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THE ROLE OF THE DEBT

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pubblicazione internet realizzata con contributo della

COMPAGNIA
di San Paolo

società italiana di economia pubblica

dipartimento di economia pubblica e territoriale – università di pavia

Local Finance Responsiveness to Federal Grants: the Role of the Debt

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June 11, 2007

Abstract

This paper provides new evidence on the determinants of the flypaper effect using US states' budget data. Instrumenting federal grants to correct for the existence of an endogeneity bias, we find that an increase in federal transfers generates an increase in spending and a decrease in taxes. The sum of these two effects is more than proportional to the increase in federal grants. As a consequence, higher federal transfers are also associated with more state budget deficits. The analysis of states taxes and budget deficit clearly suggests that the effect of grants on states fiscal policies goes beyond the excessive reaction of spending doomed as flypaper effect. A common pool problem arising from the (partial) federal financing of local public goods can offer a more plausible explanation of the fiscal response of the states to an increase in federal transfers.

Keywords: Federal Budget, Flypaper, Transfers, Debt, Common Pool

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1 Introduction

Federal grants distributed to members of a federation should only alter income levels and affect state expenditure in the same way lump-sum grants to individual community members would (Bradford and Oates, 1971). However, empirical work in the field does not support this theory and one of the most accredited alternative explanation is the “flypaper effect”. Grants stimulate government expenditures more than transfers to individuals for the same amount of money (Gramlich, 1977). Hence, a quota of the federal money sticks to the public sector instead of being distributed among citizens.

The literature is characterized by many attempts to explain the flypaper effect. One possibility is “fiscal illusion”: taxpayers interpret a decrease in the average cost of public goods, due to federal grants, as a decrease in their marginal cost. Interestingly, Wyckoff (1991) finds that capital expenditures are particularly sensitive to grants. A second possibility is that voters have imperfect information about intergovernmental grants and budget-maximizing bureaucrats use their hidden information to expand their budget (Wyckoff, 1988). A third explanation is that the flypaper effect results from econometric mis-specification as empirical studies on the flypaper often omit important unobserved input variables (Becker, 1996; Megdal, 1987; Zampelli, 1986).

A new interesting explanation comes from the idea that federal transfers can be endogenous in a regression of the local expenditure (Knight, 2002). A positive correlation between constituent preferences for public goods and intergovernmental grants biases upward the coefficient relating the federal transfer to local expenditure. Knight (2002), using data from the Federal Highway Aid Program shows that, after instrumenting federal highway grants with the political power of state congressional delegations, an increase in grants and private income similarly affects public spending. However, this result is obtained in a model which does not distinguish among different local public goods and, therefore, cannot capture the fact that an increase in highway federal transfer could indirectly affect other public good provisions because of some reallocation of the available funds.

In our paper we stress this point using aggregate data for both public expenditure and federal grants. Furthermore, we argue that the past literature has neglected the effect of federal grants on two other very important variables of state fiscal policy, namely state taxes and deficit. If a flypaper effect is in place, besides an increase in state spending, we should also observe that states do not substantially redistribute grants to their residents via a decrease in state taxes. When states cannot borrow funds, observing that grants are entirely spent by state governments is sufficient to conclude that they are not redistributed to residents via tax cuts. However, as states can and actually do use borrowing, the analysis

of spending alone cannot be sufficient to draw conclusions on the existence of a flypaper effect. State governments may use borrowing to simultaneously redistribute money via tax cuts and spend the entire amount of the grant to provide local public goods.

To address those important issues, we analyze state taxes and budget deficit together with spending during the period 1978-2002 obtaining several new and interesting results. We begin our analysis with some simple OLS regressions of percapita expenditure on percapita federal transfers from which we obtain very big and positive coefficients that, in line with previous studies, indicate the existence of a strong flypaper effect. We subsequently instrument grants with political variables, using senate overrepresentation (Atlas et al., 1995), and a dummy for the political alignment of the governor with President (Hoover and Pecorino, 2005; Larcinese et al. 2006). Once we correct for the endogeneity bias, we find a smaller, but still positive and significant coefficient for federal transfers.¹ This suggests that, even addressing the issue of the endogeneity bias, a flypaper effect (though smaller in magnitude) still exists. However, once we analyze states' taxes and deficit, a more interesting and intriguing pattern emerges. We find that an increase in federal grants is associated with a substantial reduction of state taxes and an increase of state budget deficits. Those results indicate that, contrary to the conclusions of past empirical studies, a significant proportion of the federal transfers is in fact redistributed to residents through tax cuts. Importantly, the increase in spending and the decrease in tax is also associated with an increase in borrowing (budget deficit) suggesting that the state fiscal behaviour might be affected by a "common pool" problem due to partial federal financing of local public goods (Velasco, 1997; Tabellini, Persson, 2000; Goodspeed, 2002). Therefore, the response of state spending to federal grants, doomed as an anomaly by the past literature, might in fact simply be the result of a strategic response of the states to federally funded transfers.

2 Data and methodology

We use data on 48 US continental states from 1978 to 2002². Financial variables have been provided by the US Census Bureau.³ Variables on the economic and demographic characteristics of each state are taken from the Statistical Abstract of the United States. The electoral variables, such as the presidential and senate election results and the data on gubernatorial elections, are also taken from the Statistical Abstract. Summary statistics are reported in Table 1 and the detailed definitions of variables are reported in the appendix.

¹Note that this contrasts with Knight (2002) who does not find a significant coefficient.

²As customary, Alaska, District of Columbia and Hawaii have been excluded.

³U.S. Census Bureau, Annual Survey of State and Local Government Finances and Census of Governments.

We analyze the impact of the *federals grants, economic and demographic variables* on the allocation of state expenditure estimating the following reduced form equation:

$$\begin{aligned} STEXP_{st} &= \alpha_s + \beta_t + \theta_1 \mathbf{TR}_{st} + \theta_2 \mathbf{Z}_{st} + \epsilon_{st}, \\ s &= 1, \dots, 48; \quad t = 1978, \dots, 2002; \end{aligned} \quad (1)$$

where $STEXP_{st}$ is the real per-capita state expenditure in state s at time t . As in all the subsequent regressions, we include state fixed effects (α_s) and year dummies (β_t). \mathbf{Z}_{st} is a vector including real income per capita (*income*), state population (*stpop*), unemployment rate (*unemp*), percentage of citizens aged 65 or above (*aged*) and percentage of citizens between 5 and 17 year old (*kids*). We keep these explanatory variables in all the regressions as standard economic and demographic controls. Finally, \mathbf{TR}_{st} is the federal intergovernmental revenue.

Equation (1) can suffer from an endogeneity bias because the process of allocation of federal grants can reflect the preferences of the states. Hence, we instrument the transfers by using federal political determinants of federal spending like senate overrepresentation, measured with the number of senators on population (*senatorsPC*), which has been shown to be a very strong determinant of the federal grants (Atlas et al., 1995).⁴ We also use as an instrument the political alignment between the President and the Governor, captured by the dummy (*sameP*) taking the value of one when the Governor belongs to the same party of the President and zero otherwise, which is also important in determining federal transfers to the states (Larcinese et al. 2006). We also estimate (1) for current and capital expenditure and instrument by using the same variables.

Finally we estimate the following reduced form equation for the state total taxes:

$$\begin{aligned} STTAX_{st} &= \alpha_s + \beta_t + \theta_1 \mathbf{TR}_{st} + \theta_2 \mathbf{Z}_{st} + \epsilon_{st}, \\ s &= 1, \dots, 48; \quad t = 1978, \dots, 2002; \end{aligned} \quad (2)$$

and for long term debt change, defined as the difference between the issued long term debt and the retired long term debt, we estimate the following:

$$\begin{aligned} \Delta STDEBT_{st} &= \alpha_s + \beta_t + \theta_1 \mathbf{TR}_{st} + \theta_2 \mathbf{Z}_{st} + \epsilon_{st}, \\ s &= 1, \dots, 48; \quad t = 1978, \dots, 2002; \end{aligned} \quad (3)$$

⁴Another interpretation of this variable, which is a constant divided by population, is the stickiness of federal transfers with respect to change in population (Larcinese et al. 2007).

We instrument (2) and (3) as before, by using senators percapita (*senatorsPC*) and the political alignment between the Senate and the Governor (*sameS*).

3 Results

We begin our analysis running an OLS regression of total expenditure on grants and we find that a unit increase in per capita grants generates a 119% increase in per capita total expenditure (table 2, col.1). The same regression for per capita total taxes gives a grants coefficient which is not significant (table 4, col.1). We further run the regression for the long term debt change obtaining again a grants coefficient which is not significant (table 2, col. 3). These three regressions suggest that a strong flypaper effect exists.⁵ All the grant is spent in public expenditure and moreover it stimulates an increase which is 20% larger than the total amount of the grant. If we split the regressions by current and capital expenditure we find respectively that a unit increase in per capita grants generates a 107% and 12% increase of the two spending categories (table 3, col. 1 and 2).

When we instrument the grants we get different results.⁶ The coefficient of the long term debt change (column 4, table 2) becomes positive (0.472) and significant at 1% level. A unit increase in grants causes an almost 50% increase of new debt. At the same time we find an expenditure coefficient of 0.927 (column 2, table 2) and a negative tax coefficient of -0.578, both significant at 1% level (column 2, table 4). In all the regressions we control for income percapita which is positive and significant in the regressions of the expenditure percapita and the of percapita long term debt change and total taxes percapita; unemployment, as expected is positive in the regressions of the expenditure percapita, negative in the tax regression and not significant in the long term debt regression. Finally the population's age is not significant in determining the expenditure and debt regressions.⁷

⁵Previous literature establishes a common accepted rule of thumb according to which state government expenditure should not increase by more than 10% of the federal grant increase (Hines and Thaler, 1995).

⁶After performing the two-stage least squares regressions, we test the validity of the instruments using the Hansen J -test, the minimized value of the GMM criterion function. The joint null hypothesis is that the excluded instruments are valid instruments, i.e., uncorrelated with the error term, and that they are correctly excluded from the estimated equation. Under the null, the test statistic is distributed as χ^2 in the number of overidentifying restrictions. In the instrumented regressions of the long term debt change, the total expenditure and the total taxes the overidentification test is very well passed (respectively: $P = 0.74$; $P = 0.65$; $P = 0.72$). The Hansen-Sargan test is a test of overidentifying restrictions. For the efficient GMM estimator, the test statistic is Hansen's J -statistic, the minimized value of the GMM criterion function. For the 2SLS estimator, the test statistic is Sargan's statistic, typically calculated as $N \times R^2$ from a regression of the IV residuals on the full set of instruments. The J -statistic is consistent in the presence of heteroskedasticity; Sargan's statistic is not. Since we use the command "robust" and therefore assume the presence of heteroskedasticity, which is quite common in a panel of federal states, we use, as STATA does, Hansen's J -statistic, which allows observations to be correlated within groups.

⁷In the total tax equation we control also for the square of per capita income because we expect the

Interestingly, when we instrument grants, we find that while spending still increases substantially, an important part of the federal transfers is redistributed to residents through a decrease in taxes close to 60%. These results are in net contrast with the findings of the previous literature according to which federal transfers are entirely spent by state governments. The generous states fiscal policies implies that the decrease in taxes and the increase in spending is not entirely covered by the increase in federal transfers. As a consequence, it is not surprising to find that the increase in federal grants is also associated with larger state budget deficits (long term debt change). Hence, we conclude that when states receive more federal transfers, on the one hand they spend more, on the other they try to reduce the share of state spending financed through local taxes. This fiscal behaviour suggests the existence of a “common pool” problem in the system of intergovernmental transfers and spending decisions. State expenditures are financed through own resources, federal transfers and borrowing. The increase of federal transfers - which are financed by taxing all the states (federal taxes) - decreases the states own cost of the public good and of the debt since both can be partially financed by federal taxes levied on the other members of the federation. This determines a simultaneous increase in borrowing and public expenditure and a decrease in states own taxes.⁸

4 Conclusions

US states receive sizeable federal transfers that on average, in the period we consider, amount to 24% of the total state expenditure.⁹ Federal transfers, together with state taxes charges and borrowing, are used to finance the provision local public goods.¹⁰ A large empirical literature has documented the existence of an anomaly in the state spending behaviour doomed as “flypaper effect”. Federal grants distributed to states stimulate spending more than equivalent lump sum transfers to individuals. However, omitted variables and endogeneity can both induce an upward bias in the size of the grants coefficients that can be responsible for the anomalous response of state spending to federal transfers. Instrumenting federal grants we find, in fact, that state spending does not increase more than proportionally to federal transfers. However, the increase in spending is still large. On the other

income tax revenue to increase more when the per capita income level is big because of the progressivity of the income tax system.

⁸See (Persson, Tabellini, 2000).

⁹In our sample, the share of total state expenditure covered by federal transfers ranges from a minimum 12% to maximum of 40%.

¹⁰The state taxes cover a 50% of the total spending, charges a 17% and borrowing a 4%. The remaining quota is financed by miscellaneous general revenue, liquor store and utility revenue, and total insurance trust revenue.

hand, the increase in federal transfers entails a reduction of states' taxes. Hence, contrary to the hypothesis of the flypaper effect, a very large fraction of intergovernmental grants is redistributed to citizens via tax cuts. Furthermore, as the total increase in spending and decrease in taxes is more than proportional to the raise of federal grants, then larger federal transfers are also associated with higher budget deficit of the states. These results seem to point more in the direction of a "common pool" problem arising in the provision of local public goods financed through federal transfers, rather than to a flypaper effect. Hence, we conclude that the observed fiscal behaviour of the US states may be the result of their strategic response to federal transfers.

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List of variables

From U.S. Census Bureau, Annual Survey of State and Local Government Finances and Census of Governments

- *STtotexp*: real total expenditure (year 1982 constant thousands USD per capita).
- *STcurrexp*: real current expenditure (year 1982 constant thousands USD per capita).
- *STcapexp*: real capital expenditure (year 1982 constant thousands USD per capita).
- *STTax*: real total taxes (year 1982 constant thousands USD per capita).
- *LTdebt change*: issued long term debt - retired long term debt by state (year 1982 constant thousands USD per capita).
- *Grants*: real grants (year 1982 constant thousands USD per capita).
- *Income*: real income (year 1982 constant thousands USD per capita).

From the Statistical Abstract of the US

- *Stpop*: state population divided by 1000000.
- *Aged*: share of population over 65 years old by state.
- *Kids*: share of population between 5 and 17 years old by state.
- *Unemp*: unemployment rate.

Authors' elaboration on data from the Statistical Abstract of the United States

- *SameP*: dummy variable equal to one when the party affiliation of the governor is the same of the President, and zero otherwise.
- *SameS*: dummy variable equal to one when the party affiliation of the governor is the same of the majority of the Senate, and zero otherwise.
- *SenatorsPC*: $2000/Stpop$.

Table 1: Summary Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Total expenditure	1200	18124.27	4751.094	8929.687	34586.13
Current Expenditure	1200	16568.79	4455.46	7984.276	31505.04
Capital Expenditure	1200	1555.477	614.993	466.3774	4591.115
Total Taxes	1200	8883.773	2224.852	3155.355	17311.61
Total Charges	1200	3094.847	1472.238	777.092	10291.83
LT Debt Change	1200	722.5327	1039.357	-3419.307	11671.9
Grants	1200	4390.734	1518.76	1664.959	12405.13
Income	1200	139240.3	25187.49	85182.52	242255
Unemployment	1200	5.971833	2.105291	2.2	18
Kids	1200	0.1945774	0.029601	0.0233483	0.619861
Aged	1200	0.1230036	0.0224952	0.0454728	0.376015
Population*10 ⁻⁶	1200	5.197397	5.478277	0.425	35.11603
SenatorsPC	1200	0.9729214	0.9943381	0.056954	4.705883
SamePL1	1200	0.3508333	0.4774298	0	1
SameSL1	1200	0.4308333	0.4953993	0	1

Table 2: Impact of Grants on Total Expenditure and Debts.**Dependent variable: real percapita state expenditure and long term debt change, 1978-2002**

	Total Exp	Total Exp	LT Debt Change	LT Debt Change
Grants	1.1909 (14.22)***	0.9270 (3.26)***	-0.0440 (0.65)	0.4271 (2.14)**
Income	0.0820 (11.85)***	0.0801 (10.72)***	0.0118 (2.47)**	0.0152 (3.01)***
Unemployment	202.7308 (6.26)***	210.4918 (6.29)***	50.5289 (1.43)	36.6752 (1.03)
Kids	3,053.7853 (0.94)	1,388.9807 (0.39)	-3,115.7025 (1.26)	-143.9821 (0.05)
Aged	-5,288.2366 (0.81)	-1,229.8036 (0.16)	4,093.6081 (0.82)	-3,150.8028 (0.51)
Population*10 ⁻⁶	-74.4930 (1.60)	-92.1718 (1.80)*	89.4894 (3.66)***	121.0466 (4.12)***
Constant	-1,619.2947 (1.59)	2,992.2843 (1.31)	-1,425.9209 (1.87)*	-4,647.5494 (3.20)***
Observations	1200	1200	1200	1200
State fixed effects	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES
Hansen-J (overid.)		0.6499		0.7392
Uncentered R2		0.9972		0.4908
Centered R2	0.9563	0.9558	0.2832	0.2445

Robust t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Impact of Grants on Current and Capital Expenditure.**Dependent variable: real per-capita current and capital state expenditure, 1978-2002**

	Current Exp	Current Exp	Capital Exp	Capital Exp
Grants	1.0727 (13.98)***	0.7135 (2.79)***	0.1182 (4.78)***	0.2135 (3.42)***
Income	0.0610 (9.84)***	0.0584 (8.48)***	0.0210 (11.40)***	0.0217 (11.80)***
Unemployment	192.4462 (6.68)***	203.0079 (6.69)***	10.2846 (1.16)	7.4839 (0.87)
Kids	-22.4304 (0.01)	-2,287.9942 (0.69)	3,076.2113 (3.34)***	3,676.9705 (3.53)***
Aged	-706.9203 (0.12)	4,816.0338 (0.69)	-4,581.3070 (2.43)**	-6,045.8277 (2.81)***
Population*10 ⁻⁶	-56.0400 (1.20)	-80.0984 (1.57)	-18.4530 (2.09)**	-12.0735 (1.24)
Constant	-105.4216 (0.11)	5,641.3303 (2.67)***	-1,513.8726 (5.51)***	-2,649.0451 (5.37)***
Observations	1200	1200	1200	1200
State fixed effects	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES
Hansen-J (overid.)		0.5835		0.8521
Uncentered R2		0.9971		0.9702
Centered R2	0.9586	0.9574	0.7843	0.7798

Robust t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%

Table 4: Impact of Grants on Total Taxes.**Dependent variable: real percapita total taxes and total charges, 1978-2002**

	Total Taxes	Total Taxes	Total Charges	Total Charges
Grants	0.0146 (0.26)	-0.5780 (2.88)***	-0.0193 (0.43)	-0.1631 (1.04)
Income	0.0292 (1.72)*	0.0439 (2.19)**	0.0117 (3.91)***	0.0106 (3.03)***
Incomesq*10 ⁸	8.97 (1.91)*	3.67 (0.63)		
Unemployment	-58.8607 (2.80)***	-31.9419 (1.40)	9.2946 (0.62)	13.5241 (0.88)
Kids	7,783.9285 (3.19)***	4,515.7520 (2.14)**	-584.5944 (0.33)	-1,491.8477 (0.69)
Aged	-13,921.6475 (2.75)***	-5,539.3846 (1.24)	3,930.3578 (1.12)	6,142.0449 (1.33)
Population*10 ⁻⁶	-88.8882 (2.94)***	-124.9446 (3.48)***	-91.4575 (6.93)***	-101.0917 (5.49)***
Constant	2,865.9091 (2.33)**	6,009.8958 (3.88)***	1,057.3759 (2.87)***	3,235.4141 (2.80)***
Observations	1200	1200	1200	1200
State fixed effects	YES	YES	YES	YES
Year fixed effects	YES	YES	YES	YES
Hansen-J (overid.)		0.7212		0.4934
Uncentered R2		0.9942		0.9815
Centered R2	0.9146	0.9014	0.9012	0.8994

Robust t statistics in parentheses

* significant at 10%; ** significant at 5%; *** significant at 1%