Inequality and Progressivity: An approach to tax justice

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Outline

Connections

- Economics of tax justice connected to economic inequality
- Mainly concerned with the measurement of income inequality
- Also concerned with meaning of tax progression in connection with inequality
- How are changes in inequality linked to changes in the apparent justice of the tax system?

Approach

- Lessons from standard treatment of the problem
- An alternative view
- Discussion of implications

Methods

- Compare approaches to inequality and to tax design
- In both fields methodologically distinct sub-literatures:
  - intuition
  - utilitarian welfare analysis
  - appeal to an axiomatic method.
- Lessons to be learned from each of these

Foundations 1

- Foundations already in Feldstein (1976)
  1. "equalisand"
  2. how to incorporate taxation into the distributional analysis
  3. how to evaluates income of different taxpayers
- On point 1: Apply Haig-Simons principle to income y
- Other points need more discussion

Foundations 2

- Net tax payment: $t = \tau(y)$
- Maps distribution of y into distribution of x: $x = y - \tau(y)$
- Musgrave and Thin (1948): four (local) concepts of progression:

average rate progression: $\dfrac{\mathrm{d}[\tau(y)/y]}{\mathrm{d}y}$

marginal rate progression: $\dfrac{\mathrm{d}^2\tau(y)}{\mathrm{d}y^2}$

tax liability progression: $\dfrac{y}{t}\dfrac{\mathrm{d}t}{\mathrm{d}y} = \dfrac{y}{\tau(y)}\dfrac{\mathrm{d}\tau(y)}{\mathrm{d}y}$

residual income progression: $\dfrac{y}{x}\dfrac{\mathrm{d}x}{\mathrm{d}y} = \dfrac{y}{y-\tau(y)}\dfrac{\mathrm{d}[y-\tau(y)]}{\mathrm{d}y}$

Foundations 3

- Three approaches to evaluation and aggregation of incomes

1. Intuition
2. Social welfare basis
3. Axiomatic method

Distributional concepts

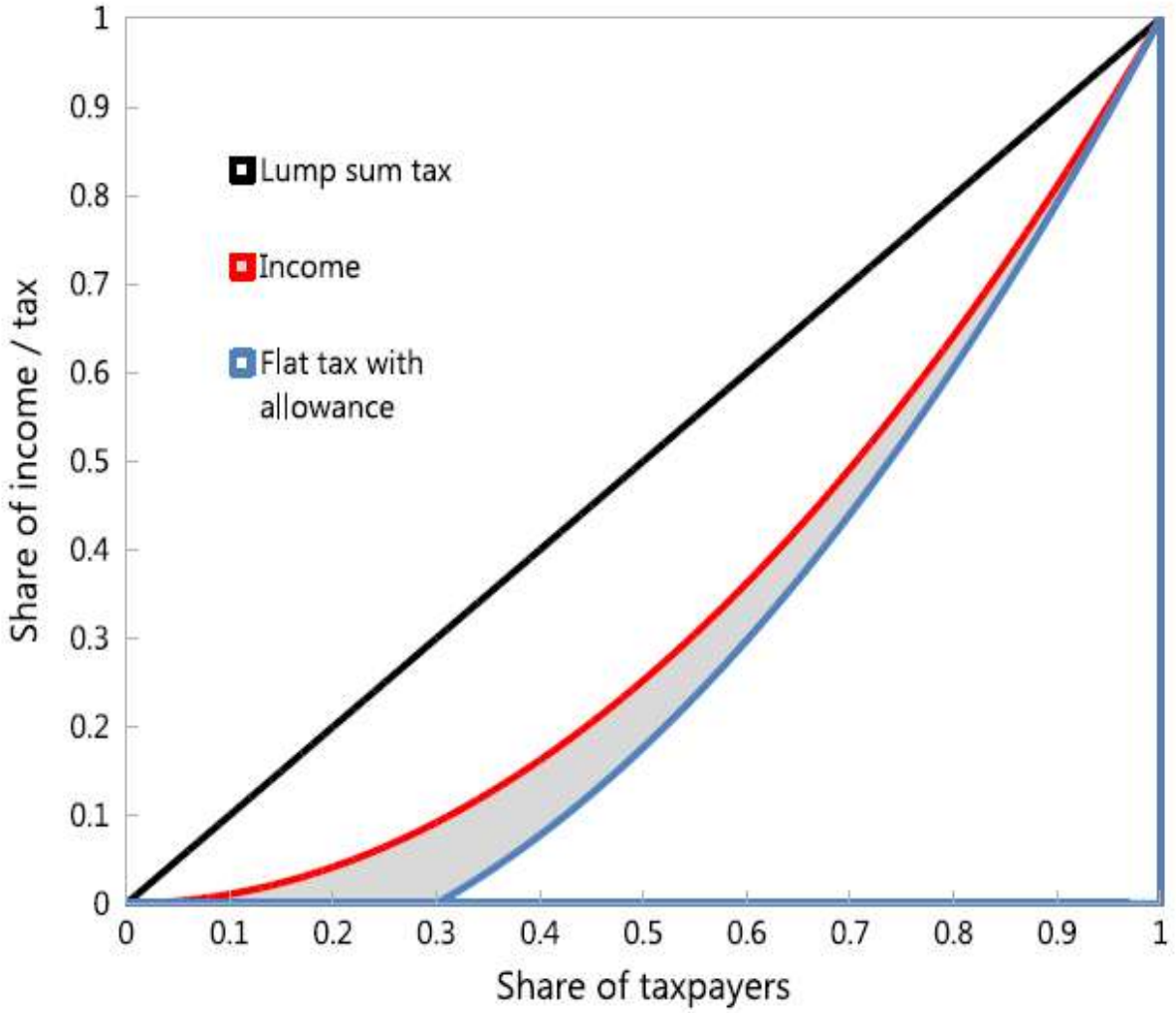
- Distribution of pretax income y in the population:
  $\mathbf{y} := (y_{(1)}, y_{(2)}, \ldots, y_{(n)})$
- Distribution of tax receipts t in the population:
  $\mathbf{t} := (t_{(1)}, t_{(2)}, \ldots, t_{(n)})$
- Distribution of posttax income x in the population:
  $\mathbf{x} := (x_{(1)}, x_{(2)}, \ldots, x_{(n)})$
- Cumulations of incomes, taxes:
  $Y_{(i)} := \sum_{j=1}^{i} y_{(j)}, \quad T_{(i)} := \sum_{j=1}^{i} t_{(j)}, \quad X := \sum_{j=1}^{i} x_{(j)}$
- Shares of incomes, taxes of the first i taxpayers:
  $Y_{(i)}/Y_{(n)}, \quad T_{(i)}/T_{(n)}, \quad X_{(i)}/X_{(n)}$

Analytical tool

- Use Lorenz curve as essential tool
- Pretax Lorenz curve for a typical income distribution, $\left(i/n, Y_{(i)}/Y_{(n)}\right)$
- Lorenz curve of tax burden, $\left(i/n, T_{(i)}/T_{(n)}\right)$
- Posttax Lorenz curve for a typical income distribution, $\left(i/n, X_{(i)}/X_{(n)}\right)$
- Use to give Kakwani (1977), Suits (1977) measures of tax progression
- Overviews in Formby et al. (1981) and Gerber et al. (2020)

Lorenz curves and progression 1

- L-curves of income and tax for three different $\tau(\cdot)$



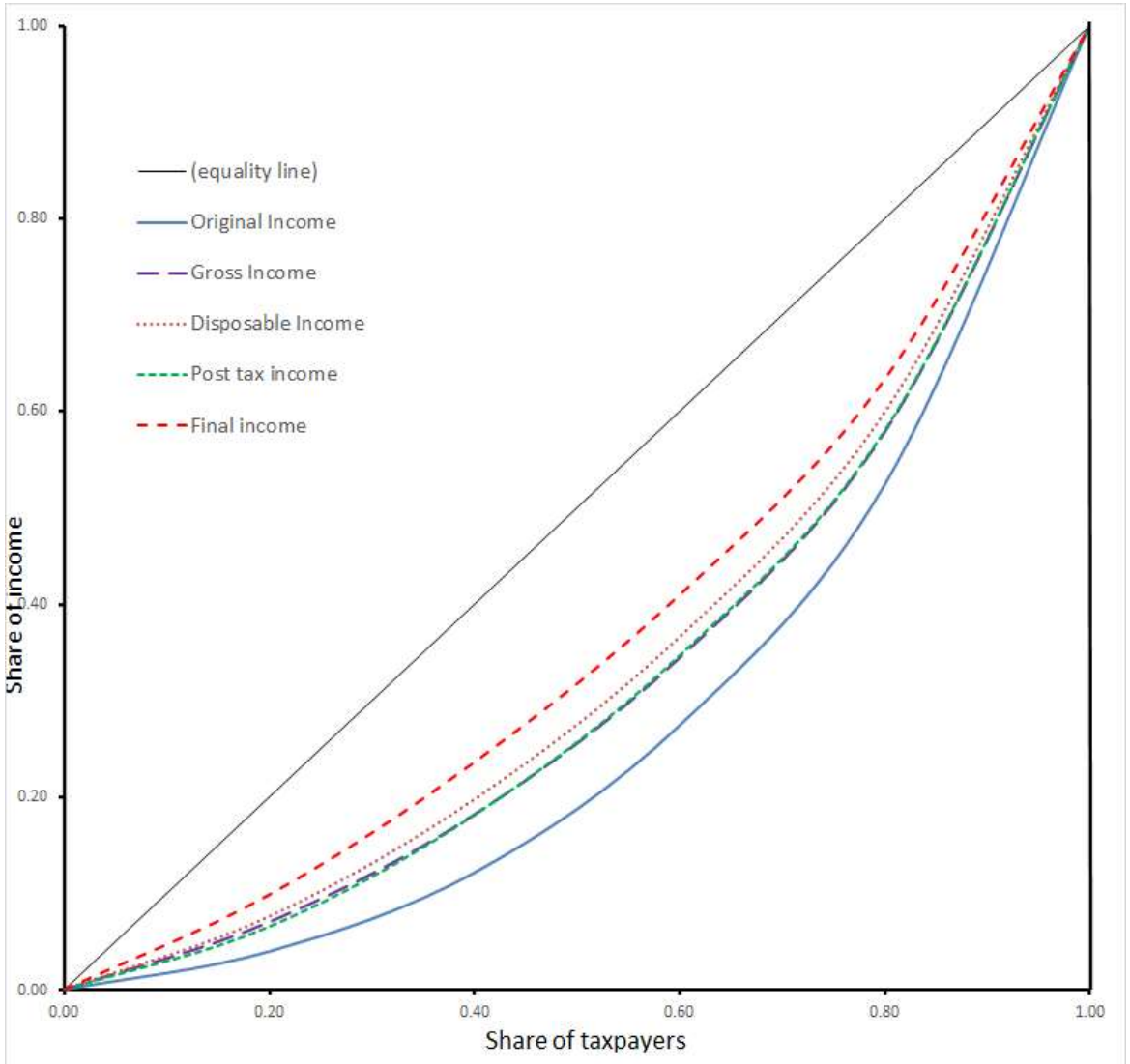
ONS and income

- The UK's ONS regularly produces data series for five income concepts

1. **Original income:** roughly speaking what one might consider as market income plus private pensions
2. **Gross income:** the line above *plus* public cash benefits (including state pensions)
3. **Disposable income:** the line above *minus* direct taxes (including income tax, national insurance and council tax payments)
4. **Post tax income:** the line above *minus* indirect taxes (including value-added tax, alcohol and tobacco duties)
5. **Final income:** the line above *plus* public non-cash benefits (including health and education)

Lorenz curves and progression 2

- L-curves for different concepts of income



Difficulties

- Some income adjustments come from imputations, not direct observations
- Some taxes or benefits may cause rank reversals.
  - use $\mathbf{x}_{[]} := \left(x_{[1]}, x_{[2]}, \ldots, x_{[n]}\right)$ where [ ] means ordering of the components follows the ordering in the y-incomes
  - resulting curve $\left(i/n, X_{[i]}/X_{[n]}\right)$ will no longer be convex
- Focus only on mechanical effect of taxes and benefits
  - no economics of tax incidence?
  - no agent responses?
- What basis for choosing Kakwani, Suits, or ONS empirics as appropriate way to consider tax progression?

Inequality and Lorenz dominance

- Social welfare depends on each taxpayer's posttax income
- W, representing social welfare, has the properties
  1. an increase in one person's income increases social welfare
  2. transfer to a richer person from a poorer person reduces welfare
- Attractive result (Atkinson 1970)
  - compare distributions with the same mean:
  - for any such W, it is true that $W(\mathbf{x}) > W(\mathbf{y})$ if and only if $\mathbf{x}\,\mathbf{L}\,\mathbf{y}$

Tax progressivity and welfare comparisons

- Theorem on progressivity and dominance (Jakobsson 1976)
  - assume that $\tau(.)$ does not induce rerankings
  - use residual progression
  - elasticity of residual progression $\eta(y) := \frac{y}{x}\frac{\mathrm{d}x}{\mathrm{d}y}$.
- Given $\tau_1(.)$ and $\tau_2(.)$ with residual progression elasticities $\eta_1(.)$ and $\eta_2(.)$: $\mathbf{x_1}$ **L** $\mathbf{x_2}$ if and only if $\eta_1(y) < \eta_2(y)$ for all y.
- Implications:
  - pretax distribution Lorenz-dominated by resulting posttax income distribution if and only if $\tau(.)$ progressive everywhere
  - redistributive effect of $\tau(.)$ unaffected by a proportionate change in all incomes if and only if $\eta(y)$ is constant for all y

Tax progressivity and welfare comparisons 2

- Development of the result (Eichhorn et al. 1984)
- Take three propositions:
  1. "the average tax rate $\tau(y)/y$ never decreases with y"
  2. "disposable income x never decreases with y"
  3. "inequality of x is not greater than inequality of y"
- Theorem:
  - Propositions 1 and 2 jointly hold if and only if proposition 3 holds
  - If proposition 1 strengthened to "$\tau(y)/y$ always increases with y" then this and proposition 2 jointly hold if and only if "inequality of x is less than inequality of y".

Inequality and income levels 1

- Inequality remains unchanged under proportionate income changes?
  - usual assumption
  - avoids spurious changes resulting from changes in monetary unit
  - but misses an important issue
- How should inequality *comparisons* be made at different levels of real income?
- Imagine an "iso-inequality" contour map
  - specific to a given level of aggregate income
  - how should the map be adapted for different income levels?
- There are several answers

Inequality and income levels 2

- An assumption about how contour maps should change with level
- Standard : contours adapted by proportionate expansion
  - implicit in so-called “relative inequality indices”
  - rescaling all incomes by same factor leaves inequality unaltered
- Alternative: contours adapted by simple translation
  - implicit in so-called “absolute inequality indices”
  - shifting all incomes by same amount leaves inequality unaltered
- Intermediate position is also possible

Inequality and income levels 3

- Suppose Austria has more income per head than Belgium but they have the same level of inequality
- What changes in income in the two countries would leave this inequality judgment unaltered?
  - same income growth for everyone in the two countries?
  - same absolute changes for everyone in the two countries?
- What happens to tax progressivity and welfare comparisons if absolute inequality approach adopted?
- Moyes (1988) : results of Eichhorn et al. (1984) still hold

Two dimensions of inequity? (1)

- "vertical inequity": income disparities examined using Lorenz analysis
- "horizontal inequity": a government intervention should follow "equal treatment of equals"
- Taxpayers with the same circumstances should be liable for the same taxes or transfers
- But tax systems can alter the rankings of the pretax and posttax income distributions
- Narrow interpretation of HI focuses on reranking analysis (Atkinson 1980, King 1983, Duclos 1993, Plotnick 1981)

Two dimensions of inequity? (2)

- No natural way of quantifying degrees of horizontal inequity
- Several pragmatic methods that have been applied to the problem
- Kaplow (1989): what exact distributional principles to apply to changes in HI?
- Rerankings violate the "incentive preservation" property (Fei 1981)
- The issue of HI perhaps should be treated as just another type of distributional comparison

Comparing distributions

- Approach to measuring progressivity based on other systematic ways of comparing two distributions
  - for example Cowell et al. (2013)
  - similar to a "norm income" concept (Almås et al. 2011, Jenkins and O'Higgins 1989)
- Use the idea of a reference distribution
- Quantify the distance from the actual to the reference distribution
  - actual: the posttax distribution x
  - reference: the pretax distribution y

Individualistic approach

- Builds on methods used for individual mobility
  - get individual "history" tracking each i's "movement" relative to the reference distribution $z_i := (x_i, y_i)$
  - and the profile of histories in the population $(z_1, z_2, \ldots z_n)$
- Key principles:
  - movement
  - independence
  - consistency
- Use a priori axiomatisation
  - capture principles precisely
  - characterise an ordering over all profiles
  - gives a class of aggregation indices

A class of mobility indices

- Axioms yield a whole class of measures, given by

$$J_\alpha(\mathbf{x},\mathbf{y}) := \begin{cases} \frac{1}{n\alpha(\alpha-1)} \sum_{i=1}^{n} \left[\left[\frac{x_i}{\mu_x}\right]^{\alpha} \left[\frac{y_i}{\mu_y}\right]^{1-\alpha} - 1 \right] & \text{if } \alpha \neq 0,1 \\ -\frac{1}{n} \sum_{i=1}^{n} \frac{y_i}{\mu_y} \log\left(\frac{x_i}{\mu_x} \Big/ \frac{y_i}{\mu_y} \right) & \text{if } \alpha = 0 \\ \frac{1}{n} \sum_{i=1}^{n} \frac{x_i}{\mu_x} \log\left(\frac{x_i}{\mu_x} \Big/ \frac{y_i}{\mu_y} \right) & \text{if } \alpha = 1 \end{cases}$$

- The parameter α characterises individual members of the class:
  - $\alpha > 0$: J sensitive to cases where $x_i > y_i$
  - $\alpha < 0$: J sensitive to cases where $x_i < y_i$

Conclusion

- For discussion!

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