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DEDICATING TAX REVENUE: Constraining Government or Masking Its Growth?

By George R. Crowley and Adam J. Hoffer

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Authors

George R. Crowley
grcrowley@troy.edu
George R. Crowley is an assistant professor of economics and member of the Manuel H. Johnson Center for Political Economy at Troy University in Troy, AL. He earned his PhD in economics from West Virginia University in 2011. His research focuses on topics in public economics and constitutional political economy with a specific emphasis on constraining government. He has published articles in journals such as *Economic Inquiry*, *Public Choice*, and the *Southern Economic Journal*. At Troy University, he teaches principles of micro and macroeconomics, intermediate microeconomics, and a course on the economic and moral foundations of capitalism.

Adam J. Hoffer
adam.hoffer@mail.wvu.edu
Adam J. Hoffer is an assistant professor of economics at the University of Wisconsin- La Crosse. He earned his PhD in economics at West Virginia University in 2012 with emphases in public economics and natural resource economics. He earned his BA in economics with a minor in business administration from Washington and Jefferson College. His primary research interests include political economy, public choice, and public finance.

Abstract

Theoretically, the process of dedicating tax revenues to specific expenditures should have no impact on expenditures because tax revenues are fungible. Nevertheless, empirical studies have found a range of effects of dedicating revenue on expenditures, and this process remains a popular policy option for state governments. This paper outlines a theory in which tax revenues dedicated to politically popular expenditures (for example, education) are used to increase general fund revenues and overall government size rather than for the stated purpose. Our empirical results show that dedicated tax revenues are (1) largely ineffective in increasing the expenditures to which they are tied and (2) effective at increasing total government size. In other words, we find support for the hypothesis that dedicating tax revenues to specific expenditures masks increases in total government spending.

Keywords: Earmarking, Excise taxes, Leviathan, Flypaper effect

JEL: H71, H72

Introduction

The practice of dedicating a portion of tax revenue to a specific expenditure category is a popular fiscal tool for state governments. Despite its widespread use, however, this practice, also known as earmarking, should theoretically have no effect on the size or composition of government expenditure.[1] Empirical studies, meanwhile, have found evidence that some portion of dedicated tax revenue does "stick" to its intended target, though the majority of the earmarked revenue goes elsewhere. In this paper, we outline a political economy theory of dedicating tax revenue to specific expenditure categories that seeks to explain its widespread use in the face of these apparent shortcomings.

The fundamental theoretical issue with earmarking tax revenue is fungibility. Because tax revenues can be perfectly substituted for one another, there is no reason to expect a dedicated or "earmarked" dollar to have any more of an impact on expenditures than a general fund, undedicated dollar. In the extreme, policy makers can use an additional earmarked dollar in place of a previously used general fund dollar, freeing that general fund dollar to be used elsewhere. The result is no change in spending in the targeted expenditure category.

Although this issue of fungibility has led many to regard the practice of dedicating tax revenues as meaningless, the "Leviathan" model of government, which assumes government seeks to maximize its size, presents a possible usefulness of earmarking tax revenue. Because dedicated funds may be used to increase spending in other areas through the fungibility of revenues, the government may turn to tax increases earmarked to politically popular programs (education, for example) or highly visible public goods (such as highways) when more general tax increases are not feasible politically. In other words, the theoretical shortcomings of earmarking tax revenue may be viewed by some policy makers as an attractive feature allowing for an increase in total government size through an increase in revenue purportedly dedicated to some popular program.

We test our model using data for 49 states (as is common in the state fiscal-policy literature, we drop Alaska from the analysis). Unlike previous studies of earmarking of tax revenue, which rely on some aggregate measure of total dollars earmarked to a specific program, we separate specific taxes and other revenue sources to determine any differences in the relative "stickiness" (and thus ability of government to use the funds elsewhere) across earmarks. Our results indicate that the majority of dedicated revenues fail to increase spending in their target expenditure category. These same earmarks, however, are quite effective at increasing spending on *other* expenditure categories. In general, the practice of earmarking tax revenue leads to larger government overall. In other words, we find evidence that policy makers may use earmarking of tax revenues to mask increases in government spending.

The following section further explains the theoretical and practical issues pertaining to earmarking of tax revenue and summarizes some key findings in the earmarking literature. Section 3 explores the so-called flypaper-effect literature and how it relates to the present paper. Section 4 details our hypothesis, and section 5 explains our empirical tests. Section 6 presents the results of our analysis. The final section summarizes the key findings and provides policy recommendations.

Earmarking Tax Revenue: Theory, Practice, and Empirical Evidence

Earmarking tax revenue is a budgetary practice that involves dedicating a percentage of the tax revenue from a specific source to a specific expenditure. Every U.S. state earmarks a percentage of its revenue for a certain purpose, but there is a large variance in the percentage of total state

* We gratefully acknowledge the financial support of the Mercatus Center.
[1] James M. Buchanan, "The Economics of Earmarked Taxes," Journal of Political Economy 71, no. 5 (1963): 457–569.

revenue that is earmarked. In 2005, Alabama earmarked 84 percent of its total state revenue, the largest percentage in the United States, while Rhode Island earmarked only 4 percent of its revenue, the lowest among U.S. states.[2]

Table 1: Earmarking in the United States (2005)

	Revenue Source												
	General Sales	Tobacco	Alcohol	Insurance	Utilities	Parimutuel	Personal Income	Corporate Income	Motor Fuel	Motor Vehical Registration	Gaming	State Property	Severance
States Levying Tax	45	50	50	50	50	37	43	45	50	50	20	37	39
States Earmarking Tax	35	26	23	26	10	9	20	14	49	12	14	9	26
Expenditure Targeted by Earmark													
Local Government	17	14	10	7	4	1	7	4	22	5	6	—	24
Education	11	10	4	4	3	2	8	5	2	1	4	3	6
State Highways	7	1	—	—	1	—	—	—	45	8	1	—	—
Health/Welfare	2	23	13	3	2	—	2	1	—	—	1	1	—
Pensions	2	1	1	7	—	—	2	1	—	—	1	1	
Parks/Natural Resources	4	2	1	—	—	—	—	—	12	1	1	2	6
Debt Service	5	4	1	—	—	1	4	1	10	3	4	2	4
Environmental Programs	4	2	—	—	—	—	—	—	3	—	—	—	6
Other	14	7	13	11	3	8	5	3	19	5	5	3	8

Source: Pérez, *Earmarking State Taxes: 4th Edition.*

Table 1 presents a summary of popular earmarked revenue sources and their most common destination in 2005. The tax revenue sources earmarked to specific expenditures the most frequently were the motor fuels tax and the general sales tax. The most popular expenditure categories to receive earmarked funding were education, state highways, and local governments. Overwhelmingly, the most common earmark across the 50 states is gasoline tax revenues targeted to highway expenditures.

Tax revenue earmarking practices not only vary across states but they also have changed substantially over time. The National Conference of State Legislatures first collected and reported data on state earmarking practices in 1954. That year, 54 percent of all state revenue was specifically dedicated to some expenditure category. Its recent survey of fiscal year 2005 shows that only 24 percent of state revenues were earmarked.

Given the differences in earmarking practices through time and across states, it is necessary to discuss why earmarks are implemented in the first place. Earmarked tax revenues are typically justified by legislators for several reasons. An earmark may be assigned to a source of tax revenue as a means for guaranteeing funding for a particular government expenditure category. This is often used to gain popular support for the creation of a new source of government revenue. A popular example of this has been governments' justifying the implementation of lotteries, the proceeds of which are to be used to fund programs such as education.

This use of dedicated tax revenues may also be justified as an attractive marketing strategy. Governments may be able to encourage additional consumption of a taxed good by promoting the advertised expenditure destination. In the case of lottery revenue earmarked to education expenditures, politicians can politicize the need for additional education revenue to sell more lottery tickets. Forms of small-scale lotteries (50/50 raffles, for example) are commonly used as fundraisers for nonprofit organizations. Participants are often willing to purchase tickets, not only at the hope of winning, but also because they know their money goes to an organization they

[2] This does not include state of New Jersey. This data is from a National Conference of State Legislatures survey to which New Jersey did not respond the. See Arturo Pérez, *Earmarking State Taxes: 4th Edition*, (Washington, DC: National Conference of State Legislatures, 2008). In 1993, New Jersey earmarked 37.6 percent of its gasoline tax revenue to spending on roads.

support. Alternative forms of gambling with a greater expected payoff are certainly available to most participants.

Another popular argument in favor of earmarked tax revenues is that they act as the transfer medium of a Pigouvian tax; that is, when a tax is placed on a good creating a negative externality in an effort to deter consumption, the earmark ensures transfer of the revenue to government programs that are designed to alleviate the burden of the externality. A related justification is tied to the principle of benefits-received taxation and the provision of public goods. Here, the tax acts as a mechanism to help mitigate the free-rider problem, and the revenues are dedicated to the provision of the public good. A popular example of this type of earmark is state gasoline excise tax revenues that fund state highway and road expenditures, which are generally considered to have public-good characteristics.

Stratmann and Bruntrager describe why this use of dedicated tax revenue is unjustified, primarily from the perspective that excise taxes fail to fully capture any externalities (1) created by the product being taxed or (2) created by the public good.[3] In describing the gasoline excise tax, they argue that charging tolls and a broader tax on all carbon emissions would be a more accurate way to match benefits received to expenses paid.[4] Nevertheless, several of these earmarks remain in place today. In 2005, every state earmarked a percentage of its gasoline tax to spending on roads, with the median percentage of revenue earmarked at 95.9 percent.[5]

While earmarked tax revenues do not perfectly assign costs and benefits, a category of dedicated revenues exists that completely fails the Pigouvian argument altogether. For example, in 2005, Alabama earmarked 40 percent of its beer tax revenue to public schools and higher education. While some argue that education provides positive externalities enjoyed by all citizens of a state, it is difficult to justify why individuals who purchase alcohol reap any higher proportion of the positive spillovers. Thus, although the Pigouvian argument is a popular one for the justification of earmarked tax revenues, other motivations for the practice clearly exist.

Further complicating the practice of earmarking revenues is the issue of fungibility: because governments allocate much of their spending through a general fund, the revenue they receive from any source is easily transferred to any expenditure. This means that additional earmarked revenue dedicated to a specific expenditure can be used as a substitute for previous funding that had been coming from the general fund. This characteristic was identified by Buchanan and shows that earmarking tax revenue to a specific expenditure category should have, by itself, no theoretical effect on the amount of spending taking place in the targeted program.[6] This issue of fungibility is crucial to our hypothesis of dedicating tax revenues to specific expenditures as a tool used to increase general fund revenues and the overall size of government, presented in section 4.

Despite earmarking's theoretical shortcomings and dubious economic justifications, state governments have widely adopted the practice. Further, empirical studies have shown that despite the issue of fungibility some percentage of revenue will tend to "stick" to its targeted expenditure. This phenomenon, known as the "flypaper effect," is discussed in the following section. We then turn our discussion to a political economy framework of why earmarking revenues continues despite its obvious shortcomings.

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[3] Thomas Stratmann and William Bruntrager, "Excise Taxes in the States" (Mercatus Center Working Paper No. 11-27, Arlington, VA, 2011).
[4] Although the gas tax does not perfectly match costs and benefits, one of its primary justifications is its simplicity. The administrative costs along with the implementation of a perfectly monitored and executed toll system could easily exceed the welfare gain.
[5] This data is from Pérez, *Earmarking State Taxes: 4th Edition*. The median state (at 95.9 percent) in 2005 was North Dakota.
[6] Buchanan, "The Economics of Earmarked Taxes."

The Flypaper Effect

Inman claims there may be as many as 3,500 studies that investigate the flypaper effect.[7] These papers investigate whether fungible revenue sticks to its intended expenditure destination. Economic theory predicts that in most scenarios, governments receiving revenue from a new source will be able to use it as a substitute for the revenue they had previously been using, and therefore little (if any) of the new revenue will reach its intended destination. Instead, the previously used revenue will be removed, and, on net, no change in expenditures will occur. Counter to this theory, however, the common theme among empirical studies is that at least a portion of this revenue sticks where it hits.

Estimates of how much sticks are wide-ranging. Gramlich, Hines and Thaler, and Bailey and Connelly provide summaries of empirical studies that investigate the effects of lump-sum grants.[8] Like earmarked tax revenue, grant revenue is a new source of fungible funding that can be used as a substitute for previously used general fund revenue. The most popular of these investigated grants have been intergovernmental grants (federal to state and local governments and state to local governments). Gramlich and Galper find a flypaper effect of 0.25 (indicating that 25 cents of every dollar sticks),[9] while Inman finds a unitary increase in spending from a $1 increase in revenue.[10] Generally, however, the flypaper estimates tend to range from 0.30 to 0.70, with a median of around 0.45.[11] This suggests that an extra dollar in federal grants to a state will result in increased spending of about 45 cents and a tax reduction of approximately 55 cents.

More recently, the flypaper effect has been estimated for own sources of revenue that are earmarked for specific expenditures. Dye and McGuire show very limited effects on expenditures of revenues targeting education, highways, or local governments.[12] Other studies have focused on state lottery revenues earmarked for education. Evans and Zhang investigate 16 states that earmark lottery revenues for K–12 education.[13] They find that an extra dollar in lottery revenue leads to an increase in education expenditures between 60 and 80 cents. This increased expenditure on education is 30 to 50 cents more than a similar increase in lottery revenue in states that earmark lottery revenue for other purposes and 20 to 30 cents more than a similar increase in revenue in states that do not earmark lottery revenue whatsoever. Similarly, Novarro finds that earmarked revenues increase K–12 spending 60 cents more than revenue earmarked for other sources and 36 cents more than revenue that was not earmarked.[14]

Other work has examined the flypaper effect for state highway spending. Nesbit and Kraft find that a $1 increase in revenues earmarked for highway expenditures increases expenditure by

[7] Robert P. Inman, "The Flypaper Effect" (National Bureau of Economic Research Working Paper No. 14579, Cambridge, MA, December 2008).
[8] Edward M. Gramlich, "Intergovernmental Grants: A Review of the Empirical Literature," in *The Political Economy of Fiscal Federalism*, ed. Wallace E. Oates (Lexington, MA: D. C. Health, 1977), 219–40; James R. Hines Jr. and Richard H. Thaler, "Anomalies: The Flypaper Effect," *Journal of Economic Perspectives* 9, no. 4 (1995): 217–26; and Stephen J. Bailey and Stephen Connolly, "The Flypaper Effect: Identifying Areas for Further Research," *Public Choice* 95 (1998): 335–61.
[9] Edward M. Gramlich and Harvey Galper, "State and Local Fiscal Behavior and Federal Grant Policy," *Brookings Papers on Fiscal Activity* 1 (1973): 15–58.
[10] Robert P. Inman, "Toward an Economic Model of Local Budgeting," in *Proceedings of the 64th Annual Conference on Taxation* (Lexington, KY: National Tax Association, 1971), 699–719.
[11] Russell S. Sobel and George R. Crowley, "Do Intergovernmental Grants Create Ratchets in State and Local Taxes? Testing the Friedman-Sanford Hypothesis" (Mercatus Center Working Paper No. 10-51, Arlington, VA, 2010).
[12] Richard F. Dye and Therese J. McGuire, "The Effect of Earmarked Revenues on the Level and Composition of Expenditures," *Public Finance Quarterly* 20, no. 4 (1992): 543–56.
[13] William Evans and Ping Zhang, "The Impact of Earmarked Lottery Revenue on State Educational Expenditures" (mimeo, University of Maryland, July 2003).
[14] Neva Kerbeshian Novarro, "Does Earmarking Matter? The Case of State Lottery Profits and Educational Spending" (Stanford Institute for Economic Policy Research Discussion Paper No. 02-19, Stanford, CA, 2002).

approximately $1.[15] Goel and Nelson find states that earmark their gasoline tax revenue for general funds (rather than for highway expenditures) spend $2.54 less on highways for each $1 diverted to the general fund.[16]

Among all of these studies, the issue of flypaper-effect asymmetry remains relatively unexplored. The few studies that have investigated symmetry have found mixed results. Gamkhar and Oates examine federal grants to state and local governments from 1953–91, finding symmetry effects.[17] Similarly, Gamkhar and Goodspeed find symmetry in state and local government responses to changes in aid.[18] Heyndels studying Flemish municipalities, Volden analyzing U.S. states, and Levaggi and Zanola studying Italian health-care expenditures find asymmetries in the replacement of local government funds.[19]

Using Wisconsin municipalities, Deller and Maher find that the treatment of intergovernmental aid is asymmetric, depending on service.[20] Specifically, local governments are more likely to respond to decreases in intergovernmental aid by substituting local revenue in the case of vital services (waste disposal services and road expenditures) than for less vital services (quality of life expenditures, which include spending on libraries, parks, and cultural services).

Thus, although from a theoretical perspective earmarking revenues should have little effect on overall expenditures, the flypaper literature has shown some effects. Given its limitations, the question remains why states continue to rely on earmarking tax revenues to specific expenditure categories. We propose a hypothesis in the following section.

Masking Increases in Government Spending

The Brennan and Buchanan "Leviathan" model of government can help explain the disconnect between theory, empirical evidence, and the underlying practice of dedicating revenues to specific expenditure categories.[21] According to this theory, government seeks to maximize its power and size. Barring some strict fiscal constitutional rules, government continues to increase the level of taxation and expenditure.

In this context, the fungibility of earmarked tax revenues provides policy makers with a way to increase government size without highly unpopular increases in rates on general fund taxation sources. Specifically, by earmarking tax revenues to a specific expenditure, policy makers are able to advocate for increases in the earmarked tax on the basis of benefitting the targeted expenditure category. Should the tax increase be approved, the earmarked revenues may be used in place of previously used general fund revenues, allowing those monies to be spent elsewhere. The result is no net effect on the targeted expenditure and an increase in total government size.

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[15] Todd M. Nesbit and Steven F. Kraft, "Federal Grants, Earmarked Revenues, and Budget Crowd-Out: State Highway Funding," *Public Budgeting and Finance* (2009): 94–110.
[16] R. K. Goel and M. A. Nelson, "Use or Abuse of Highway Tax Revenues? An Economic Analysis of Highway Spending," *Applied Economics Letters* 10 (2003): 813–19.
[17] S. Gamkhar and W. Oates, "Asymmetries in the Response to Increases and Decreases in Intergovernmental Grants: Some Empirical Findings," *National Tax Journal* 49 (1996): 501–12.
[18] S. Gamkhar, "Is the Response of State and Local Highway Spending Symmetric to Increases and Decreases in Federal Highway Grants?" *Public Finance Review* 28 (2000): 3–25; and T. J. Goodspeed, "The Relationship between State Income Taxes and Local Property Taxes: Education Finance in New Jersey," *National Tax Journal* 51 (1998): 219–38.
[19] B. Heyndels, "Asymmetries in the Flypaper Effect: Empirical Evidence for the Flemish Municipalities," *Applied Economics* 33 (2001): 1329–34; C. Volden, "Asymmetric Effects of Intergovernmental Grants: Analysis and Implications for U.S. Welfare Policy," *Publius* 29, no. 3 (1999): 51–73; and R. Levaggi and R. Zanola, "Flypaper Effect and Sluggishness: Evidence from Regional Health Expenditures in Italy," *International Tax and Public Finance* 10 (2003): 535–47.
[20] Steven C. Deller and Craig Maher, "Is the Treatment of Intergovernmental Aid Symmetric?" *Applied Economics Letters* 16 (2009): 331–35.
[21] Geoffrey Brennan and James Buchanan, "Towards a Tax Constitution for Leviathan," *Journal of Public Economics* 8 (1977): 255–74; Brennan and Buchanan, "Tax Instruments as Constraints on the Disposition of Public Revenues," *Journal of Public Economics* 9 (1978): 301–18; and Brennan and Buchanan, *The Power to Tax: Analytical Foundations of a Fiscal Constitution* (Cambridge, UK: Cambridge University Press, 1980).

An example will help to clarify this theory. Assume a state government spends $100 from the general fund on education. Suppose the legislature is able to pass a new special sales tax on the basis of its revenue being earmarked for education spending. Further, suppose this new tax brings in $50 in revenue. Although it may seem natural to assume education spending will increase by $50 as a result of the earmarked revenue (to $150), policy makers actually have the option to *decrease* spending on education out of the general fund. Even if the $50 earmarked to education spending is actually spent on education, *total* education expenditures may remain unchanged if the legislature decides to decrease general fund spending from $100 to $50. This allows policy makers to spend $50 of revenue previously dedicated to education elsewhere, and the earmark is functionally equivalent to a $50 increase in unspecified general fund revenue.

Thus, politicians may use the earmarking of tax revenues to specific expenditure categories to covertly raise revenue and expand total government size. This option becomes especially attractive when there is public resistance to general increases in taxes. Instead, policy makers may choose to enact new taxes earmarked to spending on politically popular programs such as education or obviously visible public goods, such as highways, as a way to expand total government size by exploiting tax revenue fungibility. In other words, politicians may actually view the theoretical and empirical shortcomings of earmarking as attractive features of the practice.

The degree to which dedicating tax revenues is used in this manner is an empirical question. Although previous studies have looked at how earmarked revenues affect expenditures in the targeted category (the flypaper-effect literature), we are equally interested in how earmarked revenues affect *other* expenditures. To be clear, we investigate two effects: (1) whether earmarked revenue is used for the intended purpose and (2) whether overall spending and spending on categories *other than the intended destination* increase as the amount of earmarked revenues grows. Certain earmarks are more likely to stick than others. Therefore, we will focus on specific taxes earmarked to specific expenditures and not some broader measure of total earmarked revenue as used in previous studies. The following section outlines our empirical test of the hypothesis that earmarking can increase the overall size of government.

Empirical Approach and Data

To test the degree to which specific earmarked tax revenues affect their targeted expenditure, we estimate the following equation:

$$EXP_{it} = \beta_1 EAR\ REV_{it} + \beta_2 OTH\ REV_{it} + \beta_3 X_{it} + \mu_t + \theta_i + \varepsilon_{it} \qquad (1)$$

where for state i in year t, EXP_{it} is real per-capita expenditure in the targeted category; $EAR\ REV_{it}$ is a vector of real per-capita revenue sources earmarked to the expenditure; $OTH\ REV_{it}$ is real per–capita, own-source revenue from sources other than the earmarked taxes; X_{it} is a collection of other demographic and economic control variables; and $\times_t$ and θ_i are year and census region fixed effects. The primary coefficient of interest is β_1, which represents how much of each additional dollar of earmarked revenue is spent on its intended expenditure. If the earmark increases targeted expenditures, β_1 will be positive and statistically significant. The magnitude is also crucially important: if β_1 takes a value less than 1, it indicates that some portion of the earmarked revenue is not sticking to its intended expenditure.

As discussed above, many states earmark a variety of taxes to the same expenditure category. Thus, in our specifications, the $EAR\ REV_{it}$ variable is actually a vector of several variables, accounting for each earmarked revenue source. This approach differs from those previously seen in the literature and allows us to test differences in the degree to which certain earmarked revenue sources may

stick to their intended expenditure. In our estimates of education expenditures, the $EAR\ REV_{it}$ vector comprises real per-capita general sales tax revenue, tobacco tax revenue, alcohol tax revenue, personal income tax revenue, and corporate income tax revenue multiplied by the percentage of such revenue specifically earmarked for education spending. For the estimates of local government spending, $EAR\ REV_{it}$ contains real per-capita general sales tax revenue, tobacco tax revenue, alcohol tax revenue, personal income tax revenue, corporate income tax revenue, gasoline tax revenue, and motor vehicle registration tax revenue, multiplied by the percentage of such revenue specifically earmarked for local government spending. Finally, $EAR\ REV_{it}$ comprises real per-capita gasoline tax revenue and motor vehicle registration tax revenue earmarked for highways in our estimates of highway expenditures.

The $OTH\ REV_{it}$ variable is total real per-capita own-source revenue minus that revenue contained in the $EAR\ REV_{it}$ variables. The inclusion of this variable allows us to interpret the effect of an earmarked dollar relative to all other sources of revenue. We also estimate our models using a vector of nonearmarked revenues in place of the $OTH\ REV_{it}$ variable. This specification allows for an interpretation of a difference in effects between an earmarked dollar of revenue versus a nonearmarked dollar of revenue from the same source. The X_{it} vector contains demographic and economic controls that may influence expenditures. Specifically, these controls include the percentage of the population that is white, the percentage of the population that is under the age of 15, the percentage over 65, the percentage over 25 with a high school education, real per-capita personal income, real per-capita federal grants to the state, and an indicator variable for the political party of the state's governor.[22]

Increasing Expenditures

To fully test our hypothesis, we also estimate the effect of earmarking on both nontargeted expenditures ($NON\ EXP_{it}$)

$$NON\ EXP_{it} = \beta_1 EAR\ REV_{it} + \beta_2 OTH\ REV_{it} + \beta_3 X_{it} + \mu_t + \theta_i + \varepsilon_{it} \quad (2)$$

and total state government spending ($TOT\ EXP_{it}$)

$$TOT\ EXP_{it} = \beta_1 EAR\ REV_{it} + \beta_2 OTH\ REV_{it} + \beta_3 X_{it} + \mu + \theta + \varepsilon_{it}. \quad (3)$$

Again, the variable of interest in these specifications is β_1, which measures the effect of the marginal earmarked dollar, this time on expenditures other than those for which the earmark is dedicated. If our hypothesis is correct and earmarked dollars are used to increase general fund revenues and thus the size of government, we would expect positive, statistically significant values for β_1.

Finally, to guard against any problems of endogeneity caused by states that earmark certain taxes to certain expenditure categories being systematically different from other states, we also estimate equations 1, 2, and 3 on samples including only those states with a specific earmark. In these specifications, we take each earmark separately because of small sample size. To compensate for this, the $OTH\ REV_{it}$ contains total own-source revenue minus the revenue attributed to the earmark in question. The variable of interest remains β_1, which can now be interpreted as the marginal impact of an earmarked dollar among those states that choose to earmark such tax

[22] Educational attainment may be endogenous especially to the specifications including spending on education. Dropping the educational attainment control did not meaningfully affect the results.

revenue. The results are largely consistent with our main results. We present the results to these tests in the appendix.

Following Dye and McGuire, we focus our analysis on the three major expenditure categories to which tax revenues are earmarked.[23] Specifically, these include expenditures on education, expenditures on local governments, and expenditures on highways. To capture potential differences in the stickiness of earmarks, we focus on the individual revenue sources that are earmarked and not some aggregate measure of earmarked funds as has been used in the previous literature. We analyze revenues from the general sales tax, tobacco tax, alcoholic beverage tax, personal income tax, corporate income tax, gambling tax, gasoline tax, and motor vehicle registration. We then calculate the specific revenue earmarked by multiplying the total revenue from each source by the percentage earmarked to the expenditure category.

Our data span 49 states (dropping Alaska, as is common practice in state-level revenue and expenditure studies) and three years (1988, 1993, and 2005).[24] Our rather eclectic collection of years is due to the publication dates of the most comprehensive study of state government practices of dedicating tax revenue, the *Earmarking State Taxes* report by the National Conference of State Legislatures, from which we obtain the percentage of specific tax revenues earmarked to specific expenditures.[25] Our data on state expenditures, revenues, personal income, and federal grants come from the Census Bureau's *State Government Finances* report. Data on governors' political affiliation come from the Council of State Governments' *Book of the States*. Finally, our measures of the percentage of the state population that is white, under the age of 15, over the age of 65, and over 25 with a high school education come from the Census Bureau. All fiscal variables are expressed in real per-capita terms to control for inflation and state population.

Results

Table 2 presents our results for revenues earmarked to spending on education. The first column shows our estimation of equation 1, the effects of earmarked revenues on the targeted expenditure category (in other words, the extent of the flypaper effect). Earmarked general sales tax revenue has no effect on education spending. Roughly 56 cents of every dollar of earmarked personal income tax revenue is spent on education, while earmarked alcohol and tobacco tax revenue also have a positive effect on education spending. The coefficient on earmarked alcohol tax revenue is quite large, implying a complementarity between the earmarked revenue and additional expenditures funded out of the general fund. Earmarked corporate income tax revenue has a *negative* effect on education spending, implying that when these revenues are earmarked to education, general fund spending is reduced by an amount larger than the earmark. Finally, expenditures on education are increased by approximately 30 cents of every dollar of own source from other sources.

[23] Dye and McGuire, "The Effect of Earmarked Revenues on the Level and Composition of Expenditures."
[24] New Jersey did not provide data for 2005, meaning our panel is made up of 146 observations.
[25] Martha A. Fabricius and Ronald K. Snell, *Earmarking State Taxes: 2nd Edition*, (Washington, DC: National Conference of State Legislatures, 1990); Arturo Pérez and Ronald K. Snell, *Earmarking State Taxes: 3rd Edition*, (Washington, DC: National Conference of State Legislatures, 1995); and Pérez, *Earmarking State Taxes: 4th Edition*.

Table 2: The Effect of Revenue Earmarked to Education on Spending

Revenue Earmarked to Education			
	Dependent Variable		
	Education Expenditure	Noneducation Expenditure	Total Expenditure
Earmarked General Sales Tax Revenue per Capita	0.232	0.727***	0.958***
	(0.166)	(0.171)	(0.144)
Earmarked Tobacco Tax Revenue per Capita	1.683*	-0.483	1.201
	(0.999)	(1.536)	(1.582)
Earmarked Alcohol Tax Revenue per Capita	15.269***	-11.628*	3.641
	(4.642)	(6.118)	(6.313)
Earmarked Personal Income Tax Revenue per Capita	0.564***	0.113	0.677***
	(0.088)	(0.129)	(0.130)
Earmarked Corporate Income Tax Revenue per Capita	-1.833*	4.362***	2.529**
	(1.070)	(1.372)	(1.065)
Real Own-Source Revenue Per Capita from Other Sources	0.295***	0.560***	0.855***
	(0.035)	(0.042)	(0.054)
Observations	146	146	146
R-squared	0.78	0.94	0.96

Note: All specifications include the following controls: the percentage of the state's population that is white, the percentage that is under the age of 15, the percentage over 65, the percentage over 25 with a high school education, real personal income per capita, real federal grants per capita, an indicator variable for the political party of the state's governor, and year and census region fixed effects. Coefficient estimates for these variables are available upon request. Robust standard errors in parentheses: *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.
Source: Authors' calculations.

The second column of table 2 shows the results from the first of our tests of the hypothesis that earmarked revenues are used to increase total government size. Here we test equation 2 in which the dependent variable in these specifications is total expenditures less those in the category to which the revenue source is earmarked, education. Notably, general sales tax revenue and corporate income tax revenue earmarked to education have a positive effect on *noneducation* expenditures. This result lends credence to our hypothesis, as these earmarks had either no effect or a negative effect on education spending, implying the revenues were transferred instead to the general fund. Earmarked alcohol tax revenue (which had the largest positive effect on education spending) has a similarly large negative effect on other expenditures, again suggesting a complementarity between this particular earmark and expenditures from the general fund. Predictably, earmarked personal income tax and tobacco tax revenue, which each had a positive effect on education spending, have no effect on noneducation expenditures.

Finally, the results from our estimation of equation 3, the effects of earmarked revenue on total government expenditure, are shown in the third column. General sales tax revenue, personal income tax revenue, and corporate income tax revenue earmarked to education all increase overall size of government spending by amounts approaching one full dollar per dollar earmarked. Notably, the r-squared statistic is much higher for our estimates of equations 2 and 3, which can be collectively thought of as tests of our hypothesis, than it is for our estimate of equation 1. This indicates revenues earmarked to education are a better predictor of either noneducation spending or total spending than they are of spending on the earmark's intended category.

The first column of table 3 shows the estimation of earmarks' effects on local government expenditures. Nearly all (83 cents) of an additional dollar of general sales tax revenue earmarked to local government expenditures is spent on local governments. Earmarked vehicle registration revenue also has a positive impact on expenditures to local governments. Earmarked tobacco tax, alcohol tax, personal or corporate income tax, and gambling tax revenues have no effect on spending on local governments, yet earmarked gasoline tax revenue has a negative effect on

spending. An additional dollar of own-source revenue from other sources increases expenditures on local government by approximately 13 cents.

Table 3: The Effect of Revenue Earmarked to Local Governments on Spending

Revenue Earmarked to Local Governments			
	Dependent Variable		
	Local Government Expenditure	Non–Local Government Expenditure	Total Expenditure
Earmarked General Sales Tax Revenue per Capita	0.830***	0.371	1.201***
	(0.315)	(0.419)	(0.195)
Earmarked Tobacco Tax Revenue per Capita	-0.972	2.573***	1.601**
	(0.827)	(0.736)	(0.735)
Earmarked Alcohol Tax Revenue per Capita	-0.536	-6.331	-6.867
	(6.401)	(6.669)	(4.614)
Earmarked Personal Income Tax Revenue per Capita	-0.038	0.656***	0.618***
	(0.172)	(0.206)	(0.171)
Earmarked Corporate Income Tax Revenue per Capita	-3.073	5.048***	1.974
	(1.913)	(1.740)	(1.339)
Earmarked Gambling Tax Revenue per Capita	33.979	-80.095	-46.116
	(36.044)	(55.936)	(42.9930
Earmarked Gasoline Tax Revenue per Capita	-2.564**	2.256	-0.308
	(1.279)	(1.693)	(1.464)
Earmarked Vehicle Registration Revenue per Capita	8.562***	-8.111***	0.451
	(2.489)	(2.378)	(2.374)
Real Own-Source Revenue per Capita From Other Sources	0.134***	0.708***	0.841***
	(0.050)	(0.076)	(0.054)
Observations	146	146	146
R-squared	0.52	0.89	0.96

Note: All specifications include the following controls: the percentage of the state's population that is white, the percentage that is under the age of 15, the percentage over 65, the percentage over 25 with a high school education, real personal income per capita, real federal grants per capita, an indicator variable for the political party of the state's governor, and year and census region fixed effects. Coefficient estimates for these variables are available upon request. Robust standard errors in parentheses: *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.
Source: Authors' calculations.

The second column of table 3 shows the effects on non–local government spending of revenue earmarked to local governments. Earmarked tobacco tax revenue, personal income tax revenue, and corporate income tax revenue (all of which had no effect on expenditures on local government) have a positive effect on all other categories of expenditure, again implying that the earmarks were used to effectually increase general fund revenue. Vehicle registration revenue has a predictably negative effect on non-local government spending given its very large positive effect in the previous model. The general sales tax revenue earmarked to local governments, almost all of which was shown to be spent on local governments in the previous results, unsurprisingly has no effect on other expenditures.

The results of our test of the relationship between revenues earmarked to local governments and total government size can be found in the final column of table 3. Earmarked general sales tax revenue, tobacco tax revenue, and personal income tax revenue all lead to increases in the overall size of government. As before, we note the significantly larger-squared values on our tests, suggesting earmarked revenue is a better predictor of nontargeted expenditures and overall government size.

Table 4: The Effect of Revenue Earmarked to Highways on Spending

Revenue Earmarked to Highways			
	Dependent Variable		
	Highway Expenditure	Nonhighway Expenditure	Total Expenditure
Earmarked Gasoline Tax Revenue per Capita	0.259	-0.238	0.022
	(0.198)	(0.499)	(0.466)
Earmarked Vehicle Registration Revenue per Capita	0.304	1.729***	2.033***
	(0.253)	(0.640)	(0.612)
Real Own-Source Revenue per Capita From Other Sources	0.041***	0.809***	0.850***
	(0.016)	(0.047)	(0.052)
Observations	146	146	146
R-squared	0.55	0.95	0.96

Note: All specifications include the following controls: the percentage of the state's population that is white, the percentage that is under the age of 15, the percentage over 65, the percentage over 25 with a high school education, real personal income per capita, real federal grants per capita, an indicator variable for the political party of the state's governor, and year and census region fixed effects. Coefficient estimates for these variables are available upon request. Robust standard errors in parentheses: *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.
Source: Authors' calculations.

Table 4 shows results for the models of revenues earmarked on highway expenditures. The results in the first column show that neither gasoline tax revenue nor vehicle registration revenue earmarked for highway spending have any effect on highway spending. The second and third columns, however, show that earmarking vehicle registration revenue to highways does lead to increases in nonhighway spending as well as in the overall size of government. Once again, these final two specifications are a better fit than the first as evidenced by the r-squared statistic.

Taken together, these results indicate that the majority of these earmarks (8 of 15) have no effect on their targeted expenditures, yet two actually have a *negative* effect, implying that spending from the general fund is reduced by an amount greater than the earmarked revenue. Further, the results presented in tables 2, 3, and 4 provide evidence that earmarked revenues do increase expenditures in categories other than those to which the earmark is targeted, as well as the overall size of government spending. Specifically, sales tax revenue earmarked to education spending has no effect on education expenditures, but nearly 73 cents of every earmarked dollar is used to increase expenditures in categories other than education, and total government expenditure increases by 96 cents for every dollar earmarked. The result is compounded for education-earmarked corporate income tax revenues, for which the earmark allows general fund expenditures on education to be reduced by roughly $1.83 for every $1 of earmarked revenue, leading to an associated *increase* in expenditures on noneducation programs.

Other notable results include tobacco tax revenue, personal income tax revenue, and corporate income tax revenue earmarked to local government spending, none of which has any statistically significant effect on the targeted expenditure category. Each of these, however, is associated with increases in non-local government spending, and earmarking tobacco and personal income tax revenue leads to increases in the overall size of government. A similar result is found with vehicle registration revenue earmarked to highway spending, which does nothing for spending on highways but increases nonhighway expenditure and overall government spending. Even in some cases where the earmark partially sticks, the portion that does not get spent on the targeted category is used to spend on other programs (see, for example, personal income tax revenues earmarked to education).

Table 5: The Effect of Earmarked and Nonearmarked Revenue on Spending (Education)

Revenue Earmarked to Education			
	Dependent Variable		
	Education Expenditure	Noneducation Expenditure	Total Expenditure
Earmarked General Sales Tax Revenue per Capita	0.181	0.364*	0.545**
	(0.193)	(0.191)	(0.274)
Nonearmarked General Sales Tax Revenue per Capita	0.347***	0.210	0.557***
	(0.102)	(0.138)	(0.214)
Earmarked Tobacco Tax Revenue per Capita	2.999*	-1.853	1.146
	(1.678)	(2.636)	(3.428)
Nonearmarked Tobacco Tax Revenue per Capita	2.563	5.563**	8.126**
	(1.993)	(2.390)	(3.790)
Earmarked Alcohol Tax Revenue per Capita	8.384	-25.779***	-17.395
	(8.163)	(8.820)	(13.517)
Nonearmarked Alcohol Tax Revenue per Capita	0.660	-3.100**	-2.439
	(1.400)	(1.260)	(1.993)
Earmarked Personal Income Tax Revenue per Capita	0.757***	0.231	0.988***
	(0.121)	(0.179)	(0.241)
Nonearmarked Personal Income Tax Revenue per Capita	0.249***	0.335***	0.583***
	(0.058)	(0.081)	(0.112)
Earmarked Corporate Income Tax Revenue per Capita	-2.721**	2.890*	0.168
	(1.264)	(1.501)	(1.520)
Nonearmarked Corporate Income Tax Revenue per Capita	0.636*	1.457***	2.093***
	(0.343)	(0.536)	(0.768)
Observations	146	146	146
R-squared	0.70	0.89	0.88

Note: All specifications include the following controls: the percentage of the state's population that is white, the percentage that is under the age of 15, the percentage over 65, the percentage over 25 with a high school education, real personal income per capita, real federal grants per capita, an indicator variable for the political party of the state's governor, and year and census region fixed effects. Coefficient estimates for these variables are available upon request. Robust standard errors in parentheses: *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.
Source: Authors' calculations.

The results in tables 5–7 show our specifications with the $OTH\ REV_{it}$ variable replaced with individual nonearmarked revenue from each of the earmarked revenue sources. The results are largely identical. Table 5 shows revenue sources earmarked to education expenditures. As before, sales tax revenue earmarked to education spending has no significant effect on the level of education expenditures. Nonearmarked sales tax revenue, however, does increase education spending, further illustrating the ineffectiveness of the earmark. Earmarked alcohol tax revenue has lost its significance from the previous specification. Nonearmarked personal and corporate income tax revenue positively affects education expenditures. Also as before, earmarked general sales tax revenue has a positive and significant effect on noneducation spending and total government size. The results for all other earmarks remain similar as well, the only exception being earmarked corporate income tax revenue, which now has a positive and significant effect on total government spending.

Results from our second look at local government earmarks are shown in table 6. The results are nearly identical to the previous specification shown in table 3. Nonearmarked sales tax, personal income tax, corporate income tax, and motor vehicle registration revenue all positively affect expenditures on local governments. In contrast, nonearmarked alcohol tax and gasoline tax revenues have a negative effect on expenditures to local governments. Our results for the tests also remain largely unchanged. Earmarked tobacco tax revenue and personal income tax revenue both increase non-local government spending and the overall size of government, and earmarked sales tax revenue increases total spending as well.

Table 6: The Effect of Earmarked and Nonearmarked Revenue on Spending (Local Governments)

Revenue Earmarked to Local Governments			
	Dependent Variable		
	Local Government Expenditure	Non–Local Government Expenditure	Total Expenditure
Earmarked General Sales Tax Revenue per Capita	0.795**	-0.020	0.775**
	(0.331)	(0.508)	(0.390)
Nonearmarked General Sales Tax Revenue per Capita	0.296**	0.286	0.582**
	(0.130)	(0.265)	(0.253)
Earmarked Tobacco Tax Revenue per Capita	-0.036	6.968*	6.932*
	(2.350)	(4.256)	(3.985)
Nonearmarked Tobacco Tax Revenue per Capita	0.290	5.680	5.970*
	(2.064)	(3.847)	(3.531)
Earmarked Alcohol Tax Revenue per Capita	-0.387	-12.334	-12.721
	(6.692)	(10.131)	(9.480)
Nonearmarked Alcohol Tax Revenue per Capita	-3.299*	1.832	-1.466
	(1.998)	(2.653)	(2.221)
Earmarked Personal Income Tax Revenue per Capita	0.106	0.836***	0.942***
	(0.222)	(0.303)	(0.246)
Nonearmarked Personal Income Tax Revenue per Capita	0.154*	0.494***	0.647***
	(0.089)	(0.122)	(0.111)
Earmarked Corporate Income Tax Revenue per Capita	-2.360	2.409	0.049
	(1.886)	(2.592)	(2.167)
Nonearmarked Corporate Income Tax Revenue per Capita	0.812*	1.107	1.918***
	(0.428)	(0.775)	(0.696)
Earmarked Gambling Tax Revenue per Capita	35.777	-83.492	-47.715
	(40.112)	(66.979)	(55.171)
Nonearmarked Gambling Tax Revenue per Capita	-7.975	-0.022	-7.997
	(5.889)	(11.051)	(8.905)
Earmarked Gasoline Tax Revenue per Capita	-5.632***	1.907	-3.725
	(1.716)	(3.019)	(3.033)
Nonearmakred Gasoline Tax Revenue per Capita	-3.271***	3.321**	0.050
	(1.130)	(1.645)	(1.564)
Earmarked Vehicle Registration Revenue per Capita	8.836***	-4.034	4.802
	(2.591)	(5.132)	(4.868)
Nonearmarked Vehicle Registration Revenue per Capita	2.058**	1.532	3.590**
	(0.980)	(1.537)	(1.726)
Observations	146	146	146
R-squared	0.59	0.81	0.88

Note: All specifications include the following controls: the percentage of the state's population that is white, the percentage that is under the age of 15, the percentage over 65, the percentage over 25 with a high school education, real personal income per capita, real federal grants per capita, an indicator variable for the political party of the state's governor, and year and census region fixed effects. Coefficient estimates for these variables are available upon request. Robust standard errors in parentheses: *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.
Source: Authors' calculation

Table 7: The Effect of Earmarked and Nonearmarked Revenue on Spending (Highways)

Revenue Earmarked to Highways			
	Dependent Variable		
	Highway Expenditure	Nonhighway Expenditure	Total Expenditure
Earmarked Gasoline Tax Revenue per Capita	1.198***	-1.009	0.189
	(0.307)	(1.546)	(1.577)
Nonearmakred Gasoline Tax Revenue per Capita	1.435***	-0.518	0.917
	(0.321)	(2.178)	(2.227)
Earmarked Vehicle Registration Revenue per Capita	0.803**	1.873	2.676
	(0.362)	(1.920)	(2.015)
Nonearmarked Vehicle Registration Revenue per Capita	0.794**	1.890	2.685
	(0.346)	(1.516)	(1.644)
Observations	146	146	146
R-squared	0.61	0.82	0.82

Note: All specifications include the following controls: the percentage of the state's population that is white, the percentage that is under the age of 15, the percentage over 65, the percentage over 25 with a high school education, real personal income per capita, real federal grants per capita, an indicator variable for the political party of the state's governor, and year and census region fixed effects. Coefficient estimates for these variables are available upon request. Robust standard errors in parentheses: *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.
Source: Authors' calculations.

Table 7 displays results for the expanded model of earmarks targeting highway expenditures. Here, gasoline taxes and vehicle registration revenue earmarked for highway spending have a positive and significant effect on expenditures. The magnitude also indicates that nearly the entirety of an earmarked dollar sticks to highway expenditures. To the extent gasoline taxes are justified under the Pigouvian criteria discussed previously, this result is not altogether unsurprising, though it does differ from the findings presented in table 4. The final two columns show no evidence that these earmarks increase nonhighway spending, which is also unsurprising given the results shown in the first column, though again different from the previous findings. Unlike earmarks to education or local governments, specifically controlling for nonearmarked taxes is important for the analysis of highway expenditures.

Table 8: Summary of Results

	Flypaper Effect	*Leviathan*	
	Increases Targeted Expenditure	Increases Nontargeted Expenditure	Increases Total Expenditure
General Sales Tax Earmarked to Education	No	Yes	Yes
Tobacco Tax Earmarked to Education	Yes	No	No
Alcohol Tax Earmarked to Education	Yes/No*	No	No
Personal Income Tax Earmarked to Education	Yes	No	Yes
Corporate Income Tax Earmarked to Education	No	Yes	Yes/No*
General Sales Tax Earmarked to Local Governments	Yes	No	Yes
Tobacco Tax Earmarked to Local Governments	No	Yes	Yes
Alcohol Tax Earmarked to Local Governments	No	No	No
Personal Income Tax Earmarked to Local Governments	No	Yes	Yes
Corporate Income Tax Earmarked to Local Governments	No	Yes/No*	No
Gambling Tax Earmarked to Local Governments	No	No	No
Gasoline Tax Earmarked to Local Governments	No	No	No
Vehicle Registration Earmarked to Local Governments	Yes	No	No
Gasoline Tax Earmarked to Highways	No/Yes*	No	No
Vehicle Registration Earmarked to Highways	No/Yes*	Yes/No*	Yes/No*

Note: * indicates results varied between specifications. The first result reported is from the specification including a single "other revenue" variable, while the second is from the specification including all nonearmarked revenue sources separately.
Source: Authors' calculations.

Table 8 presents a summary of the preceding results. In general, these estimates show that earmarking is not an effective method of increasing expenditures on specific programs, and typically some (or all) of the increase in revenues dedicated to a program is compensated for by associated decreases in spending from the general fund (resulting in a statistically insignificant effect of the earmark). Of the 15 earmarks explored, only tobacco tax revenue and personal income tax revenue earmarked to education and sales tax revenue and vehicle registration revenue earmarked to local governments unambiguously lead to increases in expenditures on the targeted category. In some cases, such as the corporate income tax revenue earmarked to education, the associated decrease in general fund spending overcompensates, and the earmark has a *negative* effect on spending in the targeted category.

In nearly every case where an earmark failed to stick (either partially or at all) to its targeted expenditure, however, nontargeted spending increased, suggesting that earmarks make for an

effective means of indirectly increasing general fund revenue. General sales tax revenue and corporate income tax revenue earmarked to education spending and tobacco tax revenue, personal income tax revenue, and corporate income tax revenue earmarked to local governments, as well as vehicle registration revenue earmarked to highway spending all lead to increases in nontargeted expenditures in at least one of the specifications. Further, in 7 of the 15 cases analyzed, earmarks led to increases in total government expenditure. These results lend credence to the hypothesis presented above; they provide evidence that the fungible nature of earmarks is used to increase general fund revenue and the overall size of government and not to increase spending in the targeted expenditure category.

Conclusion

The practice of dedicating tax revenues to specific expenditure categories has remained popular in state governments despite its lack of firm theoretical justification and empirical evidence that shows only cents on the dollar actually stick to intended expenditures. In this paper, we propose the hypothesis that "Leviathan" governments are aware of earmarked revenues' fungibility and exploit this to increase total government size.

Our empirical analysis provides two main results: (1) the majority of dedicated tax revenues are ineffective at increasing spending on their targeted expenditure category and (2) the majority of these earmarks that fail to stick are in fact very effective at increasing spending on other expenditure categories unrelated to their intended target and overall government size. These results are consistent with a theory of "Leviathan" government and imply that policy makers use tax revenues dedicated to politically popular programs (education, for example) or easily visible public goods (such as roads) to increase overall government size.

The policy implications of this research are straightforward. As our hypothesis suggests, the practice of earmarking tax revenue is used to increase the total size of government without the implementation of unpopular general tax rate increases. The revenue raised from earmarks primarily does *not* go to its intended expenditure category, but rather it is used as fungible revenue to be spent at the government's discretion. From a voter's perspective, these increases in total expenditures are inefficient, and therefore the elimination of earmarking, at the very least in those cases where it cannot be shown to benefit its intended target, would likely be in the public interest. Finally, to the extent a strict fiscal constitution is required to control the size of government, the earmarking of tax revenues will need to be addressed.[26]

[26] See Brennan and Buchanan, "Towards a Tax Constitution for Leviathan"; Brennan and Buchanan, "Tax Instruments as Constraints on the Disposition of Public Revenues"; and Brennan and Buchanan, *The Power to Tax*.

APPENDIX: Only Earmarking States

To control for potential characteristics unique to those states choosing to earmark specific taxes, we reestimate our models on only those states with each earmark. The results for those revenue sources earmarked for education spending are presented in table 9. Among those states that earmark each source of revenue, only tobacco and alcohol revenues actually increase education spending. As was true for the sample as a whole, earmarking sales tax revenue, personal income tax revenue, and corporate income tax revenue does not lead to increases in education spending.

Table 9: The Effect of Revenue Earmarked to Education on Spending (Only States with Earmark)

Revenues Earmarked to Education							
	Education Expenditure	Noneducation Expenditure	Total Expenditure		Education Expenditure	Noneducation Expenditure	Total Expenditure
Earmarked General Sales Tax Revenue per Capita	0.318	0.704***	1.02***	Earmarked Tobacco Tax Revenue per Capita	18.426**	-8.418	10.008
	(0.363)	(0.232)	(0.298)		(3.589)	(16.490)	(14.093)
Real Own-Source Revenue per Capita from Other Sources	0.220	0.566***	0.786***	Real Own-Source Revenue per Capita from Other Sources	0.405*	0.745	1.150
	(0.156)	(0.104)	(0.127)		(0.138)	(0.575)	(0.465)
Observations	35	35	35	Observations	16	16	16
R-squared	0.84	0.95	0.98	R-squared	0.99	0.98	0.99
Earmarked Alcohol Tax Revenue per Capita	50.793***	-40.628	10.165	Earmarked Personal Income Tax Revenue per Capita	0.981	0.087	1.069
	(0.613)	(16.485)	(15.873)		(0.952)	(0.480)	(0.622)
Real Own-Source Revenue per Capita from Other Sources	0.323**	0.410	0.733	Real Own-Source Revenue per Capita from Other Sources	0.589	0.314	0.903
	(0.007)	(0.179)	(0.172)		(0.344)	(0.193)	(0.189)
Observations	15	15	15	Observations	18	18	18
R-squared	0.99	0.99	0.99	R-squared	0.90	0.99	0.99
Earmarked Corporate Income Tax Revenue per Capita	-0.048	3.481	3.433				
	(0.560)	(4.041)	(4.064)				
Real Own-Source Revenue per Capita from Other Sources	0.214***	0.445*	0.659***				
	(0.042)	(0.192)	(0.202)				
Observations	21	21	21				
R-squared	0.99	0.97	0.98				

Note: All specifications include the following controls: the percentage of the state's population that is white, the percentage that is under the age of 15, the percentage over 65, the percentage over 25 with a high school education, real personal income per capita, real federal grants per capita, an indicator variable for the political party of the state's governor, and year and census region fixed effects. Coefficient estimates for these variables are available upon request. Robust standard errors in parentheses: *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.
Source: Authors' calculations.

The final two columns test the hypothesis that revenues earmarked to education are used to increase the total size of government. Sales tax revenue earmarked for education, which has no effect on education spending, has a positive effect on noneducation spending and total expenditures.

Table 10: The Effect of Revenue Earmarked to Local Governments on Spending (Only States with Earmark)

Revenues Earmarked to Local Governments							
	Local Government Expenditure	Non–Local Government Expenditure	Total Expenditure		Local Government Expenditure	Non–Local Government Expenditure	Total Expenditure
Earmarked General Sales Tax Revenue per Capita	0.526**	0.564*	1.090***	Earmarked Tobacco Tax Revenue per Capita	-1.340	1.666	0.326
	(0.240)	(0.305)	(0.231)		(0.876)	(1.058)	(0.898)
Real Total Own-Source Revenue per Capita	0.143**	0.554***	0.697***	Real Own-Source Revenue per Capita from Other Sources	0.058	0.567***	0.626***
	(0.068)	(0.084)	(0.062)		(0.105)	(0.136)	(0.090)
Observations	56	56	56	Observations	32	32	32
R-squared	0.81	0.92	0.97	R-squared	0.90	0.96	0.99
Earmarked Alcohol Tax Revenue per Capita	-0.346	0.056	-0.290	Earmarked Gambling Tax Revenue per Capita	48.540	-104.715	-56.174
	(5.436)	(8.445)	(6.016)		(33.813)	(102.029)	(123.867)
Real Own-Source Revenue per Capita from Other Sources	0.136**	0.590***	0.725***	Real Own-Source Revenue per Capita from Other Sources	-0.024	0.342	0.318
	(0.057)	(0.106)	(0.120)		(0.109)	(0.265)	(0.261)
Observations	50	50	50	Observations	17	17	17
R-squared	0.71	0.94	0.95	R-squared	0.95	0.99	0.99
Earmarked Personal Income Tax Revenue per Capita	-0.368	1.088*	0.720	Earmarked Corporate Income Tax Revenue per Capita	8.111	-2.714	5.397
	(0.153)	(0.304)	(0.365)		(6.716)	(3.401)	(3.912)
Real Own-Source Revenue per Capita from Other Sources	0.271**	0.271	0.542**	Real Own-Source Revenue per Capita from Other Sources	0.219	0.414**	0.633***
	(0.053)	(0.104)	(0.105)		(0.123)	(0.093)	(0.060)
Observations	17	17	17	Observations	17	17	17
R-squared	0.99	0.99	0.99	R-squared	0.95	0.99	0.99
Earmarked Gasoline Tax Revenue per Capita	2.661	-1.749	0.911	Earmarked Vehicle Registration Revenue per Capita	4.724	-9.144*	-4.420
	(3.495)	(3.942)	(4.032)		(2.975)	(4.541)	(5.161)
Real Own-Source Revenue per Capita from Other Sources	0.182***	0.590***	0.772***	Real Own-Source Revenue per Capita from Other Sources	0.156*	0.563***	0.719***
	(0.066)	(0.105)	(0.094)		(0.069)	(0.109)	(0.098)
Observations	38	38	38	Observations	22	22	22
R-squared	0.80	0.92	0.95	R-squared	0.92	0.98	0.98

Note: All specifications include the following controls: the percentage of the state's population that is white, the percentage that is under the age of 15, the percentage over 65, the percentage over 25 with a high school education, real personal income per capita, real federal grants per capita, an indicator variable for the political party of the state's governor, and year and census region fixed effects. Coefficient estimates for these variables are available upon request. Robust standard errors in parentheses: *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.
Source: Authors' calculations.

Table 10 shows the results of earmarking revenue to spending on local governments. Consistent with the previous findings, general sales tax revenue earmarked to local governments does increase expenditures. No other source of earmarked revenue has any effect on targeted expenditure, including vehicle registration revenue, which had a positive effect in the whole-sample results. The final two columns show the effect on overall spending. General sales tax revenue and personal income tax revenue earmarked to local governments increases expenditures in non-local government categories. Specifically, every dollar of earmarked personal income tax revenue is spent on other functions, while the roughly 56 cents of an earmarked sales tax dollar not spent on local governments is spent elsewhere. Total spending is increased by earmarked sales tax revenue.

Table 11: The Effect of Revenue Earmarked to Highways on Spending (Only States with Earmark)

Revenues Earmarked to Highways							
	Highway Expenditure	Nonhighway Expenditure	Total Expenditure		Highway Expenditure	Nonhighway Expenditure	Total Expenditure
Earmarked Gasoline Tax Revenue per Capita	0.745***	-0.219	0.526	Earmarked Vehicle Registration Revenue per Capita	0.95***	2.200*	3.154***
	(0.207)	(0.612)	(0.572)		(0.353)	(1.153)	(1.187)
Real Own-Source Revenue per Capita from Other Sources	0.032**	0.802***	0.834***	Real Own-Source Revenue per Capita from Other Sources	0.050*	0.760***	0.811***
	(0.016)	(0.049)	(0.054)		(0.027	(0.654)	(0.067)
Observations	136	136	136	Observations	64	64	64
R-squared	0.53	0.95	0.96	R-squared	0.35	0.95	0.94

Note: All specifications include the following controls: the percentage of the state's population that is white, the percentage that is under the age of 15, the percentage over 65, the percentage over 25 with a high school education, real personal income per capita, real federal grants per capita, an indicator variable for the political party of the state's governor, and year and census region fixed effects. Coefficient estimates for these variables are available upon request. Robust standard errors in parentheses: *** indicates statistical significance at the 1 percent level, ** at the 5 percent level, and * at the 10 percent level.
Source: Authors' calculations.

Finally, table 11 shows the results for revenues earmarked to highway expenditures. Among those states with the earmark, both gasoline and vehicle registration revenues increase expenditures on highways. These results are consistent with the above analysis of earmarks that mirror either Pigouvian taxes or the benefits-received principle. Vehicle registration revenue earmarked to highways increases both total expenditures and expenditures on areas other than highways.

Although there are some discrepancies (likely because of the small sample sizes employed here) these results are largely consistent with the previous whole-sample analysis. The majority of earmarks have no effect on expenditures in the targeted category, implying that earmarks are not an effective method to increase spending in specific areas. Instead, because of fungibility, these funds are failing to stick and are instead finding their way into general revenues for use at policy makers' discretion. Further, while earmarks are largely ineffective at increasing spending in the targeted area, there is evidence that they are effective at increasing spending in other areas and increasing total government size. This finding provides further evidence in support of the hypothesis that governments use earmarking as a way to increase tax revenues and they exploit the fungibility of such revenues to increase expenditures from the general fund. The results presented here also confirm that our previous analysis was not seriously compromised by any issues unique to those states choosing to earmark a specific tax to a specific expenditure.