A Political Economy Theory of Partial Decentralization

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In all modern democratic nations, citizens are subject to multiple levels of government: the national government, provinces/states, local governments, etc.

However, studies of federalism often pose the question as either full centralization or full decentralization:

- see, e.g., Besley & Coate (2003), Persson & Tabellini (1994, 1996), etc.

In this paper, on the other hand, we wish to study the degree of decentralization in a society:

- how much decisionmaking power is devolved to local governments, and what does this decision depend on?
We consider how the motives to both redistribute, and to commit not to redistribute too much, can inform us regarding the answer to this question.

To answer this question this paper builds on two distinct literatures:

1. The tax competition literature: this literature takes governments as either
   - Citizen-welfare maximizers, as in, Oates (1972), Zodrow & Mieszokowski (1986), Wilson (1999), where competition leads to a “race to the bottom”, or
   - Leviathan governments that are well restrained by competition (Edwards & Keen, 1996).

Results

• We show that federalism can be understood as an institution that allows for some precommitment regarding capital taxation.
  
  • See, for instance, Acemoglu and Robinson (2001, 2006), among others, for theories of how other political institutions can be understood in terms of precommitment.

• We then show that we can understand the degree of decentralization in a polity by understanding how this desire for commitment power depends on inequality and the redistibutive efficiency of public goods.
  
  • We can understand the decentralization of the many public goods without spillovers and taste heterogeneity.
Agent Utility

- Agents have a utility function

$$u(c^n, s(j), k^n; \beta^n) = c^n_j + \int_0^1 G(s(p)) \, dp - (k^n - \beta^n) \, l\left(\frac{k^n}{\beta^n}\right)$$

where

- $c^n_j$ is the consumption of agent $n$ who lives in district $j$.
- $s(p)$ is the spending on public good $p$; there is a continuum of size 1 of homogenous public goods.
- $G(s(p))$ is the utility from public good $p$. It is a smooth, increasing, and concave function.
- $k^n$ is the amount of capital invested by agent $n$.
- $\beta^n$ is the initial type of agent $n$, distributed according to $H(\cdot)$ on $[\beta^\text{min}, \beta^\text{max}]$.
- $l$ is the cost of generating capital $k^n$ given type $\beta^n$. 
The economy is divided into $J$ identical districts, each with a mass 1 of population.

There are two levels of government:

- Local governments, who are responsible for public goods $p \in [0, \lambda]$, and
- The central government, who is responsible for public goods $p \in (\lambda, 1]$.

Each level of government has access to both a capital tax $\tau$ and a head tax $T$.

Each level of government must satisfy its budget constraints:

$$\int_0^\lambda s_j(p) \, dp = \tau_j k_j + T_j$$ for all $j = 1, \ldots, J$

$$\int_\lambda^1 s(p) \, dp = \tau k + T$$

where $k_j$ is the amount of capital invested in district $j$ and $k$ is the total level of capital in the economy.
Production

• Consumption goods are produced according to a production function $F(k_j)$ by a continuum of firms at the district level using capital
  • $F(k_j)$ is increasing, weakly concave, and smooth.
• Let $\rho_j$ denote the pre-tax rate of return to capital in district $j$. Perfect intradistrict competition implies that
  \[ \rho_j = F'(k_j) \]
• We also assume perfect interdistrict competition for capital, so that
  \[ r = \rho_j - \tau_j - \tau \]
where $r$ is the net return to capital.
• Given the economy, consumption is given by

\[ c_j^n = rk^n + F (k_j) - \rho_j k_j - T_j - T \]

where

• \( r \) is the net return to capital.
• \( k^n \) is the capital of agent \( n \).
• \( F (k_j) \) is the total production in his district.
• \( \rho_j k_j \) is the returns to capital owners of capital in district \( j \).
• \( T_j \) is the head tax of district \( j \).
• \( T \) is the head tax of the central government.
Formal Definition of Equilibrium

For a given level of decentralization $\lambda$, a subgame perfect equilibrium is a capital investment decision function $k(r, \beta)$ for $\beta \in [\beta^{\min}, \beta^{\max}]$, policy decisions $T, \tau, s(p)$ for $p \in [\lambda, 1]$, \( \begin{cases} T_j, \tau_j, \rho_j, s_j(p) \text{ for each } p \in [0, \lambda] \end{cases} \) \( j=1, \ldots, J \), an after-tax rate of return on capital $r$, and investment location decisions such that

1. Capital markets are perfectly competitive both intra- and interdistrict: $\rho_j = F'(k_j)$ in each district and $r$, the after-tax rate of return in each district, is $\rho_j - \tau - \tau_j$.

2. The district citizens, taking the rate of return on capital $r$ and their budget constraint as given, choose the Condorcet winner in their policy space.

3. The citizenry, taking the central government budget constraint as given, chooses the Condorcet winner in its policy space.

4. Agents choose to invest an amount of capital $k(r, \beta), \beta \in [\beta^{\min}, \beta^{\max}]$ to maximize their utility.
Equilibrium Variables

- Let $k(\beta^n, r)$ be the amount of capital held by an agent with endowment $\beta^n$ who expects an after-tax rate of return on capital $r$.
- Total capital $k(r)$ is given by

$$k(r) \equiv \int_{\beta_{\min}}^{\beta_{\max}} k(\beta, r) \, dH(\beta)$$

and the capital of the median type is given by

$$k^{\text{med}} \equiv k(\beta^{\text{med}}, r)$$

- We introduce $\Phi(r)$ as a measure of inequality:

$$1 < \Phi(r) \equiv \frac{k(r)}{k^{\text{med}}} < \infty$$
The Problem of the Central Government

- We first consider the optimal policy of the central government from the perspective of the median type.
- The optimal policy solves

\[
\max_{\tau, s(p)} \left\{ c_j^{med} + \int_0^\lambda G(s_j(p)) \, dp + \int_\lambda^1 G(s(p)) \, dp - \left( k^{med} - \beta^{med} \right) I\left( \frac{k^{med}}{\beta^{med}} \right) \right\}
\]

subject to

\[
\int_\lambda^1 s(p) \, dp = \tau k + T.
\]
- However, the problem simplifies to

\[
\max_{\tau, \tau, s(p)} \left\{ -\tau k^{med} - T + \int_\lambda^1 G(s(p)) \, dp \right\}
\]
The Median Type’s Solution

- Concavity of $G$ implies that spending should be equalized across public goods, i.e.

$$s(p) = \frac{\tau k + T}{1 - \lambda}$$

- As $\Phi > 1$, the median type prefers capital taxation over head taxation, hence

$$\hat{T} = 0$$

- Finally, solving for $\hat{\tau}$ we obtain

$$G' \left( \frac{\hat{\tau} k}{1 - \lambda} \right) = \Phi^{-1} < 1$$

so that public goods are oversupplied relative to first best, as they act as a redistibutive channel.
The Problem of the District Government

- The problem of a generic voter \( n \) in district \( j \) is:

\[
\max_{k_j, T_j, \tau_j, s_j(p)} \left\{ \begin{array}{l}
c_j^n + \int_0^\lambda G(s_j(p)) \, dp + \int_1^\lambda G(s(p)) \, dp - \\
(k^n - \beta^n) l \left( \frac{k^n}{\beta^n} \right)
\end{array} \right\}.
\]

subject to

\[
\int_0^\lambda s_j(p) \, dp = \tau_j k_j + T_j
\]

- Again, the problem simplifies:

\[
\max_{k_j, T_j, \tau_j, s_j(p)} \left\{ F(k_j) - \rho_j k_j - T_j + \int_0^\lambda G(s(p_j)) \, dp_j \right\}
\]

which is independent of agent type.
• Again, the concavity of $G$ implies that

$$s_j(p) = \frac{\tau_j k_j + T_j}{\lambda}$$

• The first order condition with respect to $k_j$ yields

$$F'(k_j) - \rho_j + \tau_j = 0$$

so that $\hat{\tau}_j = 0$.

• Finally, we obtain by differentiating with respect to $T_j$:

$$G' \left( \frac{\hat{T}_j}{\lambda} \right) = 1$$
Summary

Theorem
The central government will exclusively use capital taxes, and will set $G'(\frac{\tau_k}{1-\lambda}) = \Phi^{-1}$, which provides more than the efficient amount of public good.

Theorem
Each district government will efficiently provide each public good (i.e. $G'(s_j(p)) = 1$ for all $j = 1, ..., J, p \in [0, \lambda]$) using only a head tax.

Theorem
If $\Phi$ does not increase too fast in $\tau$, any standard equilibrium is unique, and the equilibrium capital tax rate $\tau_j + \tau$ is a decreasing function of decentralization $\lambda$. 
To study the equilibrium level of decentralization and characterize how it changes with respect to the parameters of the economy, we now assume a number of functional forms.

- **Linear production technology**: \( F(k) = Ak \)
- **Linear capital investment costs**: \( I\left(\frac{k^n}{\beta^n}\right) = \frac{k^n}{\beta^n} \)
- **Power law public goods**: \( G(s(p)) = \frac{[s(p)]^\alpha - 1}{\alpha} \), for \( \alpha < 1 \), where \( \alpha \) denotes the *redistributive efficiency* of the public good.
With these functional forms, we can solve for a number of equilibrium outcomes:

\[ \Phi = \frac{\bar{\beta}}{\beta_{\text{med}}} \]

\[ k^n = \frac{\beta^n}{2} (A - \tau - 1) \]

\[ \tau = \Phi \gamma + 1 \frac{1 - \lambda}{\bar{k}} \text{ where } \gamma = \frac{\alpha}{1 - \alpha} \]

Note that \( \Phi \) is fixed with respect to the choice of government variables.

**Theorem**

*The linear-quadratic model admits a unique standard equilibrium with the following comparative statics:*

1. \( \frac{\partial k^n}{\partial \lambda} > 0 \)
2. \( \frac{\partial k^n}{\partial \alpha} < 0 \)
3. \( \frac{\partial k^n}{\partial \Phi} < 0 \)
4. \( \frac{\partial k^n}{\partial A} > 0 \)
The Constitutional Problem

- The previous analysis has fixed the level of decentralization.
- However, now consider a constitutional stage where $\lambda$ is determined:

$$\max_{\lambda} \left\{ k_{med} (A - \tau) - \left( k_{med} - \beta_{med} \right) \frac{k_{med}}{\beta_{med}} - T_j + \right\}$$

$$\left(1 - \lambda\right) \frac{\left(\frac{\tau k}{1-\lambda}\right)^\alpha - 1}{\alpha} + \lambda \frac{\left(\frac{T_j}{\lambda}\right)^\alpha - 1}{\alpha}$$

$$\max_{\lambda} \left\{ k_{med} (A - \tau) - \left( k_{med} - \beta_{med} \right) \frac{k_{med}}{\beta_{med}} - \right\}$$

$$\lambda + \left(1 - \lambda\right) \frac{\Phi^\gamma - 1}{\alpha}$$

- This program is well-defined and concave.
The Determinants of Decentralization

- The constitutional stage problem has the following first-order condition:
  \[-k^{med} \frac{d\tau}{d\lambda} = 1 + \frac{\Phi\gamma - 1}{\alpha}\]

- The right hand side is the gain from additional decentralization: we can write
  \[\frac{d\tau}{d\lambda} = \frac{\partial\tau}{\partial\lambda} + \frac{\partial\tau}{\partial k} \frac{\partial k}{\partial\lambda}\]
  so there are two benefits to decentralization:
  - There is a direct effect on taxation of capital, as the national government now provides less public goods, and
  - There is an indirect effect, as when the national government provides less public goods, people will invest in more capital, and hence tax rates will be lower.

- The left hand side are the costs of decentralization:
  - There is a direct cost, in that the local governments now provide more public goods, and
  - There is an indirect cost, in that the level of provision of these locally provided public goods is lower.
Comparative Statics of Decentralization

Theorem

The optimal degree of decentralization is characterized by:

1. \( \frac{\partial \lambda^*}{\partial A} \leq 0 \)
2. \( \frac{\partial \lambda^*}{\partial \alpha} \geq 0 \)
3. \( \lambda^* \) is first decreasing and then increasing in \( \Phi \).

Optimal Decentralization \( \lambda^* \)
Conclusions

- We have constructed a theory of federalism that relies on the effects of tax competition
  - Our theory is independent of spillovers and taste heterogeneity
  - It provides an explanation of the degree of decentralization
- We have shown that the degree of decentralization is
  - increasing in the redistributive efficiency of the public good and
  - decreasing in capital productivity
- We have focused on political economy issues, but this is not vital: the same issues would arise in a world of identical agents if labor taxes were even slightly distortionary *ex post*