

Appendix

Our empirical analysis focuses on the link between one component of government expenditure (pensions expenditures) and income growth. The empirical analysis uses data from 50 U.S. states from 1991 to 2017. We follow [Devarajan et al. \(1996\)](#), in estimating whether public pension expenditures are “productive” government expenditures.

Table 1: Descriptive Statistics

Variables	Mean	SD
Per-capita income growth (%)	3.74	2.61
Pensions related government expenditure as a % of TGE	7.30	2.63
Total government expenditure (TGE) as a % of Income	14.94	3.98
Log initial per capita income (constant 2012 U.S. \$)	10.38	0.32
Population growth (%)	0.97	0.85

The dependent variable is chosen as the per-capita growth rate of personal income. Our key explanatory is the share of pensions expenditure in total government expenditure. To control for level effects, we also include the share of government expenditure in state personal income. Other controls include population growth and initial income per capita.

As in [Devarajan et al. \(1996\)](#), we include the initial level of income to control for convergence effects. A major issue that must be addressed before the relationship between state budgets and economic growth can be tested is the issue of convergence in growth rates across states. Convergence implies a negative relationship between growth rates and the initial level of income. The assumption is that when states begin with lower levels of income they will experience higher rates of economic growth. In the absence of barriers to the mobility of factors of production, income in low-income states will tend to converge with that of higher income states. Differences in growth rates may be due to the differences in initial levels of income. A regression analysis of the relationship between budgetary decisions and income growth would have to control for the initial level of income to account for the convergence of state growth rates.

As pointed out by [Devarajan et al. \(1996\)](#), in order to minimize the joint endogeneity and possible reverse causality between spending and growth, we use a five-year forward moving average of the dependent variable to eliminate business cycle-type short-run fluctuations induced by shifts in public spending.

We begin by estimating the following equation:

$$PCIG_{(t+1,t+5)}^i = \alpha_1(TGE/PI)_t^i + \alpha_2(P/TGE)_t^i + \alpha_3 I_t^i + \alpha_4 POP_t^i + \mu_t^i$$

Where $PCIG_{(t+1,t+5)}^i$ is the five-year forward moving average of per-capita personal income growth for state i . $(TGE/PI)_t^i$ is the share of total government expenditure in gross domestic product for state i at time t and $(P/TGE)_t^i$ is the share of pension expenditure in total government expenditure for state i at time t . I_t^i is the log of initial per capita income and POP_t^i population growth. The error term is μ_t^i . We also include state and year fixed effects.

Table 2: Results with two-way fixed effects

Estimation technique: 5-year moving average – Two-way fixed effect	
Dependent variable: per capital personal income growth (%)	
Pensions related government expenditure as a % of TGE	-0.076 *** (0.026)
Total government expenditure as a % of income	-0.12 *** (0.027)
Log initial income (constant 2012 U.S. \$)	-15.03 *** (0.90)
Population growth (%)	0.23 *** (0.087)
Observations	1300
Number of states	50
Adjusted R^2	0.6483

As expected, the initial level of income is negatively correlated with future growth in personal income (convergence). Also expected is the fact that population growth is positively linked to income growth. The level effect of total government expenditure on per-capita growth is negative and statistically significant. This is consistent with the fact that the dead weight loss associated with higher distortionary state (*income*) taxes exceeds the effect of an increase in state government expenditures.

Pensions expenditures are also negatively related to per-capita growth. This relationship is statistically significant. A unit increase in the share of government expenditures spent on pensions reduces the growth rate of per-capita personal income by 0.08 percentage points.

Figure 1: State governments that spent a larger percentage of their total expenditures on pensions experienced lower income growth during the past three decades

Average pension spending as a share of total expenditures and per capita personal income, 1991-2017

Source: Bureau of Economic Analysis, U.S. Census Survey of State and Local Government Finances

