

Shocks to the Property Tax Base and Implications for Local Public Finance

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Introduction

- Paper has four sections:
 - Introduction
 - A general theoretical model
 - An optimal tax response to a shock
 - Summary and conclusions
- I will emphasize section 3 on the optimal tax response in this presentation

A general theoretical model

- Total own-source revenue for the local government is:

$$R = R_A + R_B = t_A X_A + t_B X_B$$

- And the local government's budget constraint, including an intergovernmental grant is:

$$t_A X_A + t_B X_B = k(s)(1 - m) - z$$

A general theoretical model

- Solving for the alternative tax rate as a function of the property tax rate we get:

$$t_B = [k(s)(1 - m) - z - t_A X_A] / X_B$$

- From which we can compute the trade-off in tax rates:

$$\frac{dt_B}{dt_A} = -\frac{X_A}{X_B}$$

A general theoretical model

- Solving for the property tax rate, we have:

$$t_A = [k(s)(1-m) - z - t_B X_B] / X_A$$

- From which we can derive an expression for the change in property tax rate required for a change in the property tax base:

$$\frac{\partial t_A}{\partial X_A} = - \frac{[k(s)(1-m) - z - t_B X_B]}{X_A^2}$$



Impact of a property tax base shock

- Note that a negative shock to the property tax base causes the tax rate to rise inversely proportional to the square of the property tax base
- Furthermore, as the property tax base shrinks, the required increase in the tax rate to maintain the same level of public good provision accelerates

An optimal tax response to a shock

- An alternative way to think about adjustment to a property tax base shock, incorporates the marginal efficiency or adjustment costs of altering tax revenue sources
- We assume that a shock to the property tax base raises the effective rate of taxation in the short run as it reduces the market value of the property, but not the assessed value or the nominal tax rate
- With an increase in the effective tax rate the efficiency cost of raising tax revenue using the property tax increases

Model set-up

- There are two revenue instruments: $R = R_A + R_B$
- Efficiency or adjustment costs are proportional to the square of the tax rates, so in the short-run adjustment costs are proportional to the square of the revenue generated by each tax
- Denote the adjustment cost as a function of local government characteristics X as $\theta_i(X), i = A, B$
- The larger θ the less efficient is the tax source as the marginal efficiency cost is higher

Utility of revenue net of adjustment costs

- The objective is to maximize the utility of revenue generated, net of efficiency or adjustment costs:

$$\lambda V(R, X) - .5\theta_A(X)R_A^2 - .5\theta_B(X)R_B^2$$

- where λ is a parameter reflecting the strength of the preference for local government revenue, and the efficiency costs are equally weighted

First order condition

- The first order condition indicates that the share of revenue generated using the property tax (instrument A) should be inversely proportional to the efficiency cost of generating revenue with that tax instrument, for a given efficiency cost of the alternative tax instrument (instrument B):

$$\frac{R_A}{R} = \frac{\theta_B}{\theta_A(x) + \theta_B(X)}$$

Proposition 2

- An increase (decrease) in the taste for government, in the sense that the utility of government revenue is directly proportional to λ increases, will increase (decrease) the optimal amount of revenue generated from both tax instruments.

Proposition 3

- An efficiency improvement (detriment) in tax instrument A , which reduces the size of the parameter θ_A will increase (decrease) the optimal amount of revenue reliance on that tax instrument.

Proposition 4

- An efficiency improvement (detriment) in tax instrument A will decrease (increase) the optimal reliance on the other tax instrument B , but will increase (decrease) overall revenue generated by the combination of the two tax instruments.



Proposition 5

- Less than full replacement is the optimal response to a shock to the tax system that reduces tax revenue from one instrument.

An empirical test

- The theory suggest that we can run regressions of the type:

$$R_{B_{it}} = \alpha_i + \beta_0 R_{B_{i,t-1}} + \beta_1 R_{A_{it}} + \beta_2 X_{it} + \beta_3 X_{it} R_{A_{it}} + \mu_t + \varepsilon_{it} \quad (26)$$

Test for replacement revenue

- We can then compute the expression

$$\phi = \frac{-\beta_1}{(1 - \beta_0)}$$

- Where $\phi = 1$ indicates full replacement and $\phi = 0$ indicates no replacement
- In example case of 1997 Nebraska elimination of ad valorem tax on motor vehicles, $\hat{\beta}_0 = 0.238$ $\hat{\beta}_1 = 4.734$
- Hence, $\phi = 0.064$ and the long-run replacement property tax revenue was just 6%

Summary and conclusions

- In the traditional model a shock to the property tax base:
 - Increases reliance on the alternative tax instrument, the amount of which depends on the property tax rate and the alternative tax instrument base
 - And, a shock to the property tax base causes the property tax rate to rise by an amount that depends on the cost of providing the public good, the parameters of the intergovernmental grant mechanism, and the two tax bases

Summary and conclusions

- In the optimal tax approach, with adjustment costs reflecting efficiency costs of tax collection, I show that:
 - A shock to the property tax base decreases the optimal reliance on that tax instrument,
 - An increase in the reliance on the alternative tax instrument,
 - A reduction in the overall revenue generated by the two tax instruments, and
 - Incomplete replacement revenue