Fiscal Incidence, Fiscal Mobility and the Poor: A New Approach

Nora Lustig Sean Higgins

Department of Economics
Tulane University

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Universidad del Pacífico
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Standard Measures

- Standard measures of poverty, inequality, progressivity and incidence are often anonymous
  - The identity of winners and losers is not known
  - In fact, the anonymity axiom is considered a desirable property of indicators
- Leave out important information about how the poor are affected by fiscal policy
- For example, we can have:
  - Poverty (including the squared poverty gap) declining
  - Income distribution becoming less unequal
  - Progressive net taxes
  - Low or no horizontal inequity
  - But some of the poor become substantially poorer

New Approach: Fiscal Mobility Matrix

- Directional mobility literature provides a useful framework
  - See, for example, Fields (2008)
- Compare the status of identified individuals in the before and after taxes and transfers situations
- One can see which individuals are adversely/favorably impacted by a particular policy
- We establish dominance criteria so that alternative policies can be compared in terms of the downward mobility they induce

Definitions

- Fiscal Mobility
  - The directional movement between the before and after net taxes situations among k pre-defined income categories
- Fiscal Mobility Matrix
  - $k \times k$ transition matrix P where the ij-th element p_{ij} is the probability of moving to income group j after net taxes for an individual in group i before net taxes

  $\Rightarrow P$ is a stochastic matrix with $\sum_{j=1}^{k} p_{ij} = 1 \ \forall i \in \{1, \ldots, k\}$
- Poverty Lines
  - Let $\boldsymbol{z}$ be a vector of poverty lines between z_{min} and z_{max}. These poverty lines determine a subset r of the k income categories $(r < k)$ that are considered poor

Downward Mobility

- If any element that is both in the strictly lower triangle of P and an element of one of the first r columns of P is unequal to 0, there is downward mobility among the poor (or into poverty)
  - i.e., if $p_{ij} > 0$ for some $i \in \{1, \ldots, k\}$ and some $j \in \{1, \ldots, r\}$ such that $j < i$
  - Example: $k = 6$ and $r = 3$

An Illustration: Brazil

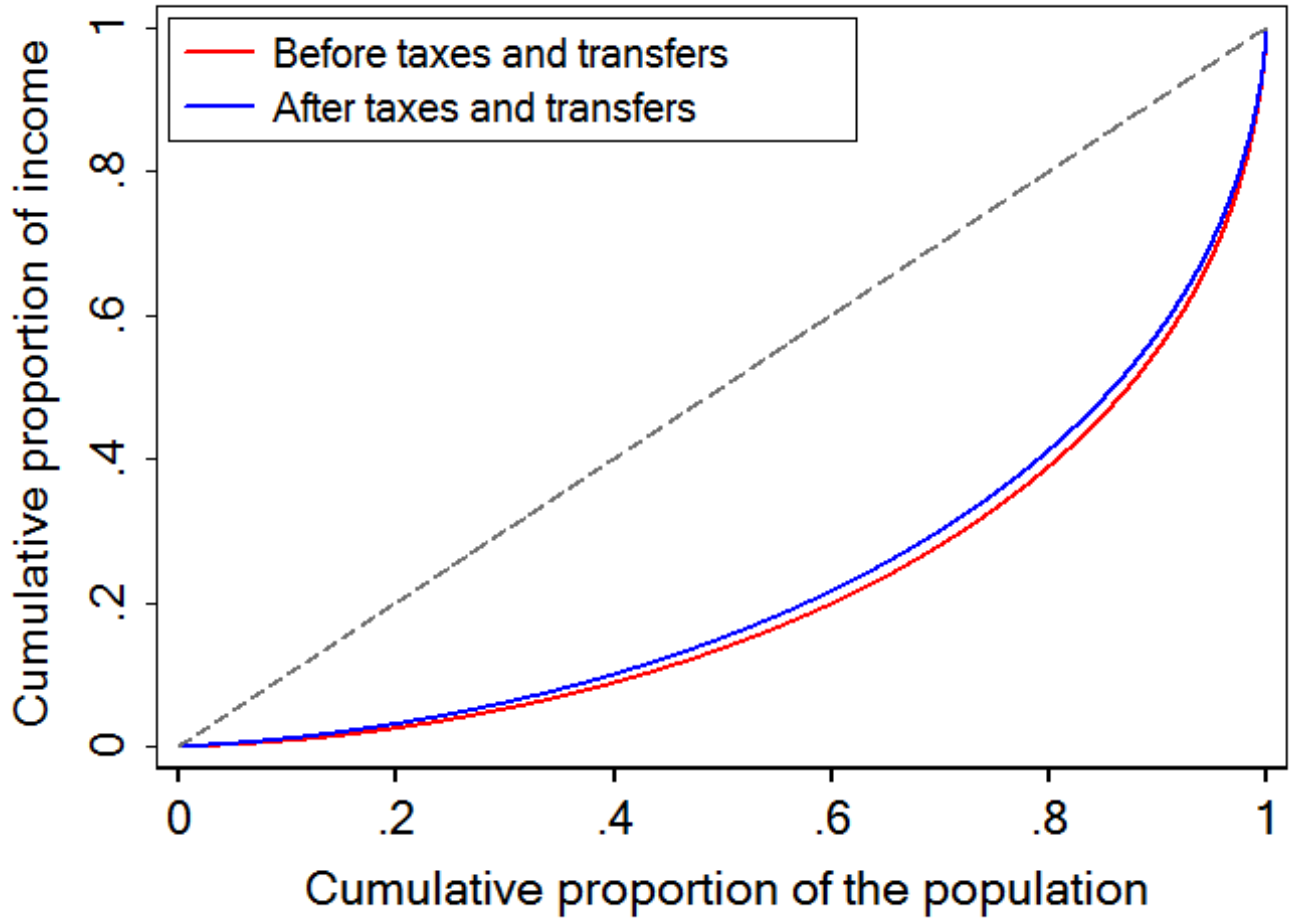
- Inequality, ultra-poverty and extreme poverty fall

Indicator	Before taxes and transfers	After taxes and transfers
Gini Coefficient	0.573	0.539
Headcount Index[1]	5.7%	4.3%
Poverty Gap[1]	2.3%	1.3%
Squared Poverty Gap[1]	1.3%	0.6%
Headcount Index[2]	15.3%	15.0%
Poverty Gap[2]	6.3%	5.4%
Squared Poverty Gap[2]	3.7%	2.7%

[1] $1.25 PPP per day poverty line
[2] $2.50 PPP per day poverty line

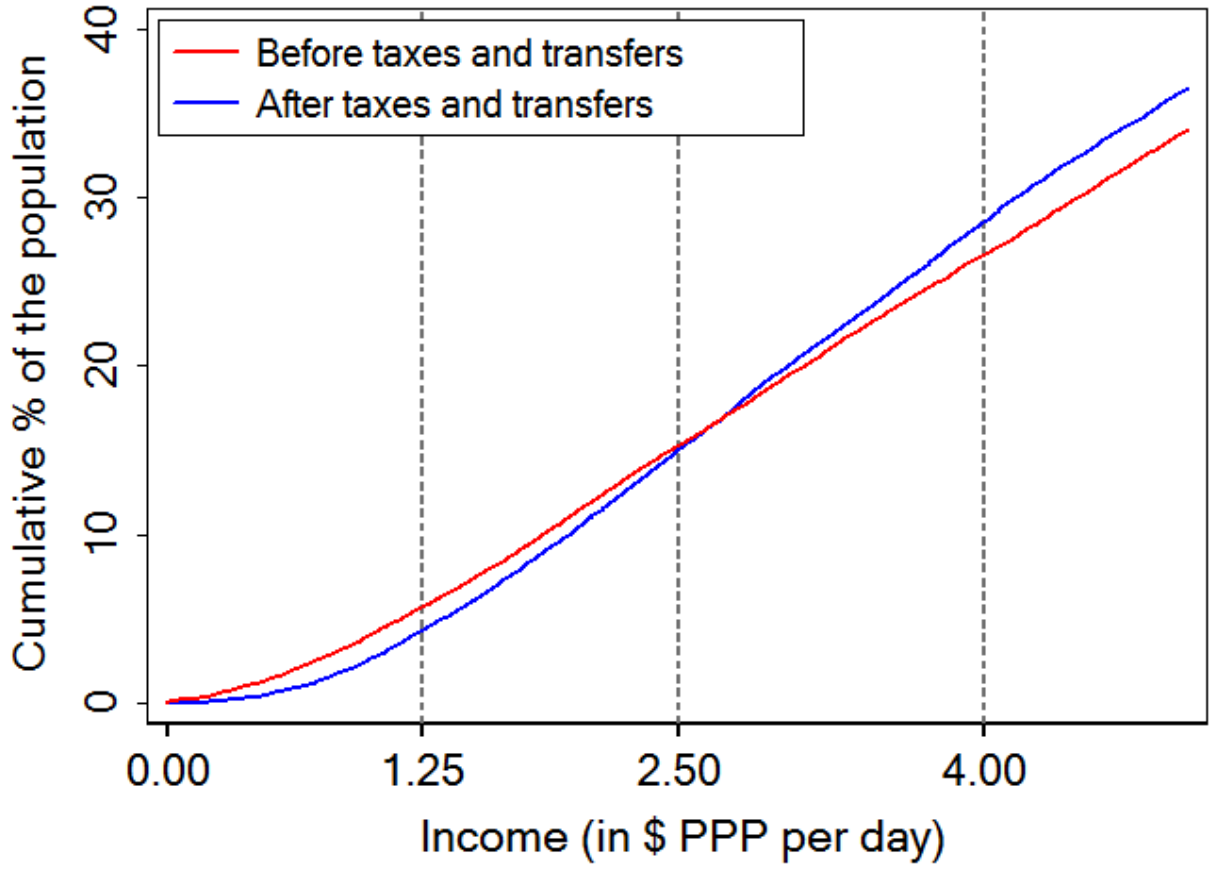
An Illustration: Brazil

- Income distribution after taxes and transfers
  Lorenz dominates distribution before taxes and transfers



An Illustration: Brazil

- CDF of after taxes and transfers income first-order stochastic dominates CDF of before taxes and transfers income over domain of ultra and extreme poverty lines ($\leq$ \$2.50 PPP per day)

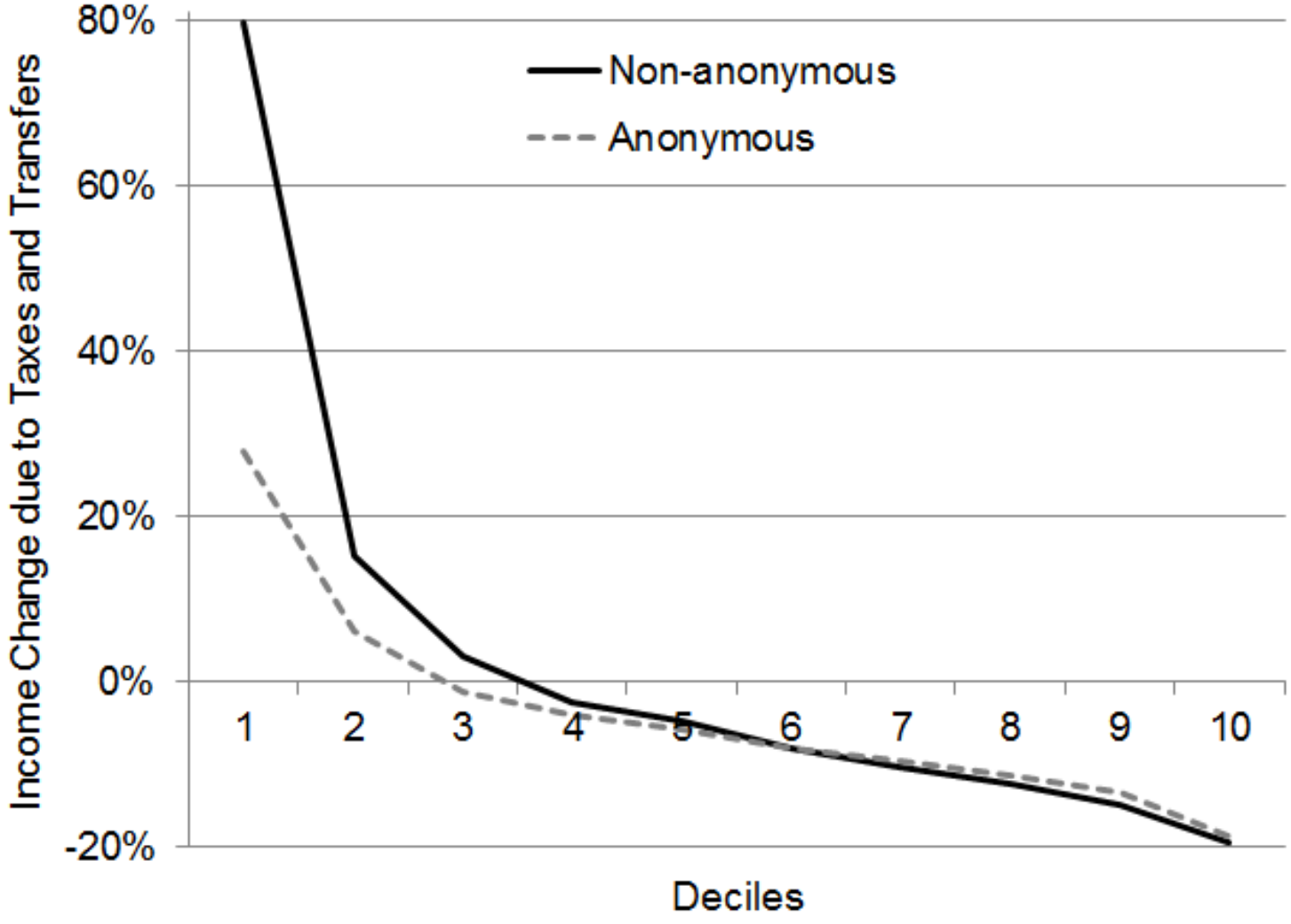


An Illustration: Brazil

- Progressive overall tax system:
  - Kakwani index of direct and indirect taxes is 0.03
  - Reynolds-Smolensky index of after taxes and transfers income with respect to before taxes and transfers income is 0.05
- Anonymous incidence analysis: two poorest deciles are, on average, net recipients from the tax and transfer system
- Non-anonymous incidence analysis: three poorest deciles are, on average, net recipients from the tax and transfers system
  - Incomes of those in the poorest decile by market income increase by 80% on average

An Illustration: Brazil

- Incidence by deciles



An Illustration: Brazil

- However:
  - Around 15% of the moderate poor become extreme poor
  - Around 4% of the extreme poor become ultra poor

Fiscal Mobility Matrix: Brazil

Before taxes and transfers groups	After taxes and transfers groups: < 1.25	1.25–2.50	2.50–4.00	4.00–10.00	10.00–50.00	> 50.00	% of Pop.	Mean Income
< 1.25	69%	21%	6%	3%			5.7%	$0.74
1.25–2.50	4%	81%	10%	4%			9.6%	$1.89
2.50–4.00		15%	75%	9%	1%		11.3%	$3.24
4.00–10.00			11%	86%	3%		33.6%	$6.67
10.00–50.00				15%	85%		35.3%	$19.90
> 50.00					32%	68%	4.5%	$94.59
% of Pop.	4.3%	10.7%	13.5%	35.8%	32.5%	3.2%	100%	$14.15
Mean Income	$0.86	$1.91	$3.25	$6.61	$19.34	$88.70	$12.17	

How Much do the Losing Poor Lose?

- Matrix of average proportional losses
  - $k \times k$ matrix L with ij-th element ℓ_{ij} equal to the average percent decrease in income of those who began in group i and lost income due to taxes and transfers, ending in group $j \leq i$
  - Negative semi-definite and weakly lower-triangular by construction
  - There is income loss among the poor if and only if $\ell_{ij} < 0$ for some $j \leq r$

Average Proportional Losses: Brazil

Before taxes and transfers groups	After taxes and transfers groups: < 1.25	1.25–2.50	2.50–4.00	4.00–10.00	10.00–50.00	> 50.00	% of Pop.	Group Avg.
< 1.25	–10% $0.83						5.7%	–10% $0.83
1.25–2.50	–13% $1.34	–10% $2.01					9.6%	–10% $1.96
2.50–4.00		–14% $2.71	–11% $3.40				11.3%	–11% $3.27
4.00–10.00			–15% $4.36	–14% $7.04			33.6%	–14% $6.70
10.00–50.00				–16% $10.98	–16% $21.76		35.3%	–16% $20.03
> 50.00					–22% $56.66	–21% $113.3	4.5%	–21% $94.99
% of Pop.	4.3%	10.7%	13.5%	35.8%	32.5%	3.2%	100%	
Group Avg.	–11% $0.95	–11% $2.20	–12% $3.73	–14% $7.73	–16% $23.46	–21% $113.3		–14.5% $16.10

Average Proportional Losses: Brazil

- Ultra poor who lose
  - Begin with $0.83 PPP per day on average
  - Lose 10% of their income on average
- Extreme poor before transfers who become ultra poor after transfers
  - Begin with $1.34 PPP per day on average
  - Lose 13% of their income on average

Fiscal Mobility Dominance

- In terms of fiscal mobility, is an alternative scenario more desirable *for the poor* than the actual scenario?
- Compare two fiscal mobility matrices P and P' and denote strong downward mobility dominance by the binary relation $\mathcal{M}^S$
- $P \, \mathcal{M}^S \, P'$ if P exhibits less downward mobility among the poor (and into poverty) than P'
- Formally, $P \, \mathcal{M}^S \, P'$ if $\sum_{m=1}^{j} p_{im} \leq \sum_{m=1}^{j} p'_{im}$ for $i \in \{2, \ldots, k\}$ and $j \leq r < i$, with strict inequality for some i

Alternative Scenario: Neutral Tax

- Compare actual scenario in Brazil to an alternative
- Neutral (horizontally equitable) tax
  - Individuals are taxed proportional to their incomes such that total tax revenue remains fixed
- Transfers received are still as observed
- 22% of moderate poor become extreme poor
- 7% of extreme poor become ultra poor

Fiscal Mobility Matrix: Neutral Tax

Before taxes and transfers groups	After taxes and transfers groups: < 1.25	1.25–2.50	2.50–4.00	4.00–10.00	10.00–50.00	> 50.00	% of Pop.	Mean Income
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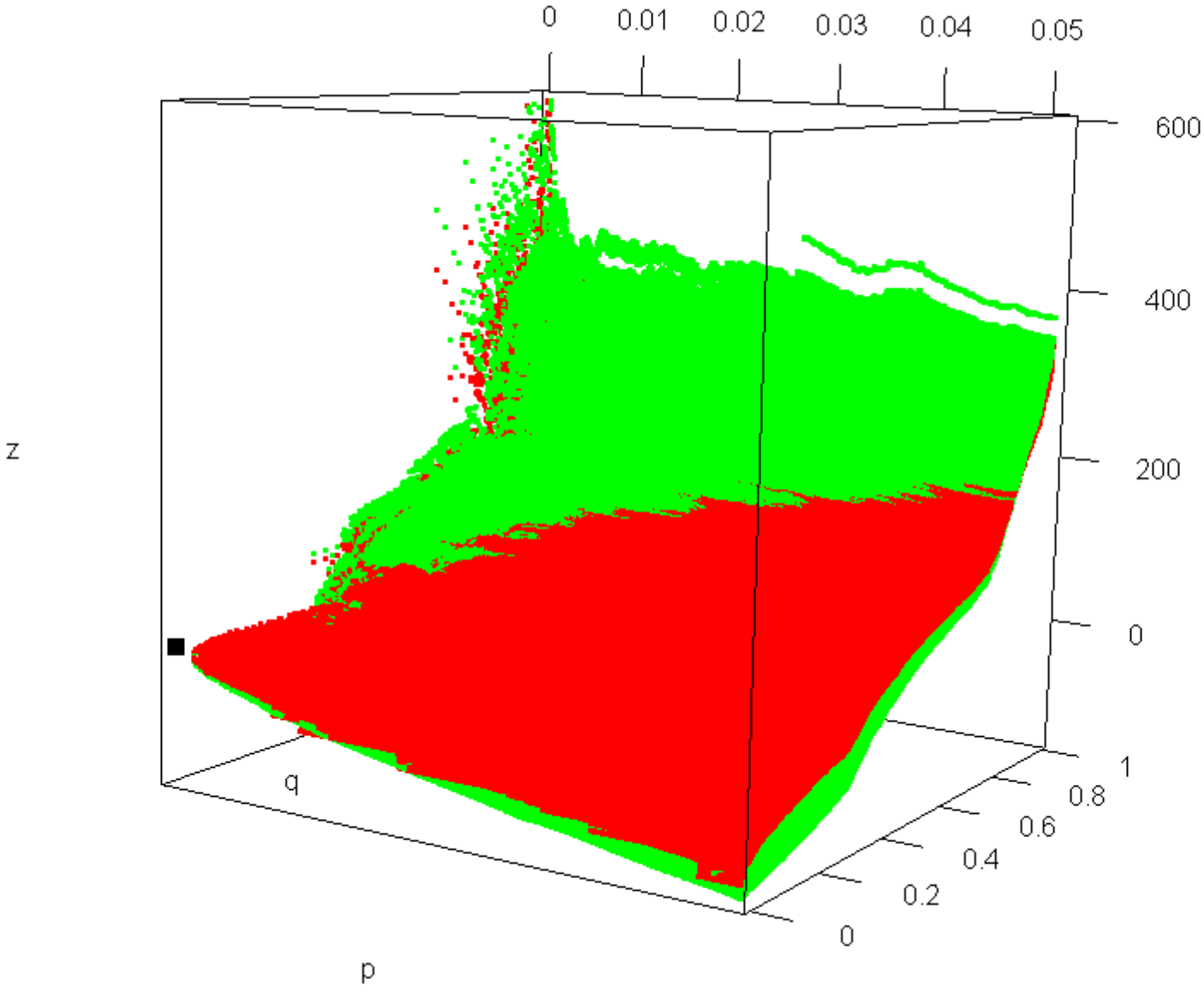
10.00–50.00				19%	81%		35.3%	$19.90
> 50.00					29%	71%	4.5%	$94.59
% of Pop.	4.7%	11.1%	14.2%	35.4%	31.3%	3.3%	100%	$14.15
Mean Income	$0.86	$1.90	$3.25	$6.61	$19.40	$91.54	$12.17	

Alternative Scenario: Neutral Tax

- Higher downward mobility among the poor in neutral tax scenario
  - Compare cumulative downward mobility vectors:

$$\begin{array}{cc} \text{Actual} & \text{Neutral Tax} \\ (.04) & < (.07) \\ (0, .15) & < (0, .22) \\ (0, 0, .11) & < (0, 0, .16) \end{array}$$

Bourguignon's Welfare Dominance



Bourguignon's Welfare Dominance