increased property values of residential or commercial property that may lie adjacent to a new highway. One of the more creative techniques that a government might use to attempt to capture some of this value is to sell the naming rights of a fixed asset to a private company. This may be much more common for types of fixed assets other than highways, like stadiums, but serves as an example of the variety of ways that a government can use non-road pricing to generate revenues.

Debt financing through bond issuance is insignificant at the local level in all three states, although Washington does generate a sizeable portion of its revenues (16%) from bond proceeds at the state level, while the state of South Carolina did not issue a single bond in 2007. While the extent of authority that states and local governments have to issue debt varies across the nation, all three states under consideration do have debt-financing authority. The ability of a state to use debt instruments may depend upon the existence of tax and expenditure

limitations (TELs) and the stringency of those limitations. Washington and South Carolina both have constitutional spending limitations, which use different formulas to determine the allowable growth of government spending. The growth of spending in South Carolina, for example, is limited by "either the average growth in personal income or 9.5% of total state personal income for the previous year, whichever is greater" (www.ncls.org). Therefore, the formula could eliminate the possibility for debt financing highway expenditures. New York has no such legislation.

An additional source of funding for infrastructure projects, including highways, is state infrastructure banks (SIBs). In 2005, President Bush signed into law the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which established a new SIB program under which all states "are authorized to enter into cooperative agreements with the Secretary of Transportation to establish infrastructure revolving funds eligible to be capitalized with Federal transportation funds authorized for fiscal years 2005-2009" (www.transportation-finance.com). The banks can then offer a range of loans and credit assistance enhancement products that are used to leverage Federal funds in an effort to attract additional non-Federal public and private sponsors of highway and transportation projects. SIB funds can also be used as collateral to issue bonds or establish a guaranteed reserve fund. All three states under consideration have SIBs and are used to varying degrees for funding projects. As of December 2008, New York had entered into the different SIB loan agreements with a value of \$2.3 million, while South Carolina had thirteen such agreements with a total value of \$3.3 billion, by far the largest amount in the nation.

As discussed earlier, one of the challenges to governments is to determine whether or not the private sector may be able to provide certain public goods, such as highways, more efficiently than the public sector. Private funds are becoming an increasingly important source

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for financing infrastructure investment, including highways, either through purely private project finance or by various Public-Private Partnership (PPP) arrangements. Washington and Mississippi are currently among 23 states which have enacted statues that enable the use of various methods of PPPs for the development of transportation infrastructure (www.fhwa.dot.gov). Both Washington and South Carolina has legislation in place that allows solicited and unsolicited PPP proposals, including the "outsourcing of long-term operations and maintenance and other asset management duties to the private sector" (www.fhwa.dot.gov). Only in 2011 did the state legislators in New York signal that they might finally be warming up to the idea of PPPs when they passed legislation allowing certain design-build PPP infrastructure projects to take place. Until then, the ability to enter into PPP arrangements had been limited to a food and industry development program (www.ncsl.org).

As a result of the diverse legislation across states, the method of project delivery varies greatly from state to state. A brief summary of two major highway projects delivered in Washington and South Carolina will serve to capture some of these differences; the Alaskan Way Viaduct in Seattle, Washington and the "27 in 7" highway and bridge replacement project in South Carolina.

The Alaskan Way Viaduct is a \$3.1 billion project to replace an existing double-decker highway running through downtown Seattle with a four-lane, double-decker bored-tunnel. The existing structure was damaged in a 2001 earthquake. The project is being delivered in a traditional design-build fashion, where a joint-venture private company undertakes the design and construction of the tunnel but is being financed entirely by public monies. This includes \$334.3 million in Federal funds, \$2.46 billion in State funds, and \$6.5 million of local funds, and \$300 million from the Port of Seattle. State funds will be financed largely by gas tax revenues and up to \$400 million in tolling revenues. In this case, local funds will account for just 0.2% of the total funding (www.fhwa.dot.gov).

The "27 in 7" was a statewide effort from 1999 to 2008 to accelerate the implementation of 200 highway projects from 27 to 7 years, hence the name. The South Carolina DOT entered into partnerships with two private construction and resource management (CRM) firms to "undertake strategic planning and financial management and coordinate design and construction activities, all without augmenting the size of the state agency" (www.fhwa.dot.gov). The form of PPP was a simple program management, with each CRM responsible for \$760 million of road and bridge construction contracts. The funding sources were derived from three primary lenders; the South Carolina SIB, bonding, and the Transportation Infrastructure Finance and Innovation Act (TIFIA), which is a Federal program through which the United States Department of Transportation "provides credit assistance in the form of direct loans, loan guarantees, and credit assistance to major surface transportation projects with dedicated revenue streams" (www.transportation-finance.org). It is interesting to note that, contrary to 2007 when South Carolina did not issue any bonds, the state generated 25% of its total revenue from bond receipts in 2001, with a nominal value of \$447 million (www.subsidyscope.org).

Although this section has provided a very superficial summary of some of the differences in legislation and methods of project delivery that are observed across states, it should be apparent that a more comprehensive survey of such information encompassing all 50 states would surely demonstrate even greater variance. However, such an in-depth survey is both unrealistic and unnecessary for the purposes of this paper.

## Section 6: Conclusions and Policy Recommendations

This paper has presented evidence that fiscal decentralization has had a negative impact on aggregate highway and transportation expenditure in the United States. Due to limitations in the data, it is impossible to pin-point exactly which levels of local government have been most negatively affected by decentralization. It is also possible that the results are downward biased since all four types of local governments found in the United States have been lumped together into one category. Breaking this data down into the appropriate subcategories would be necessary to make more concrete conclusions about the effects of decentralization on spending of any type. Theory suggests that an underdeveloped institutional environment, excessive fragmentation, or a misalignment of revenue and expenditure responsibilities can be serious impediments upon the benefits of decentralization proposed by the theory. Although the first is certainly not the case in the United States, whose institutions are perhaps the most developed in the world, excessive fragmentation and misalignment could be serious causes for concern and warrants additional future research.

Because of the drastic institutional differences observed across states, any policy recommendation should be made at the state level since any Federal government policy mandating that states fund their expenditures through defined revenue sources imposes upon the autonomy of the state. However, the Federal government can play an important supervisory and advisory role. For example, proposed legislation is currently being debated in Congress about the creation of a national infrastructure bank (NIB) that would behave much like the European Investment Bank. Currently 32 states have created state infrastructure banks, although it is unclear how much cooperation and knowledge sharing between the individual SIBs. A national infrastructure bank should have two components, a Federal component and a State component, embodied by a branch of the national infrastructure bank operating in each of the 50 states. The national branch of the bank would be responsible for supervising the state branches, ensuring that compliance is made with various Federal laws, such as with Environmental Protection Agency regulations. The Federal branch could also operate as an auditor of the state branches to monitor the risk profiles of the individual SIBs and even offer certain credit enhancing assistance through various direct loans and loan guarantees for state banks that meet well defined minimum financial criteria. It may be necessary for the Federal

government to finance the SIBs initially as well until the SIBs have sufficient turn-over of funds to operate independently. Perhaps the most important role that the Federal branch of the bank could assume is that of advisor and mediator, by encouraging or even mandating cooperation and knowledge sharing among the state branches. In this way, successful techniques and bestpractices could be replicated in other states given similar circumstances.

The state branches of the NIB would serve several functions beyond identifying the scope for potential projects, performing feasibility studies, and fielding solicited and unsolicited offers from the private sector for PPP projects. One such function could be the auditing and monitoring of local government's revenue and expenditure responsibilities with regards to the provision of public infrastructure. This role could also be filled by another government agency and, in fact, already is to some extent by independent budgetary committees. However, given the SIBs focus on and familiarity with the latest innovations in infrastructure, they may be significantly better informed and in a much better position to assume such an auditor/advisory role than an independent agency. This is analogous to the Federal Reserve and the Securities and Exchange Commission tendency to hand pick some of Wall Street's brightest to take on supervisory positions with the respective agencies because of their familiarity with the latest financial innovations being used by the private sector. Having such a well-informed auditor/advisor may help in identifying and mitigating any misalignments between revenue and expenditure responsibilities of local governments, which would almost certainly increase the benefits of decentralized provision of public goods.

Ultimately, the goal of the NIB and its state branches has to be to improve and build upon the decaying, insufficient stock of public infrastructure in the United States. One way to make this happen is by to increase the real amount being spent on infrastructure goods by using their resources to leverage and guarantee existing funding to increase the attractiveness of infrastructure investments and, ultimately, the amount of funding provided by both public and

private sources. The second way is to improve the efficiency of infrastructure provision. As the results of this paper have shown, there are currently certain factors at play that are limiting, and indeed, reversing the benefits that theory argues and empirical evidence has suggested come with decentralized provision of public goods. It is paramount that these inefficiencies, such as excessive fragmentation and misalignment, are identified in the near future. Further is needed in this area and, as proposed above, a NIB with branches in each state could serve this purpose the best because of their proximity to the issue at hand and the informational advantages that come with that proximity.

# Appendix

Funding Source	FY 2007 Funding (2007 dollars)	Share of State's Total Highway Funding (%)
STATE FUNDING:		
User Revenues	\$584,653,000	38%
Non-user Revenues	\$34,625,000	2%
Bonds	\$0	0%
State Subtotal	\$619,278,000	40%
LOCAL FUNDING:		
User Revenues	\$0	0%
Non-user Revenues	\$364,826,000	23%
Bonds	\$14,454,000	<1%
Local Subtotal	\$379,280,000	24%
FEDERAL FUNDING5	\$559,160,000	36%
Total	\$1,557,718,000	100%
Population	4,424,232	
Spending/Capita	\$352.1	

# A.2) New York Highway Funding Sources 2007

Funding Source	FY 2007 Funding (2007 dollars)	Share of State's Total Highway Funding (%)
STATE FUNDING:		
User Revenues	\$2,817,069,000	22%
Non-user Revenues	\$2,196,212,000	17%
Bonds	\$668,905,000	5%
State Subtotal	\$5,682,186,000	45%
LOCAL FUNDING:		
User Revenues	\$595,672,000	5%
Non-user Revenues	\$3,933,748,000	31%
Bonds	\$676,097,000	5%
Local Subtotal	\$5,205,517,000	41%

FEDERAL FUNDING5	\$1,877,308,000	15%
Total	\$12,765,011,000	100%
Population	19,254,630	
Revenue/Capita	\$663.0	

# A.3) Washington Highway Funding Sources 2007

Funding Source	FY 2007 Funding (2007 dollars)	Share of State's Total Highway Funding (%)
STATE FUNDING:		
User Revenues	\$1,634,076,000	36%
Non-user Revenues	\$91,730,000	2%
Bonds	\$712,231,000	16%
State Subtotal	\$2,438,037,000	54%
LOCAL FUNDING:		
User Revenues	\$4,564,000	<1%
Non-user Revenues	\$1,176,788,000	26%
Bonds	\$83,050,000	2%
Local Subtotal	\$1,264,402,000	28%
FEDERAL FUNDING5	\$841,190,000	19%
Total	\$4,543,629,000	100%
Population	6,287,759	
Revenue/Capita	\$722.6	

Source\* Federal Highway Administration's (FHWA) Highway Statistics Publications. See Tables Tables SF-1, LGF-1, HM-10 and HM-

## Bibliography

- Akai, Nobuo, and Masayo Sakata. "Fiscal Decentralization Contributes to Economic Growth:
  Evidence from State-level Cross-section Data for the United States." *Journal of Urban Economics* 52 (2002): 93-108. Print.
- De Mello, Luiz L. *Fiscal Decentralization and Public Investment: The Experience of Latin America*. Working paper no. No. 824. OECD. Print. OECD Economics Department Working Papers.
- Estache, Antonia, and Sarbajit Sinha. *Does Decentralization Increase Spending on Public Infrastructure?* Working paper no. 1457. World Bank, 1995. Print. World Development Report.
- "Gasoline Taxes: Combined Local, State, and Federal." *www.api.org*. American Petroleum Institute, Apr. 2012. Web. 30 May 2012. <a href="http://www.api.org/Oil-and-Natural-Gas-Overview/Industry-">http://www.api.org/Oil-and-Natural-Gas-Overview/Industry-</a>

Economics/~/media/21EBD0B62EBA42B1965EE82EFFB6585D.ashx>.

- "Highway Funding Data by Source and Type." www.subsidyscope.org. Subsidy Scope. Web. 24 May 2012. <a href="http://subsidyscope.org/transportation/direct-expenditures/highways/funding/state/">http://subsidyscope.org/transportation/direct-expenditures/highways/funding/state/</a>.
- "Innovation. Tools. Financing." *FHWA Office of Innovative Program Delivery*. Federal Highway Administration. Web. 11 May 2012. <a href="http://www.fhwa.dot.gov/ipd/index.htm">http://www.fhwa.dot.gov/ipd/index.htm</a>.
- Kappeler, Andreas, and Timo Valila. "Fiscal Federalism and the Composition of Public
  Investment in Europe." *European Journal of Political Economy* 24.3 (2008): 562-70.
  Print.

Keen, Michael, and Maurice Marchand. "Fiscal Competition and the Pattern of Public Spending." *Journal of Public Economics* 66.1 (1997): 33-53. Print.

Musgrave, R. A. "The Fiscal Outlook." The Journal of Business 27.1 (1954): 4. Print.

Oates, Wallace E. "An Economist's Perspective on Fiscal Federalism." *The Political Economy of Fiscal Federalism*. Lexington, MA: Lexington, 1977. 3-20. Print.

Oates, Wallace E. "An Essay on Fiscal Federalism." *Journal of Economic Literature*XXXVII.September 1999 (1999): 1120-1149. Print.

- "Overview of Highway Trust Fund Estimates" (2006) (testimony of Katherine Siggerud, Director of Physical Infrastructure Issues). United States Government Accountability Office. Web. 24 May 2012. <a href="http://www.gao.gov/assets/120/113356.pdf">http://www.gao.gov/assets/120/113356.pdf</a>>.
- "Public-Private Partnerships for Transportation: A Toolkit for Legislators." *NCPPP Resources*. National Conference of State Legislatures. Web. 16 May 2012. <www.ncsl.org/issuesresearch/transport/public-private-partnerships-for-transportation.aspx>.
- Rodriguez-Pose, Andres, and Anne Koijer. *Fiscal Decentralization and Economic Growth in Central and Eastern Europe*. Discussion Paper Series. London School of Economics. Print.
- Samuelson, Paul. "The Pure Theory of Public Expenditures." *The Review of Economics and Statistics* 36.4 (1954): 387-89. Print.
- "State and Local Government Finance Data." *State and Local Government Finance Data*. U.S. Census Bureau. Web. 26 Mar. 2012. <a href="http://www.census.gov/govs/www/financegen.html">http://www.census.gov/govs/www/financegen.html</a>.

- Thiessen, Ulrich. *Fiscal Decentralization and Economic Growth in High Income OECD Coutnries.* Rep. Berlin: German Institute for Economic Research, 2001. Print.
- Tiebout, Charles M. "A Pure Theory of Local Expenditures." *Journal of Political Economy* 64.5 (1956): 416-424. Print.
- "Transportation Funding and Financing." AASHTO Center for Excellence in Project Finance and Transportation Funding & Financing. Web. 19 May 2012. <a href="http://www.transportation-finance.org/funding\_financing/>">http://www.transportation-finance.org/funding\_financing/></a>.