

Preliminary and Incomplete

Why do we subsidize subnational debt? *

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Mai 30, 2024

Abstract

Many bad cases have caused subnational debt to be associated with crises. There is plenty of theoretical, empirical, and policy literature on why and how subnational debt should be limited and whether fiscal rules and limits are effective in containing overborrowing and avoiding further crises. However, in reality, we observe the opposite. Across the world, federative and unitary central governments subsidize subnational public debt in many ways. In this paper I build a model to understand the economics behind it. A simple, tractable model highlights the tradeoffs between the efficiency gains of fiscal decentralization, the hazards of subnational debt, the externalities of subnational public goods, and the information frictions about local preferences.

Keywords: public finance, fiscal policy, fiscal federalism, public debt

JEL Classification: E6, H1, H74, H77, H81

* I thank my supervisor, Alexander Ludwig, my co-supervisor Ester Faia, the colleagues from the chair of Public Finance and Macroeconomics Dynamics, and from the Frankfurt Quantitative Macro Group (FQMG) for very useful comments. The paper also benefited from the rich interactions with Sean Dougherty and Pietrangelo de Biase, and other participants in the OECD Network on Fiscal Relations across Levels of Government. As usual, all errors are my own. Research funding from the State of Hessen is gratefully acknowledged.

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<https://abrochado.github.io/>

1. Introduction

Many bad cases have caused subnational debt to be associated with crises. Not surprisingly, most recommendations from theory and practice go in the direction of restricting subnational public debt. However, the data shows that most central governments do the opposite and subsidize subnational borrowing. Part of the explanation can be related to the efficiency gains of decentralized public goods provision and positive externalities of public goods across regions. In this work I build a simple model to highlight the tradeoffs that determine the choice for decentralizing public debt and subsidizing or restricting it.

A handful of country cases can exemplify the occurrence of subsidies to subnational debt. The United States gives tax exemptions to approximately 90% of subnational bonds issued and, during the Global Financial Crisis, paid part of the interest for subnational bonds issued (Brochado et al., 2024). Brazil offers countless lines of subsidized credit and guarantees and restructures subnational debt every couple of years (with a discount) (Brochado and Cruz, 2022). The Eurozone provided implicit guarantees and a big bailout program with big implicit net transfers to distressed member states (Gourinchas et al., 2022). India provides centralized issuance (operation) of subnational bonds (and arguably implicit guarantees) (Brochado et al., 2024). The German supreme court granted federal bailout to debt distressed states (Heppke-Falk and Wolff, 2008). Multilateral institutions, give subsidized credit to subnationals in big emerging countries that are (or would be) able to access competitive credit markets on their own (Smoke, 2023).

To understand the economics behind this choice between restricting or subsidizing subnational debt, I build a simple, tractable two-period model with many regions. Representative households consume private and public goods. In each region, households have different preferences for the public good. The central government does not know the preference in each region, so there is a case for decentralization. Local governments know the preferences

of their households, so the tailored allocation would be feasible with subnational public debt. On the other hand, the public good entails a positive externality across regions, so there is also a case for a central (coordinated) decision. Moreover, regions can free ride on their peers because of central government subsidizing (guaranteeing) subnational public debt.

The model enables the understanding of how the tradeoffs qualitatively depend on key fiscal federalism parameters. A quantitative version of the model can then be used to replicate the observed levels of subsidies to subnational public debt.

In what follows I present a very brief literature review, describe the model, and outline the next steps of the research.

2. Literature Review

There is a vast and long dating literature on fiscal federalism spanning through various dimensions of decentralization (see, for instance, Oates, 2005 for a thorough survey).

In particular, the model developed here is inspired by three important papers from the micro- and macroeconomic literature on fiscal federalism and public debt. First, it draws inspiration from the model of efficient decentralized provision of public goods in Oates (1972). Second, it borrows the idea of a simple two period structure with debt and externalities from the seminal paper of Chari and Kehoe (2008) and the more recent paper from Dovis and Kirpalani (2020).

There are roughly three major forces identified and studied in this literature that act in favor or against decentralization of fiscal policy, namely: i) efficiency of decentralized provision if preferences are heterogeneous across regions; ii) inefficiency of decentralized provision when there are positive externalities in the public good; and iii) free riding / moral hazard of decentralized public debt. In this work I contribute to the literature by

including all three of them in a simple and tractable model, which I describe next.

3. The Model

In a two-period world, there are N regions (subnational governments) indexed by $n \in \{1, 2, \dots, N\}$. Each region has the same size with a representative household who consumes a private good and a local public good. The preference parameter for the local public good θ_n can differ across regions (interregional heterogeneity). Households discount future utility by β and receive exogenous income y_{tn} that may vary in time and across regions. The local public good is durable (infrastructure, education and health, amenities). For simplicity, the household has a separable log-utility function and the depreciation of the public good is zero.

3.1. Autarky

First consider there is no central government and no possibility of borrowing.

The social planner solves

$$\begin{aligned} \max U_n &= u(c_{0n}) + \theta_n v(g_{0n}) + \beta[u(c_{1n}) + \theta_n v(g_{0n})] \\ \text{s.t.} \end{aligned}$$

$$c_{0n} + g_{0n} = y_{0n}$$

$$c_{1n} = y_{1n}$$

Assuming $u(.) = \ln(.)$ and $v(.) = \ln(.)$ we have the first order condition:

$$g_{0n} = (1 + \beta)\theta_n c_{0n} \tag{1}$$

Using (1) in the first-period budget constraint leads to:

$$c_{0n}^{aut} = \frac{y_{0n}}{1 + (1 + \beta)\theta_n} \tag{2}$$

$$c_{1n}^{aut} = y_{1n} \quad (3)$$

$$g_{0n}^{aut} = \left[\frac{1}{1 + \frac{1}{(1+\beta)\theta_n}} \right] y_{0n} \quad (4)$$

where “aut” in the superscript refers to the solution in autarky.

Note that, since $\beta > 0$ and $\theta_n \geq 0$, we necessarily have that $g_{0n}^{aut} \leq y_{0n}$. Moreover, the optimum level of public good provision in the limiting cases for the preference parameter are, intuitively, as follows:

$$\lim_{\theta_n \rightarrow 0} g_{0n}^{aut} = 0 \quad \text{and} \quad \lim_{\theta_n \rightarrow \infty} g_{0n}^{aut} = y_{0n} \quad (5)$$

A solution with a (Ramsey) subnational government taxing income (also with no borrowing) coincides with the autarky social planner solution.

Substituting the solutions derived above (equations (2), (3), and (4)) using the log-utility function we get the regional welfare in autarky:

$$\begin{aligned} w_n^{aut} = & [1 + (1 + \beta)\theta_n] \ln y_{0n} + \beta \ln y_{1n} \\ & + (1 + \beta)\theta_n \ln[(1 + \beta)\theta_n] - [1 \\ & + (1 + \beta)\theta_n] \ln[1 + (1 + \beta)\theta_n] \end{aligned} \quad (6)$$

3.2. Subnational Social Planner with Debt

Now assume the subnational social planner can borrow from abroad (rest of the country or anywhere) with an exogenous interest rate

$$\max U_n = u(c_{0n}) + \theta_n v(g_{0n}) + \beta [u(c_{1n}) + \theta_n v(g_{0n})]$$

s.t.

$$c_{0n} + g_{0n} = y_{0n} + d_{1n}$$

$$c_{1n} = y_{1n} - (1 + r)d_{1n}$$

From which we get the following first order conditions:

$$c_0: \quad g_{0n} = (1 + \beta)\theta_n c_{0n} \quad \text{Same as} \quad (1)$$

$$d_1: \quad \frac{g_{0n}}{c_{1n}} = \frac{(1 + \beta)\theta_n}{\beta(1 + r)} \quad (7)$$

Note that from (1) and (7) we get the usual Euler Equation for c_{0n} and c_{1n} .

Isolate c_{0n} and c_{1n} from (1) and (7), substitute in the budget constraints and join the resulting expressions by d_{1n} to get the following expression for g_{0n} :

$$g_{0n}^{spd} = \frac{\theta_n}{1 + \theta_n} \left[y_{0n} + \frac{y_{1n}}{(1 + r)} \right] \quad (8)$$

And using this in (1) and (7)

$$c_{0n}^{spd} = \frac{1}{(1 + \beta)(1 + \theta_n)} \left[y_{0n} + \frac{y_{1n}}{(1 + r)} \right] \quad (9)$$

$$c_{1n}^{spd} = \frac{\beta(1 + r)}{(1 + \beta)(1 + \theta_n)} \left[y_{0n} + \frac{y_{1n}}{(1 + r)} \right] \quad (10)$$

where “spd” stands for the solutions for the social planner with debt¹.

This allocation is supported by a debt level of:

$$d_{1n}^{spd} = \left[\frac{\theta_n}{1 + \theta_n} + \frac{1}{(1 + \beta)(1 + \theta_n)} \right] \left[y_{0n} + \frac{y_{1n}}{(1 + r)} \right] - y_{0n} \quad (11)$$

Substituting the solutions derived above (equations (8), (9), and (10)) in the log-utility function we get the regional welfare:

$$\begin{aligned} w_n^{spd} = & (1 + \beta)(1 + \theta_n) \ln \left(y_{0n} + \frac{y_{1n}}{1 + r} \right) + \beta \ln[\beta(1 + r)] \\ & + (1 + \beta)[\theta_n \ln \theta_n - (1 + \theta_n) \ln(1 + \theta_n) \\ & - \ln(1 + \beta)] \end{aligned} \quad (12)$$

¹ This solution coincides with the solution of a subnational Ramsey planner that can borrow in the first period and pay the debt using taxes collected in the second period.

We can compare the regional welfare derived from the solutions with debt and in autarchy. For simplicity we assume that $r = 0$ and $y_{0n} = y_{1n} = y$. Then

$$w_n^{aut} = (1 + \beta)(1 + \theta_n) \ln y - \xi \quad (13)$$

$$w_n^{spd} = (1 + \beta)(1 + \theta_n) \ln y + \varsigma \quad (14)$$

where $\xi > 0$ and $\varsigma \geq 0$ (see Appendix).

So, as expected, $w_n^{spd} > w_n^{aut}$.

3.3. Ramsey Central Planner with Central Debt and Information Friction

Now assume there is only a central planner providing the (subnational) public good. Public good provision in the first period is funded by debt, which is paid in the second period with proceeds from a proportional income tax. Further assume that the central government does not know the exact local preferences (or is obliged to impose a homogeneous tax rate)². So, the decisions are made based on the average preference parameter $\bar{\theta} = \frac{1}{N} \sum_{n=1}^N \theta_n$.

Assume there is no subnational government (or they are only administrative units that cannot tax nor borrow). The subnational public good is provided **according to the local tax collection**³ (with a centrally defined uniform fiscal policy). The Ramsey planner will then solve the following problem

$$\max u(c_{0n}) + \bar{\theta} v(g_{0n}) + \beta [u(c_{1n}) + \bar{\theta} v(g_{0n})]$$

s.t.

$$c_{0n} + g_{0n} = y_{0n} + b_{1n}$$

$$c_{1n} = y_{1n} - (1 + r)b_{1n}$$

² One can also think of a political friction where the political forces, or the constitution of the federation, demand isonomic treatment for the federated jurisdictions.

³ So far, there is no room for free riding on other regions' taxes.

where b_{1n} stands for the bonds sold by the central government to finance this public good.

The solution has the same form as the subnational social planner's, apart from the preference parameter. To simplify notation, we define $h_n = y_0 + \frac{y_1}{1+r}$ to be the human capital, or lifetime discounted income. Then we have the following expressions:

$$g_{0n}^c = \frac{\bar{\theta}}{1 + \bar{\theta}} h_n \quad (15)$$

$$c_{0n}^c = \frac{1}{(1 + \beta)(1 + \bar{\theta})} h_n \quad (16)$$

$$c_{1n}^c = \frac{\beta(1 + r)}{(1 + \beta)(1 + \bar{\theta})} h_n \quad (17)$$

where the superscript “c” denotes the solutions for the central planner with debt and limited information.

Therefore, regions with a higher-than-average preference for (local) public goods will receive fewer public goods and more private goods than what would be optimal, and vice-versa for regions that put less weight on public goods than the average. For sure, every region that has preferences different than the average will be worse off if the local public good is provided by the central government, when the central government does not know the preferences.

This is not surprising but serves as reference for the discussions that will follow.

4. Next steps

The paper will proceed by adding to the above model: i) a positive externality across regions of the subnational public good; ii) an instrument and motive for the central government to reshuffle resources in the second period (effectively creating the free riding in subnational debt). The solution to this model will provide insights into how the parameters of regional heterogeneity and the positive externality of the public good interact with the negative free-riding externality and the information friction.

The work will also include an empirical description of the subsidies and other types of incentives given to subnational debt across the world, using data available for major federative countries, like United States, Canada, Brazil, Spain, India, and Germany.

The benchmark tractable model will then be extended into a quantitative macro model aiming to replicate the observed levels of subsidies to subnational public debt.

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