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DO INTERGOVERNMENTAL GRANTS CREATE RATCHETS IN STATE AND LOCAL TAXES?
Testing the Friedman-Sanford Hypothesis

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Abstract

A large literature on the "flypaper effect" examines how federal grants to states at time period *t* affect state spending (or taxes) at time period *t*. We seek to answer the fundamentally different question of how federal grants at time period *t* affect state tax policy *in the future* at periods *t+1*, *t+2*, and so on. Federal grants often result in states creating new programs and hiring new employees, and when the federal funding for that specific purpose is discontinued, these new state programs must either be discontinued or financed through increases in state own source taxes. Government programs tend to be difficult to cut, as goes Milton Friedman's famous quote about nothing being as permanent as a temporary government program, suggesting it is likely that temporary federal grants create permanent (future) ratchets in state taxes. Far from being purely an academic question, this argument is in practice why South Carolina's Governor Mark Sanford attempted to turn down federal stimulus monies for his state. In addition to examining the impact of federal grants on future state budgets, we also examine how federal and state grants affect future local government budgets. Our findings confirm that grants indeed result in future state and local tax increases of roughly 40 cents for every dollar in grant money received in prior years.

Keywords: Federal Grants, Ratchet Effects, State Tax Policy

JEL: H77, H71

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Do Intergovernmental Grants Create Ratchets in State and Local Taxes? Testing the Friedman-Sanford Hypothesis

"Nothing is so permanent as a temporary government program."

—Nobel Laureate Milton Friedman (*The Yale Book of Quotations*, 2006)[1]

I. Introduction

As the opening quote from Nobel Laureate Milton Friedman illustrates, government programs can be hard to discontinue once they are created. The many New Deal programs still in existence seem to fit into this category.[2] In his book, *Crisis and Leviathan*, Higgs (1987) even proposes a ratchet theory of government growth in which temporary government programs that are enacted in response to major crisis events become permanent, thereby providing an explanation for historical government growth.[3] Most recently, the federal stimulus response to the financial crisis has brought about a large increase in federal government spending accompanied by a host of new government programs that may linger much longer than anticipated.

A significant amount of the recent expansion in government spending has been carried out through a major increase in federal grants to states and local governments for new "shovel-ready" projects. If these temporary programs are hard to eliminate in the future, their permanence will require states and localities to eventually raise their own taxes to fund these programs once the federal funds are gone. Far from always being an unintended consequence, some federal grants are made with the intention that states will pick up funding the program in the future. In 2010, for example, the city of Morgantown, West Virginia, along with 39 other cities, began receiving federal funding for the hiring of two new police officers for three years,

after which time the city will have to fund these new permanent full-time positions using own source revenue.

The general question of whether federal grants to states cause subsequent state (or local) tax increases is the topic we explore in this paper. The implications are important because if this is the case, then the recent federal fiscal stimulus should not only be predicted to cause a permanent ratchet upward in federal spending, but also a permanent ratchet in the size of state and local governments in the United States. Far from being purely an academic question, this argument is in practice why South Carolina's Governor Mark Sanford attempted to turn down part of the federal stimulus monies for his state. Referring to when the temporary federal stimulus funding runs out two years in the future, he states:

> "Who helps us then? Do we raise taxes … or do we just summarily end programs … [o]r are we to plan on yet another round of stimulus windfall from Washington in two years … The easiest of all things would be to take and simply spend all of Washington's well-intended stimulus efforts—but in our case it would guarantee opportunities lost that I don't think our state can afford."
>
> South Carolina Governor Mark Sanford "Prudence on Stimulus in State's Best Interest," *Myrtle Beach Sun-News*, April 6, 2009.

There is a rather large literature examining how federal grants at time period *t* affect state or local spending (or taxes) during the same time period *t* (i.e., the "flypaper effect" literature). That literature asks whether federal grants tend to truly expand state spending (that is, "stick"), or whether recipients instead use some of the funding to offset current taxes or to fund other programs through reallocations of fungible resources *in the period of the grant*. We discuss this literature in our paper because it will be important to account for it in our empirical analysis, however, what we seek to answer in this paper is a fundamentally different question unaddressed in the current literature: How do current federal grants at time *t* affect state and local tax policy *in*

the future? Our analysis attempts to answer this question using data on state revenue measures and federal grants, as well as a sample of local governments in Pennsylvania. Our results do indeed confirm the hypothesis that federal grants result in future increases in state and local taxes and own source revenue.

We will proceed as follows. Section II will discuss the reasons why temporary government programs tend to have permanence. Section III will review the literature on the "flypaper effect" because our estimation will require that we control for this in the estimation. Section IV discusses our data and presents our empirical results. Section V examines whether grants from different federal agencies tend to differ in their impact on future taxes. Section VI examines the impact of federal grants on individual tax rates and revenue sources for state governments, section VII explores the impact of federal and state grants on local own source revenue, and section VIII concludes.

II. Nothing is so Permanent as a Temporary Government Program

While one can find quotes from several notable individuals, such as the paper's opening quote by Milton Friedman, that *state* the observation that temporary programs tend to become permanent, it is worthwhile to briefly address the reasons why this may occur from the academic literature.

First, spending programs create their own new political constituency, in that the government employees and private recipients whose incomes depend on the program, and their families, will use political pressure to fight against any discontinuation of the program [see Musgrave (1981) and Cullis and Jones (1998), chapter 14]. Regardless of the overall necessity or efficiency of the program, there are always individuals who benefit from government spending, and in fact these pecuniary gains to factor owners are often the primary justification

for legislative support for particular government projects [see Weingast, Shepsle, and Johnsen (1981)].

Secondly, recent work in development economics shows that the resource windfalls to different governments generated by foreign aid (which, in a sense, is what the federal government is to state governments) intensify political struggles over control of the new government resources [see Djankov, Montalvo, and Reynal-Querol (2008)]. A similar phenomenon has been found to happen when states receive massive inflows of FEMA assistance after a disaster [see Leeson and Sobel (2008)]. With more government funds comes additional fights over political resource allocations, and an expansion in the rent-seeking industry occurs.[4] The new resources that flow into lobbying then gain experience through time at how do so effectively and become permanently more productive at producing political pressure [see Becker (1983)].[5] This lobbying-industry specific human and physical capital, if and when the external aid disappears, then shifts focus toward gaining additional control over internal domestic government spending. In a similar manner, federal grants may result in an expansion in state lobbying activity that is successful in gaining influence over future state spending.

Third, Higgs (1987, p. 73) discusses reasons why increases ("ratchets") in government spending do not entirely fade through time. He points to ideological change and "the politics of entrenched bureaucrats, their clients, and connected politicians." In this manner, even the clients and politicians who fund these programs become a force arguing for the continuation of temporary programs.

It is important to be clear that in some cases the future state financing of the program is not an unintended consequence, but is rather part of the explicit design of the federal grant. The

federal grants mentioned earlier in the introduction that helped cities hire new police officers for three years were *designed* with the intention of requiring future local financing in the future.

In addition, different government grants are indeed different, and some may be more likely to result in the creation of permanent programs than others. Funds to repave an *existing* highway, for example, do not as obviously require a commitment of future resources, and even if the funding was to build a new road, the permanent future costs would only be on the maintenance of the road (a much smaller amount than the cost of grant funded construction). Thus, the expectation for our empirical testing is that we should see the impact of $1 in government grants creating somewhat less than $1 in future tax increases as only part of the spending may become permanent. Because it is impossible to break out data on federal grants into which funding is temporary versus permanent, we simply note that our data uses all federal grants and that therefore we need to interpret the results with this in mind.

More importantly, if the federal grant does not expand state spending by the full amount of the grant *in the period of the grant*, this will be important to consider in specifying our empirical model. The reason is that if a federal grant of $100 only increases net state spending by $40, then only $40 in future tax increases will be required to fund the program annually. This discussion is the subject of our next section.

III. The Flypaper Effect

Formal economic models of the impact of federal grants on state spending (that is, spending in the year of the grant) make a clear prediction [see, for overviews, Hines and Thaler (1995) and Bailey and Connolly (1998)].[6] Analogous to economic models of food stamps given to individuals, fungibility of existing resources can allow the recipient to make adjustments which

can partially offset or reallocate the external grant funding. For example, at the extremes, a state could chose to expand spending by the entire amount of the grant, or alternatively could choose to keep total spending levels the same, and simply cut own source taxes by the amount of the grant—essentially rebating the grant to citizens.

According to economic theory, a federal grant to a state should act identically to a pure cash transfer to the state's citizens. Because the propensity to spend on state government out of income has been estimated to be roughly 5 to 10 percent, the literature's theoretical prediction is that $100 in federal grants should increase state spending by only roughly $5 to $10 dollars, with the rest being returned to citizens through tax reductions relative to what taxes would have been without the grant. The impact on state or local debt is generally ignored because state and local governments are almost always subject to balanced budget constraints, and we as well do not examine state or local debt.

The literature actually differentiates two different types of grants: lump-sum grants and matching grants. To be precise, the discussion in the paragraph above was for the case of a lump-sum grant. Matching grants, in which the federal government matches the amount spent by a state on a program, are theoretically expected to have a more stimulating impact on current spending because they create a price effect in addition to the above income effect. Matching grants effectively lower the tax price of the program to state citizens during the period of the grant, and therefore also result in an increase in quantity demanded of state government beyond the income effect's 5 to 10 percent.

Despite this clear theoretical prediction, the large empirical literature on the topic consistently finds that federal grants increase state spending by more than this theoretical prediction, and the term "flypaper effect" has been used to describe this phenomenon. The

literature's estimates vary widely, and the two papers previously cited both have tables listing the estimates from a long list of other papers. Excluding the few outliers on each end, generally the large cluster of estimates tends to be in the 30 to 70 percent range, with a median estimate in around 45. Thus, the existing empirical literature concludes that if the federal government gives a $100 grant to a state in year *t*, the state's spending will rise by approximately 45 cents in year *t*, and taxes will be reduced by approximately 55 cents in year *t*.

While the flypaper effect is a hotly debated area in the public finance literature, for our purposes we simply need an average estimate so that we can accurately control for this effect when estimating the effect of federal grants on *future* state taxes. The reason why this is important to consider is that if a temporary one-year $100 federal grant only increases state spending by $45 in the year of the grant (with the other $55 going to tax reductions), then even if this program continues into the future we should expect to see future taxes rise by only $45 in response to this $100 federal grant. That is, the maximum increase in future taxes is determined by the size of the flypaper effect.

Figure 1. The Effect of Federal Aid on State Finances

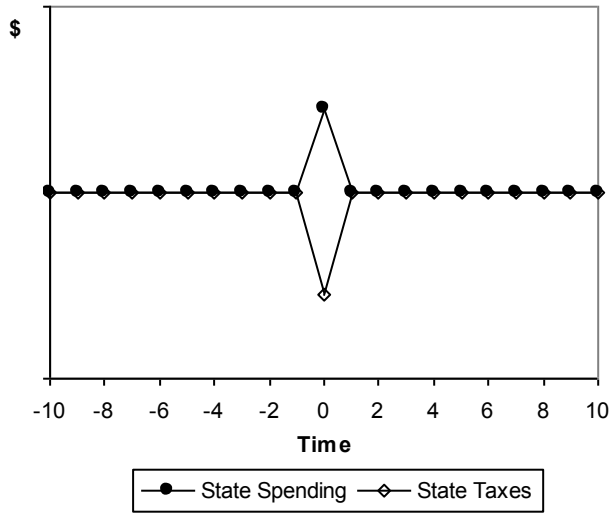

Figure 1a) The impact of a one time grant at time zero, for a program that is cut after the grant disappears, based on a flypaper estimate of 0.45.

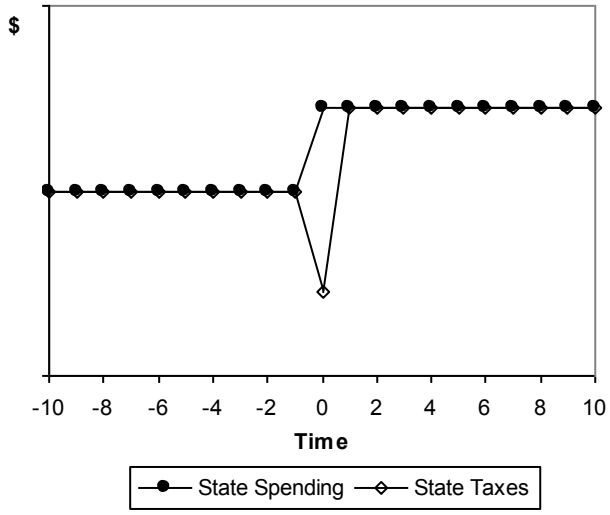

Figure 1b) The impact of a one time grant at time zero, for a program that is made permanent after the grant disappears and is funded out of state own source taxes, based on a flypaper estimate of 0.45.

Because of the complexity of this idea, figures 1a and 1b attempt to show how a one-period federal grant would impact both state spending and taxes under two scenarios. First, figure 1a shows the impact for a grant program that was indeed temporary, and was discontinued after the end of the federal funding. Using the median estimate of the flypaper effect from the literature (0.45), figure 1a shows that spending rises by 45 percent of the grant amount, while taxes are reduced by 55 percent of the grant amount in the period of the grant (period 0 in the figure). In the future periods, spending and taxes return to the old levels. If this were the case in the actual data, we would get estimates of the effect of the federal grant on state *taxes* that showed a –0.55 in the period of the funding, and because the program disappears the estimate on lagged grants would be zero.

In figure 1b we show how this differs if the program is alternatively fully continued in the future and financed by an increase in state taxes. If this were the case in the data, we would get estimates of the effect of the federal grant on state taxes that showed a –0.55 in the period of the funding, and because the program continues, the estimate on lagged grants would be +0.45 (which, as we discuss below, is mathematically equal to one plus the same period *tax* effect of –0.55 from above). There is the possibility that only part of the program remains permanent, and in this case not illustrated, the long-run effect would be greater than zero but less than the full +0.45 amount.

Thus, the flypaper effect literature contains clear predictions about the sizes of our coefficients. First, in the year of the grant, we should expect to see state own source taxes *reduced* by approximately 30 to 70 cents (the range of estimates from the literature's estimates). Second, in the subsequent years once the grant is gone, if federal grants do create ratchets at the

state level, and the program becomes permanent, we should expect to see state own source tax *increases* of approximately 30 to 70 cents (if fully continued, or less if not).

Specifically in terms of our coming empirical model:

$$\text{Current State Revenue} = \alpha + \beta_1 * \text{Current Federal Grants} + \beta_2 * \text{Previous Federal Grants} + \varepsilon \qquad (1)$$

we should expect the impact of current grants on current taxes to be in the range –0.3 to –0.7 because of the flypaper effect, and the coefficient on previous federal grants to be in the range +0.3 to +0.7 if the grants do create permanent programs that result in states having to raise internal revenue for their continued operation. The coefficients should roughly follow the pattern $\beta_2 - \beta_1 = 1$. So if the estimated current (same) period impact of the federal grant on state taxes represented by β_1 is –0.7 (implying tax reductions of 70 cents per dollar and thus a spending increase of other 0.3), we should expect the maximum future tax increase (if the program is fully continued) to be +0.3. In practice, we will estimate this model using several different measures of state revenue and taxes, and in addition we will examine a multitude of lag structures for previous federal grants, and two-way fixed effects.

IV. Data and Empirical Results

We test the effects of federal grants on future state revenue using a balanced panel of the 50 U.S. states and annual data for 1995 through 2008. Data on federal grants to states comes from annual issues of the *Federal Aid to States Report* published by the U.S. Census Bureau. We use this source because it contains data both on total federal aid as well as data on grants broken down by specific federal government department. Our data on state revenue is from the U.S. Census Bureau's *Annual Survey of State Government Finances*. We adjust all aid and revenue variables for inflation using the Consumer Price Index. Descriptions and summary statistics as

well as a complete list of data sources for all variables used in this paper can be found in appendix 1.

Our panel data allows for the estimation of two-way fixed effects models. The use of two-way fixed effects controls for all factors that are either specific to a state through time (such as a given state having a smaller budget due to not having an income tax, for example) or common across all states in a given time period of data (such as a national economic recession, for example) and is preferable to attempting to control for a host of other factors that can affect own source revenue.[7] This, of course, prevents us from using the traditional demographic controls (such as median age or percent nonwhite) as these factors do not vary enough through time in a given state, and are thus picked up by the state fixed effects. We estimate our fixed effect regressions with ordinary least squares. After incorporating several lags of our federal aid variable our number of usable observations becomes 400, spanning the period 2001–2008.

Our basic empirical model is one in which we use state own source revenue as the dependent variable, and our independent variables of interest are current and previous federal grants. Our biggest challenge is formulating the best lag structure for previous federal grants. We begin by including only current period federal grants and a one-year lag, and then add additional lagged federal grants one period at a time.[8] We present the results of this experiment in table 1.

Table 1. The Effect of Federal Aid on State Own Source Revenue

Dependent Variable: Total Own Source Revenue

Specification	1	2	3	4	5	6
Total Federal Aid (t)	-1.2113***	-0.7692***	-0.8403***	-0.9153***	-0.8629***	-0.7337***
	(-9.60)	(-7.57)	(-8.72)	(-9.77)	(-9.20)	(-10.56)
Total Federal Aid (t-1)	1.9928***	0.2912**	0.5026***	0.6101***	0.5449***	
	(17.29)	(2.11)	(3.76)	(4.69)	(4.20)	
Total Federal Aid (t-2)		1.5687***	0.7574***	0.7656***	0.7617***	
		(16.15)	(5.15)	(5.41)	(5.45)	
Total Federal Aid (t-3)			0.6913***	0.1376	0.1825	
			(7.05)	(1.01)	(1.35)	
Total Federal Aid (t-4)				0.6032***	0.2603*	
				(5.65)	(1.77)	
Total Federal Aid (t-5)					0.4813***	
					(3.33)	
∑ Total Federal Aid (t-1 through t-5)						0.4162***
						(31.28)
Adjusted R^2	0.637	0.782	0.806	0.820	0.825	0.817
Number of Observations	400	400	400	400	400	400

Note: All models include state and year fixed effects, t-statistics in parentheses, * indicates statistical significance at the 10% level, ** at 5%, *** at 1%.

As can be seen in table 1, the problem with adding too many lags is that multicollinearity becomes an issue because of the high degree of correlation in a state's level of federal grants through time (generally around a 0.99 correlation coefficient on these lags in our data). This is witnessed in our estimates by some lags that were previously significant (like lag 3) becoming insignificant as additional lags are included. We also estimated our model including each lag separately to check that each was significant when included alone (which they are), and these results are summarized in appendix 2. Given the limited time span of our panel of data we are unable to get the model to consistently run and provide estimates using more than 5 lags as too many periods get excluded from the data.

In an attempt to overcome the multicollinearity issue we also construct a single variable that is the (sum) total of federal grants during the five years prior to the current year. This is

presented in the final column of table 1. This is our most "clean" specification and, interestingly, also produces some of the most reasonable estimates based on our prior expectations. Not only is the single coefficient on the cumulative total fairly representative of the average coefficient on the individual lags in the previous columns, but more importantly the estimates in this final specification roughly satisfy the linear relationship $\beta_2 - \beta_1 = 1$ that was anticipated from the literature [+0.4162 – (–0.7337) = 1.1499], and we cannot statistically reject the hypothesis that the sum is indeed one (the implied 95 percent confidence interval is 0.99 to 1.30).[9]

Most importantly, however is the fact that the estimates suggest a full permanent programmatic effect with future taxes being roughly the amount required to permanently expand spending by the amount caused initially by the federal grant. In all specifications there is a clear positive effect of federal grants on the future tax levels in a state, even going back in time up to 5 or more lags. These results seem to confirm our hypothesis.

Table 2. The Effect of Federal Aid on State Tax Revenue

Dependent Variable: Total Tax Revenue

Specification	1	2	3	4	5	6
Total Federal Aid (t)	-1.0456***	-0.7203***	-0.7710***	-0.8421***	-0.7813***	-0.6377***
	(-9.37)	(-7.31)	(-8.02)	(-8.97)	(-8.36)	(-9.20)
Total Federal Aid (t-1)	1.6009***	0.3487***	0.4994***	0.6014***	0.5256***	
	(15.71)	(2.60)	(3.74)	(4.62)	(4.06)	
Total Federal Aid (t-2)		1.1543***	0.5762***	0.5840***	0.5795***	
		(12.26)	(3.93)	(4.12)	(4.16)	
Total Federal Aid (t-3)			0.4925***	-0.0328	0.0193	
			(5.03)	(-0.24)	(0.14)	
Total Federal Aid (t-4)				0.5723***	0.1741	
				(5.35)	(1.19)	
Total Federal Aid (t-5)					0.5588***	
					(3.88)	
∑ Total Federal Aid (t-1 through t-5)						0.3257***
						(24.54)
Adjusted R^2	0.559	0.681	0.699	0.719	0.729	0.716
Number of Observations	400	400	400	400	400	400

Note: All models include state and year fixed effects, t-statistics in parentheses, * indicates statistical significance at the 10% level, ** at 5%, *** at 1%.

Table 2 shows similar estimates to table 1 but using a different dependent variable: state tax revenue. This differs from state own source revenue by excluding state non-tax sources of revenue (such as user fees). Again in table 2 the results show a similar trend as in table 1 with the additional lags being significant, but some multicollinearity affecting the results as too many additional lags are included. In our preferred sum specification (in the final column), we again get estimates right in line with our predictions that meet the rough $\beta_2 - \beta_1 = 1$ linear relationship. In the final column of table 2 this is +0.3257 – (–0.6377) = 0.9634, which is again not statistically different from one using standard critical test levels (the implied 95 percent confidence interval is 0.82 to 1.10).

Taken as a whole, the estimates from tables 1 and 2 suggest that each dollar of federal grants in period *t* causes an expansion in current (same) period state spending of between 0.27

and 0.36 (in the lower range of the previous flypaper literature estimates, and this is calculated as 1- β_1), and then subsequently results in states raising taxes by between 0.33 and 0.42 (this is simply β_2) which is precisely the amount required to permanently continue all of the state programs created through the initial federal grants.

While this should be obvious based on our discussion of figures 1a and 1b, it is worth clarifying that this is not simply a case where the grant is used to cut taxes in the current period and then taxes are raised back to their previous levels after the grant. The grant results in permanently larger state government spending that must be financed by permanently higher levels of own source taxation. Because of how it is specified, our estimate of future tax increases is the marginal amount by which future taxes are higher than they would have been without the grant ever taking place, meaning the true tax increases in the year the grant disappears are larger than this estimate as taxes must be increased both to replace the one-year partial tax cut in the period of the grant and additionally to fund the expansion in programmatic spending.

Of note is the fact that the adjusted R-squared values are uniformly higher for the specifications using own source revenue than they are for the specifications using tax revenue. Because the difference is that own source includes other non-tax sources of revenue (such as user charges and fees), this result may imply that changes in these other non-tax sources of revenue for states are slightly easier to accomplish and are an important part of how states adjust their own revenue in response to federal grants.

V. Grant Analysis by Department

Federal grants to states are given through individual federal government agencies. The five agencies which provide the largest amount of grants are the Department of Health and Human

Services (accounting for 57.0 percent of grants), Department of Transportation (11.3 percent of grants), Department of Housing and Urban Development (10.1 percent of grants), Department of Education (7.7 percent of grants), and Department of Agriculture (5.9 percent of grants).[10] Combined, these five largest grant areas account for 92 percent of all federal grants. In this section we explore the question of whether grants from different government agencies tend to have different degrees of permanence or, more precisely, different degrees of impact on future state taxes.

In this specification we break up our prior federal grant variable into six new variables, one for each department/agency and then a sixth variable that includes the dollar amount for all other grants (the remaining 8 percent of grants). We run the regressions for both total state own source revenue and total state tax revenue. The results are presented in table 3.

Table 3. The Effect of Federal Aid by Department

Dependent Variable	Total Own Source Revenue	Total Tax Revenue
Total Federal Aid (t)	-0.7319***	-0.6294***
	(-10.50)	(-9.08)
∑ Dept. of Agriculture Grants (t-1 through t-5)	0.1934	-0.4629
	(0.31)	(-0.76)
∑ Dept. of Education Grants (t-1 through t-5)	0.4112***	0.2908***
	(3.61)	(2.57)
∑ Dept. of Health and Human Services Grants (t-1 through t-5)	0.4576***	0.3639***
	(10.03)	(8.02)
∑ Dept. of Housing and Urban Development Grants (t-1 through t-5)	0.5422**	0.5932**
	(2.13)	(2.35)
∑ Dept. of Transportation Grants (t-1 through t-5)	0.3536**	0.3095**
	(2.37)	(2.08)
∑ Grants from all other agencies (t-1 through t-5)	0.4173***	0.3241***
	(30.08)	(23.51)
Adjusted R^2	0.818	0.720
Number of Observations	400	400

Note: All models include state and year fixed effects, t-statistics in parentheses, * indicates statistical significance at the 10% level, ** at 5%, *** at 1%.

Interestingly, four of the six coefficients are almost identical. The coefficients for Department of Education, Department of Health and Human Services, Department of Transportation, and all other federal grants are all positive and significant, and roughly in the range of 0.35 to 0.46 in the own source revenue specifications and in the range of 0.29 to 0.36 in the tax revenue specifications. Grants from the Department of Housing and Urban Development in both specifications have the highest long-run impact on taxes at 0.54 in own source and 0.59 in tax revenue. All of these estimates are roughly in the range suggested by the linear flypaper rule, and the results imply that virtually the entire bump in program spending continues into the future to be financed through state internal taxes. Also interestingly, the highest-to-lowest ranking of the coefficients across departments is identical in the two specifications, although the coefficients in the tax revenue specifications tend to be slightly smaller (with the exception of the Department of Housing and Development).

The coefficient on the Department of Agriculture is the only one whose results seem to be at odds with the other results, with a coefficient of 0.19 that is the right sign but insignificant in the own source specification (although, interestingly, also not significantly different from the value of 0.2681 implied by the linear relationship) and a coefficient of -0.46 that is the wrong sign but insignificant in the tax revenue specification. We are unsure why the results from this one agency are different from the other results. Whether grants from the Department of Agriculture truly carry less long-run burden on states, or whether this is a spurious estimate due to the multicollinearity among the grants is unclear. Given that the coefficient is not statistically different from either zero or the predicted value in the own source specification, we are reluctant to draw firm conclusions that grants from this one agency are somehow different. This is particularly true given that the other four not only have common estimates, but are also in line

with the estimate from the all other grants variable. In addition, of the five largest grant agencies we have singled out, the Department of Agriculture accounts for the smallest percentage of grants. Thus, we think the most likely conclusion that can be reached is that there are not large differences in the long-run persistence of grants across agencies.

Also worthy of note is that again in these regressions, the specification using own source has a higher adjusted R-squared than the specification using tax revenue, supporting the idea that these non-tax adjustments in revenue are an important factor in explaining how states respond to federal grants.

VI. Individual Revenue Source Estimations

In this section we attempt to more precisely test our hypothesis by directly examining the effect of federal grants on individual state tax *rates*. Based on the results of the last section, we return to a combined variable reflecting total grants rather than breaking it out by agency.

For each state we are able to collect individual tax rates for the state sales tax, the state cigarette tax, and the state beer tax. Most state personal and corporate income taxes have bracket structures with different rates, making it impossible to use one specific tax rate, so in an effort to include them we have instead used state personal and corporate income tax revenue rather than rates. The results of our estimations are summarized in table 4.

Table 4. The Effect of Federal Aid on Individual State Revenue Sources

Dependent Variable	Personal Income Tax Revenue	Corporate Income Tax Revenue	General Sales Tax Rate	Cigarette Tax Rate	Beer Tax Rate
Total Federal Aid (t)	-0.5866***	-0.1145***	-0.00002	-0.0166	-0.0003***
	(-11.23)	(-7.93)	(-0.10)	(-0.92)	(-6.33)
∑ Total Federal Aid (t-1 through t-5)	0.1514***	0.0531***	0.00001	0.0038	0.0001***
	(15.30)	(19.40)	(0.06)	(0.65)	(8.84)
Adjusted R^2	0.521	0.615	0.128	0.467	0.223
Number of Observations	344	368	360	400	400

Note: All models include state and year fixed effects, t-statistics in parentheses, * indicates statistical significance at the 10% level, ** at 5%, *** at 1%. Federal aid is in per capita terms in the rate specifications. Personal income, corporate income, and general sales tax specifications exclude states that do not impose these taxes.

With the exception of the personal and corporate income taxes, which are measured in dollars of revenue (like our previous regressions), the other coefficient estimates in the tax rate specifications are not directly comparable to the other estimates, nor are they interpreted in the same way because they reflect the change in the tax rate itself, rather than revenue, caused by grants. If indeed states, for example, raise their sales tax rate to fund a program begun by a federal grant, the change in the tax rate is what is estimated. Actually, in the rate specifications we have converted federal grants from raw dollars to dollars per capita to match better with the rate variable, so this influences the interpretation as well. Thus, these coefficients will be extremely small, but in the end we are looking for confirmation that the current (same) period impact is negative, followed by a significant and positive impact in the future (shown by the coefficient on summed previous grants).

The results from all five individual revenue sources have the correct signs, but only three of the five tax sources have results that are significant: the beer tax rate and both personal and corporate income tax revenue. Given that the personal income tax is the major source of state government revenue, it is comforting that our results hold when examining this revenue source

directly. Although it is disappointing that we cannot see the results being more significant for state sales taxes, which are also a major revenue source, this may simply imply states rely more on income taxes and other revenue sources when adjusting to changes in federal aid.

VII. Do Federal and State Grants Create Ratchets in Local Taxes?

In theory, this permanent impact of grants should also apply at the local level. Local governments not only receive grants from the federal government, but also from state government as well. Here we examine whether federal and state grants to localities have similar impacts on future local taxes.

We focus our analysis of local governments on a case study of counties in Pennsylvania for which we were able to obtain detailed grant information. Our data cover 63 counties annually over the period 1997 to 2004. The panel includes federal and state aid as well as data on total own source revenue for each county. After including lagged federal and state aid data, our Pennsylvania county panel consists of 252 total observations and spans the period 2001 to 2004. Aid and revenue variables are again adjusted for inflation using the Consumer Price Index. Summary statistics, descriptions, and sources for these variables can also be found in appendix 1.

As before, we employ a two-way fixed effects model. Again, the use of fixed effects helps control for omitted variables which are either constant through time for all counties or specific to a single county. Since our data on Pennsylvania counties contains substantially fewer years than our state-level data we must use fewer lags in our models.

For our local analysis we focus only on total own source revenue and do not specifically attempt to model individual taxes. For states, tax revenue is 71 percent of all own source

revenue, but for our local governments in the sample, tax revenue accounts for only 43 percent of all own source revenue. Local governments rely much more heavily on non-tax revenue sources such as license and user fees and the total own source revenue would include these but tax revenue would not. We also note that even for states, the specifications using own source revenue had a higher adjusted R-squared.

We begin our analysis by including current and lagged grant variables that reflect the total grants received by the county (combined state and federal grants). We will then break this into two variables to see if we can find differences in the effect of state versus federal grants on county taxation. The first three columns of table 5 show the results of our estimations using combined grants to county governments in Pennsylvania. We show how the results change as we change the length of the historical sum. The first column, for example, contains a variable that is two periods of lagged grants, while the second column of results is for three periods of grants, and so forth.

Table 5. The Effect of Federal and State Aid on Pennsylvania County Own Source Revenue

Dependent Variable: Total Own Source Revenue						
Specification	1	2	3	4	5	6
Total State and Federal Aid (t)	-1.1751***	-1.0400***	-0.9802***	-1.1629***	-1.0044***	-0.8838***
	(-6.32)	(-5.41)	(-5.36)	(-6.24)	(-5.32)	(-4.77)
∑ Total State and Federal Aid (t-1 through t-2)	0.3068***					
	(3.63)					
∑ Total State and Federal Aid (t-1 through t-3)		0.1396**				
		(2.24)				
∑ Total State and Federal Aid (t-1 through t-4)			0.0844**			
			(2.01)			
∑ Total State Aid (t-1 through t-2)				0.4062***		
				(2.98)		
∑ Total State Aid (t-1 through t-3)					0.4623***	
					(3.91)	
∑ Total State Aid (t-1 through t-4)						0.2619***
						(3.17)
∑ Total Federal Aid (t-1 through t-2)				0.2323**		
				(-2.00)		
∑ Total Federal Aid (t-1 through t-3)					-0.1089	
					(-1.10)	
∑ Total Federal Aid (t-1 through t-4)						-0.1382
						(-1.40)
Adjusted R^2	0.140	0.112	0.108	0.139	0.144	0.127
Number of Observations	252	252	252	252	252	252

Note: All models include county and year fixed effects, t-statistics in parentheses, * indicates statistical significance at the 10% level, ** at 5%, *** at 1%.

The results in the first three columns of table 5 for combined grants are again similar to the results we found when examining the impact of grants on state taxes. During the period of the grant, counties lower taxes/fees, and then in the future raise taxes and other sources of revenue to continue the operation of the programs. The results are roughly identical to what was found before for states, with the exception that the current period impact is larger, and the decay appears to be greater over the long run.[11]

The remaining columns break up grants into federal and state. Interestingly, when split the state grants seem to show more permanence, while the federal ones show less. In fact, in

some of the specifications, the lagged federal grant variable becomes negative and insignificant. We are unsure why this is the case, but note this is clearly why in the combined grant variable it begins to diminish, as by itself the state variable doesn't decline as much as additional lags are added. In theory there is no reason why state and federal grants should function differently. We do note that the federal grants are much smaller than state grants to local governments.

Approximately three-fourths of all grants to local governments come in the form of state grants (in our sample). So the state results are relatively more important. In addition, we are only examining county governments in one state, and it is unclear if these results would hold up for other levels of local government (cities or school districts, for example), or for other states.

Nonetheless, when we examine either the combined grants or the state grants, the results for local governments seem to mirror our results from earlier. For every $100 in grants, local governments eventually raise revenue by between $23 and $46 to support the continued operation of these programs.

VIII. Conclusion

While a vast previous literature has examined the impact of federal grants on state and local spending, this previous literature focuses exclusively on the impact of the grant in the period it is received. We depart from this literature by examining the impact of federal grants on state and local tax policy in future periods.

Our results clearly demonstrate that grant funding to state and local governments results in higher own source revenue and taxes in the future to support the programs initiated with the federal grant monies. Our results are consistent with Friedman's quote regarding the permanence of temporary government programs started through grant funding, as well as South

Carolina Governor Mark Sanford's reasoning for trying to deny some federal stimulus monies for his state due to the future tax implications. Most importantly, our results suggest that the recent large increase in federal grants to state and local governments that has occurred as part of the American Recovery and Reinvestment Act (ARRA) will have significant future tax implications at the state and local level as these governments raise revenue to continue these newly funded programs into the future. Federal grants to state and local governments have risen from $461 billion in 2008 to $654 billion in 2010. Based on our estimates, *future* state taxes will rise by between 33 and 42 cents for every dollar in federal grants states received today, while local revenues will rise by between 23 and 46 cents for every dollar in federal (or state) grants received today. Using our estimates, this increase of $200 billion in federal grants will eventually result in roughly $80 billion in future state and local tax and own source revenue increases. This suggests the true cost of fiscal stimulus is underestimated when the costs of future state and local tax increases are overlooked.

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[1] The original Friedman quote appears both in the October 27th, 2993 issue of the *Cleveland Plain Dealer* and in the book he coauthored with his wife Rose D. Friedman, *Tyranny of the Status Quo* (Harourt Brace Jovanovich, San Diego, CA, 1984, pg. 115). Variants of this quote have also been attributed to President Ronald Reagan and Utah Senator Wallace F. Bennett. Reagan's quote is "We have long since discovered that nothing lasts longer than a temporary government program," appearing in *Ronald Reagan: The Great Communicator* (HarperPerennial, New York, NY, 2001, pg. 59). Bennett's quote is "It is an age-old Washington axiom that there is nothing so permanent as a temporary government program," appearing (somewhat ironically given the topic of our paper) in a government committee review of federal grants to states (*Periodic Congressional Review of Federal Grants-in-aid*, published by United States Congress, Senate, Committee on Government Operations, 1964, pg. 15).

[2] See Higgs (1987), chapter 8, for a discussion of the many remaining 'institutional legacies' of the New Deal programs.

[3] The 'leviathan' model of government is one that assumes the objective of government is to maximize its size, see Brennan and Buchanan (1977, 1978, 1980).

[4] Rent seeking is the term used to refer to the expenditure of resources to capture political transfers, see Tullock (1967).

[5] In the terminology of Baumol (1990), the expansion of government spending increases the return to unproductive entrepreneurship. See Coyne, Sobel, Dove (forthcoming) for a discussion of how this industry specific (lobbying) capital does not easily transfer back into the private sector.

[6] In this section we provide only a brief summary of the main arguments in this rather large literature. See Hines and Thaler (1995) and Bailey and Connolly (1998) for excellent overviews and summaries of this large empirical literature and the theoretical expectations.

[7] We experimented with the inclusion of state-specific time trends in addition to state fixed effects. None of the state trend variables were statistically significant, indicating our two-way, state and year, fixed effects are sufficient.

[8] We have adjusted for the difference between federal and state fiscal years in the data by pre-lagging federal funds by one year.
[9] One can back out the implied flypaper effect coefficients (on spending) from our regressions (on taxes) for comparison with previous literature by calculating 1- β_1, which is 0.2663 in the final specification.
[10] Percentages are for federal grants to state and local governments for federal fiscal year 2008.
[11] In theory, the maximum coefficient on the current period is one, and in the table some of the coefficients are greater than one, however, none of these are significantly different from one at traditional levels.

Appendix 1. Data Description and Sources

Variable Name (Source)	Description	Mean	Standard Deviation
State Vairables			
Total Federal Aid (1)	Real total federal aid to states, in thousands, years 1995-2008	3574847.10	4180921.71
Department of Agriculture Aid (1)	Real total Dept. of Agriculture aid to states, in thousands, years 1995-2008	213799.03	246964.57
Department of Education Aid (1)	Real total Dept. of Education aid to states, in thousands, years 1995-2008	288052.38	365898.73
Department of Health and Human Services Aid (1)	Real total Dept. of HHS aid to states, in thousands, years 1995-2008	2045520.75	2551574.91
Department of Housing and Urban Development Aid (1)	Real total Dept. of HUD aid to states, in thousands, years 1995-2008	355236.31	471877.60
Department of Transportation Aid (1)	Real total Dept. of Transportation aid to states, in thousands, years 1995-2008	387171.25	378911.65
All Other Departments Aid (1)	Real federal aid to states, in thousands, for those departments not itemized, years 1995-2008 (Total federal aid - total aid from all departments itemized above)	584816.39	2152988.43
Total Own Source Revenue (2)	Real total revenue raised in state, in thousands, years 2001-2008 (Total Revenue - Intergovernmental Revenue)	8938835.67	10199828.66
Total Tax Revenue (2)	Real total tax revenue, in thousands, years 2001-2008	6594359.79	8112677.41
Personal Income Tax Revenue (3)	Real total 'individual income' tax revenue, in thousands, years 2001-2008	418010.65	704042.20
Corporate Income Tax Revenue (3)	Real total 'corporate net income' tax revenue, in thousands, years 2001-2008	416434.90	687550.60
General Sales Tax Rate (4)	General sales tax rate, expressed as percentage (e.g. 6%=6), years 2001-2008	5.30	1.00
Cigarette Tax Rate (4)	Cigarette tax rate, cents per 20-pack, years 2001-2008	73.88	56.86
Beer Tax Rate (4)	Beer tax rate, dollars per gallon, years 2001-2008	0.25	0.21
Total Federal Aid Per Capita (1,6)	Real per capita federal aid, in dollars, years 1995-2008 ((Total Federal Aid*1000)/State Population)	689.43	266.48
Consumer Price Index (5)	Consumer Price Index, base year 1982-1984		
Pennsylvania County Variables			
Total Federal Aid (7)	Real total federal grants, in dollars, years 1997-2004	7148449.75	21208147.89
Total State Aid (7)	Real total state grants, in dollars, years 1997-2004	14593204.79	34458943.56
Total State and Federal Aid (7)	Real total grants from state and federal government, years 1997-2004 (Total Federal Aid + Total State Aid)	21741654.54	55102780.39
Total Own Source Revenue (7)	Real total revenue raised in county, in dollars, years 2001-2004 (Total Revenue - Total State and Federal Aid)	43571966.27	64514635.71

Sources

(1) U.S. Census Bureau, *Federal Aid to States Report*
(2) U.S. Census Bureau, State Government Finances, "Annual Survey of State Government Finances"
(3) U.S. Census Bureau, *Statistical Abstract of the United States*
(4) Tax Foundation, "State Sales, Gasoline, Cigarette, and Alcohol Tax Rates by State, 2000-2010"
(5) Bureau of Labor Statistics, "Consumer Price Index History Table"
(6) U.S. Census Bureau, Population Division, Population Estimates
(7) Pennsylvania Department of Community and Economic Development, County Financial Statistics

Appendix 2. Statistical Significance of Individual Lags

Dependent Variable: Total Own Source Revenue

Specification	1[a]	2	3	4	5
Total Federal Aid (t)	-1.2113***	-0.6240***	-0.3659***	-0.2351***	-0.1011
	(-9.60)	(-8.32)	(-4.86)	(-2.92)	(-1.25)
Total Federal Aid (t-1)	1.9928***				
	(17.29)				
Total Federal Aid (t-2)		1.7249***			
		(27.34)			
Total Federal Aid (t-3)			1.4075***		
			(24.91)		
Total Federal Aid (t-4)				1.3695***	
				(21.41)	
Total Federal Aid (t-5)					1.7670***
					(20.19)
Adjusted R^2	0.637	0.780	0.752	0.705	0.686
Number of Observations	400	400	400	400	400

Note: All models include state and year fixed effects, t-statistics in parentheses, * indicates statistical significance at the 10% level, ** at 5%, *** at 1%.

[a] Column 1 above is identical to Column 1 in Table 1.

References

Bailey, Stephen J. and Stephen Connolly. 1998. "The Flypaper Effect: Identifying Areas for Further Research," *Public Choice* 95: 335-361.

Baumol, William J. 1990. "Entrepreneurship: Productive, Unproductive and Destructive." *Journal of Political Economy* 98(5): 893-921.

Becker, Gary. 1983 "A Theory of Competition Among Pressure Groups for Political Influence," *Quarterly Journal of Economics* 98(3): 371-400.

Brennan, Geoffrey and James Buchanan. 1977. "Towards a Tax Constitution for Leviathan." *Journal of Public Economics* 8:255-274.

Brennan, Geoffrey and James Buchanan. 1978. "Tax Instruments as Constraints on the Disposition of Public Revenues." *Journal of Public Economics* 9:301-318.

Brennan, Geoffrey and James Buchanan. 1980. *The Power to Tax: Analytical Foundations of a Fiscal Constitution*, Cambridge University Press.

Coyne, Christopher J., Russell S. Sobel, and John A. Dove. Forthcoming. "The Non-Productive Entrepreneurial Process," *Review of Austrian Economics*.

Cullis, John and Philip Jones. 1998. *Public Finance and Public Choice*. Second Edition. New York: Oxford University Press, chapter 14.

Djankov, Simeon, Jose Montalvo, and Marta Reynal-Querol. 2008 "The Curse of Aid," *Journal of Economic Growth* 13(3): 169-194.

Higgs, Robert. 1987. *Crisis and Leviathan: Critical Episodes in the Growth of American Government*. Oxford, Oxford University Press.

Hines, James R., Jr. and Richard H. Thaler. 1995. "Anomalies: The Flypaper Effect," *Journal of Economic Perspectives* 9(4): 217-226.

Leeson, Peter T., and Russell S. Sobel. 2008. "Weathering Corruption," *Journal of Law and Economics* 51(4): 667-681

Musgrave, Richard. 1981. "Leviathan Cometh—Or Does He?" in H. Ladd and T. N. Tiedman (eds.) *Tax and Expenditure Limitations*, COUPE Papers on Public Economics, 5, Washington, DC: The Urban Institute, 77-120.

Tullock, Gordon. 1967. "The Welfare Cost of Tariffs, Monopolies, and Theft," *Western Economic Journal* 5(3): 224-232.

Weingast, Barry R., Kenneth A. Shepsle, and Christopher Johnsen. 1981. "The Political Economy of Benefits and Costs: A Neoclassical Approach to Distributive Politics," *Journal of Political Economy* 89(4): 642-664.