Optimal Taxation and Public Provision for Poverty Minimization

Ravi Kanbur (Cornell University)
Jukka Pirttilä (UNU-WIDER)
Matti Tuomala (University of Tampere)
Tuuli Ylinen (Aalto University)

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Introduction

- Many developing countries suffer from high inequality
- Typically the only to way for a government to affect inequality and poverty is via redistributive taxes and transfers, as well as public good provision
- In low-income countries, these systems are still in early age: need to upgrade towards more comprehensive systems

Our paper

- Characterize the optimal redistributive tax-transfer system for developing countries
  - Labour income tax, commodity taxes
  - Cash transfer, public provision of public and private goods
- Employ optimal tax theory framework (Mirrlees 1971)

Our paper

- Modifications to optimal tax framework for developing countries
- Depart from fully nonlinear taxes
    - Consider a linear income tax, universal benefit
    - Follow linear tax literature (Dixit&Sandmo 1977, Piketty&Saez 2013)
- Depart from social welfare maximization as objective (based on individual utilities)
    - Consider poverty minimization as explicit objective
    - Follow general non-welfarist literature (Seade 1980, Kanbur, Pirttilä&Tuomala 2006) and poverty minimization literature (Kanbur,Keen&Tuomala 1994, Pirttilä&Tuomala 2004)

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Preview of results

- Changing from welfare maximization to poverty minimization, some of the standard optimal tax results change

  - More sensitive to labour supply behaviour
  - Uniform commodity taxes are never optimal; favour differentiated commodity taxes

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The model

- Government's instruments:
  - linear income tax τ
  - universal lump-sum benefit b
  - public provision: pure public good G or quasi-private good $s = G + h$
  - commodity taxes (subsidies) t_j

The model

- ▶ N individuals with labour income $z^i = w^i L^i$,
  consumption $c^i = (1 - \tau)z^i + b$
- ▶ Government's objective
  - ▸ Social welfare maximization
    $max \ \sum_i W\left(V^i(1-\tau, b)\right)$ s.t. $\tau \sum_i z^i = Nb + R$
  - ▸ General non-welfarism
    $max \ \sum_i F(c^i, z^i)$ s.t. $\tau \sum_i z^i = Nb + R$
  - ▸ Poverty minimization as a case of non-welfarism
    $\sum_i F(c^i, z^i) = \sum_i D\left(c^i, \bar{c}\right) \ \left(= \frac{1}{N} \sum_{i=1}^{h} \left(\frac{\bar{c} - c^i}{\bar{c}}\right)^{\alpha}\right)$

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Results: Linear income taxation

When the government is welfaristic, we have the optimal tax rate:

$$\frac{\tau^*}{1-\tau^*} = \frac{1}{e}(1-\Omega)$$

- e aggregate labour supply elasticity: $e \uparrow \Rightarrow \tau \downarrow$
- Ω takes inequality into account via welfare-weighted incomes: more unequal $= \Omega \downarrow \Rightarrow \tau \uparrow$

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When the government's objective is to minimize poverty (deprivation $D\left(c^i, \bar{c}\right)$), the optimal tax rule becomes:

$$\frac{\tau^*}{1-\tau^*} = \frac{1}{e}\left(1 - \tilde{D}\right)$$

- $e \uparrow \Rightarrow \tau \downarrow$
- $\tilde{D} = \frac{1}{\bar{z}}\frac{\sum_i D_c\left(z^i + (1-\tau)z^i_{1-\tau}\right)}{\sum_i D_c\left(1 + (1-\tau)z^i_b\right)} = \frac{1}{\bar{z}}\frac{\sum_i D_c\left(1+e^i\right)z^i}{\sum_i D_c\left(1+(1-\tau)z^i_b\right)}$ measures the
  relative efficiency of taxes in reducing deprivation: $\tilde{D} \downarrow \Rightarrow \tau \uparrow$
  - additional efficiency impact e^i within $\tilde{D}$: induce the poor to work more by lowering τ (on everyone) (cf. Kanbur, Keen&Tuomala 1994)

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$$\sigma^* = \frac{p - \tau \bar{z}_G}{1 - \tau \bar{z}_b}$$

- σ^* welfare-weighted sum of marginal rates of substitution between G and b

- RHS reflects relative cost of public provision

  - p (price of G) reflects the marginal rate of transformation
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Provision of pure public good G

When the government's objective is to minimize poverty
(deprivation $D = D\left(x^i, G, \bar{x}, \bar{G}\right)$), the public provision rule becomes:

$$D^* = \frac{p - \tau \bar{z}_G}{1 - \tau \bar{z}_b}$$

- $D^* = \frac{\sum_i D_G + \sum D_x (1-\tau) z_G^i}{\sum_i D_x \left(1 + (1-\tau) z_b^i\right)}$ relative efficiency of G in reducing deprivation

  - Additional impact on deprivation via labour supply impacts z_G^i

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- ▶ Provision of quasi-private good $s = G + h$

  - ▶ Deprivation $D\left(x^i, s^i, \bar{x}, \bar{s}\right)$: people can make private purchases h^i but total amount s^i defines deprivation
  - ▶ If do not crowd out private purchases, equal to pure public good case
  - ▶ If crowd out private purchases entirely, and provision is funded with a matching increase in tax rate, no impact on poverty

- ▶ Publicly provided good G affects productivity:

  - ▶ Consumption of good G is not valued as such ($D_G = 0$), but it has an impact on the wage rate:
    $z^i = w(G)L^i$ such that $w' > 0 \Rightarrow z^i_G = w\frac{\partial L}{\partial G} + w'L$
  - ▶ Public provision can be desirable even if no direct impact on individual deprivation

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Results: Commodity taxation with linear income taxation

Welfaristic tax rule:

$$\frac{1}{N}\sum_i\sum_j t_j \frac{\partial \tilde{x}_k^i}{\partial q_j} = \frac{1}{\lambda} cov(\gamma^i, x_k^i)$$

Poverty-minimizing tax rule:

$$\frac{1}{N}\sum_i\sum_j t_j \frac{\partial \tilde{x}_k^i}{\partial q_j} = -\frac{1}{\lambda}\left[\frac{1}{N}\sum_i D_c x_k^i + \frac{1}{N}\sum_i\sum_j D_c q_j \frac{\partial \tilde{x}_k^i}{\partial q_j}\right]$$
$$+\frac{1}{\lambda} cov\left(D_c q_j \frac{\partial x_j^i}{\partial b}, x_k^i\right) - \frac{1}{\lambda} cov\left(\sum_j t_j \frac{\partial x_j^i}{\partial b}, x_k^i\right)$$

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&\quad + \frac{1}{\lambda} cov\left(D_c q_j \frac{\partial x_j^i}{\partial b}, x_k^i\right) - \frac{1}{\lambda} cov\left(\sum_j t_j \frac{\partial x_j^i}{\partial b}, x_k^i\right)
\end{aligned}$$

Results: Commodity taxation with linear income taxation

- ▶ Interpretation of welfaristic and poverty-minimizing tax rules is similar:
  - ▶ The more low-income people consume the good the more its consumption should be encouraged (when income is low, impact on D is higher)
- ▶ Uniformity result changes:
  - ▶ Deaton 1979: uniform commodity taxes ($t_j = t$) optimal only under strict assumptions (preferences separable between consumption and leisure; linear Engel curves)
  - ▶ Under poverty minimization, result does not hold even under the same assumptions - favour differentiated taxes for the benefit of the poor

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Summary

- Use optimal tax framework to characterize comprehensive redistributive tax and transfer systems for developing countries

  - Use linear income tax (and commodity taxes) to finance universal lump-sum income transfer (and public provision of public or private goods)
  - Objective is to reduce poverty in the country

- Illustrate key tax results under these features - find that having poverty minimization as objective matters

  - Tax rules more sensitive to labour supply behaviour
  - Uniform commodity taxes are never optimal; favour differentiated commodity taxes

- Model can also be used for further developing country applications

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Applications

Framework suitable for other developing country applications, e.g.:

- Informality
    - Not everyone is registered to pay taxes
    - Impacts poverty reduction efficiency
- Low administrative capacity
    - Part of collected tax revenue "leaks out"
    - Ineffective administration, corruption, etc.
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Applications

Informality: consider a wider inability to move to the formal sector

- ▶ Formal sector: pay linear income tax τ, receive income transfer
- ▶ Informal sector: don't pay taxes, receive income transfer
- ▶ Probability to be in the formal sector: $\kappa = \kappa(\tau, z^i(\tau, b))$
  - ▶ $\kappa\prime = \kappa_\tau + \kappa_z z_\tau$ where $\kappa_\tau < 0$, $\kappa_z > 0$ and $z_\tau < 0$ so that the result is $\kappa\prime < 0$
  - ▶ $\kappa_z z_b < 0$
- ▶ Illustrates:
  - ▶ smaller income transfer b for everyone because $\sum_i \kappa\tau z^i < \sum_i \tau z^i$
  - ▶ but reduce poverty: the poor and informal ($\kappa_z > 0$) have disposable income $c = z + b$