Fair and efficient taxation under partial control

Erwin Ooghe & Andreas Peichl

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- *Fairness* plays a role in redistribution:
  - the more an outcome is determined by 'luck' (resp. 'effort')
  - the more (resp. less) redistribution is preferred
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  - under partial control [and lots of assumptions]

Individual preferences/constraints

- Utility $U(c, \mathbf{x}, \mathbf{e})$ is a function of
  - consumption c
  - non-income factors $\mathbf{x} = (x_1, x_2, \ldots, x_J)$
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- Individuals solve

$$\max_{\mathbf{e}} U(c, \mathbf{x}, \mathbf{e}) \text{ s.t. } c \leq y - \tau(y, \mathbf{x}) \ \& \ (y, \mathbf{x}) = f(\mathbf{e}).$$

Simplifying assumptions

- quasi-linear & additive structure on utility:
  - $U(c, \mathbf{x}, \mathbf{e}) = c + \sum_{j=1}^{J} \beta_j x_j - h(\mathbf{e})$, with
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- linear production function f:
  - $y = \alpha_0 e_0 + (1 - \alpha_0)\theta_0$, and
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- Unobserved abilities and tastes:
  - $\boldsymbol{\theta} = (\theta_0, \theta_1, \ldots, \theta_J)$ is $N(\boldsymbol{\mu}^{\theta}, \boldsymbol{\Sigma}^{\theta})$
  - $\boldsymbol{\gamma} = (\gamma_0, \gamma_1, \ldots, \gamma_J)$ is $N(\boldsymbol{\mu}^{\gamma}, \boldsymbol{\Sigma}^{\gamma})$

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  with $y^*(\tau, \boldsymbol{\theta}, \gamma)$ and $\mathbf{x}^*(\tau, \boldsymbol{\theta}, \gamma)$ individual choices.
- The planner solves

$$\max_{\tau} W(\tau) \text{ s.t. } R(\tau) \geq R_0,$$

  with R_0 an exogenous (per-capita) revenue requirement.

Simplifying assumptions

- Welfare is the 'average transformed well-being', i.e.,

$$W(\tau) = \phi^{-1}[\int_{\boldsymbol{\theta}} \int_{\gamma} \phi(v(\tau, \boldsymbol{\theta}, \gamma)) dF(\boldsymbol{\theta}) dG(\gamma)],$$

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- Well-being $\widehat{v} = v(\tau, \boldsymbol{\theta}, \gamma)$ is a cardinalization of utility and implicitly defined as

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- Taxation is linear, so

$$\tau(y,\mathbf{x}) = T + t_0 y + \sum_{j=1}^{J} t_j x_j.$$

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- Pareto: higher utilities are reflected in higher welfare
- Compensation (for abilities): a PD transfer between individuals with the same tastes improves social welfare
- Responsibility (for tastes): if all individuals have the same ability, then the laisser-faire should result $(\tau^* = R_0)$

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Tax up to the point where:

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We focus on two special cases—income only & adding a tag to income—before discussing the general case in more detail.

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- decreases with the degree of control α_0.

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so, it should be higher

  - the higher the direct effect β_1 of the tag on well-being
  - the higher the signal σ_{01}^{θ}. [+ other; see paper]

Towards testable conditions

- Recall that the optimal tax on the tag t_1^* should satisfy

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  in which all terms are observable.
- In particular, $cov(x_1, y) / cov(x_1, x_1)$ is an OLS estimate, so
  - β_1 is the direct effect of the tag on well-being, and
  - $(1 - t_0^*) \times cov(x_1, y) / cov(x_1, x_1)$ is E[indirect effect].

Testable conditions

- Consider income and non-income factors, partitioned into
  - non-controllable non-income factors $N = \{j | \alpha_j \to 0\}$
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- Consider data collected in:
  - a $n \times 1$ vector $\boldsymbol{y}$ for gross incomes,
  - a $n \times |N|$ matrix $\boldsymbol{X}_N$ for the non-controllable factors,
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- We obtain that the optimal tax rates t_j^*, for j in N, are

$$\boldsymbol{t}_N^* = \boldsymbol{\beta}_N + (1 - t_0)(\boldsymbol{X}_N' \boldsymbol{X}_N)^{-1} \boldsymbol{X}_N' \boldsymbol{y} + (\boldsymbol{X}_N' \boldsymbol{X}_N)^{-1} \boldsymbol{X}_N' \boldsymbol{X}_P (\boldsymbol{\beta}_P - \boldsymbol{t}_P).$$

[implementation + link with 'EoP'-literature]