

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

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*Well-being and inequality in the long run:  
measurement, history and ideas*

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# Standard Measures

- Standard measures of poverty, inequality, progressivity and incidence are by definition 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
  - Don't capture the “losing poor”
- For example, we can have:
  - Poverty (including the squared poverty gap) declining
  - Income distribution becoming less unequal
  - Progressive net taxes
  - 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
  - ⇒  $P$  is a stochastic matrix with  $\sum_{j=1}^k p_{ij} = 1 \quad \forall i \in \{1, \dots, k\}$
- Poverty Lines
  - Let  $\mathbf{z}$  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  $i \in \{1, \dots, k\}$  and some  $j \in \{1, \dots, r\}$  such that  $j < i$
  - Example:  $k = 6$  and  $r = 3$



## An Illustration: Brazil

- Inequality, ultra-poverty and extreme poverty fall

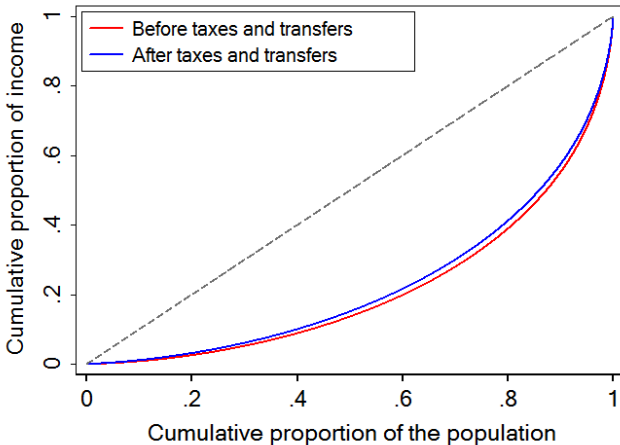
Indicator	Before taxes and transfers	After taxes and transfers
Gini Coefficient	0.573	0.539
Headcount Index <sup>1</sup>	5.7%	4.3%
Poverty Gap <sup>1</sup>	2.3%	1.3%
Squared Poverty Gap <sup>1</sup>	1.3%	0.6%
Headcount Index <sup>2</sup>	15.3%	15.0%
Poverty Gap <sup>2</sup>	6.3%	5.4%
Squared Poverty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

<sup>1</sup> \$1.25 PPP per day poverty line

<sup>2</sup> \$2.50 PPP per day poverty line

# An Illustration: Brazil

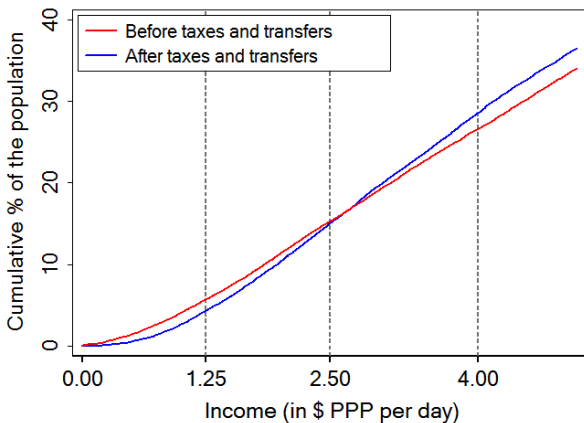
- Income distribution after taxes and transfers  
Lorenz dominates distribution before taxes and transfers





# An Illustration: Brazil

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

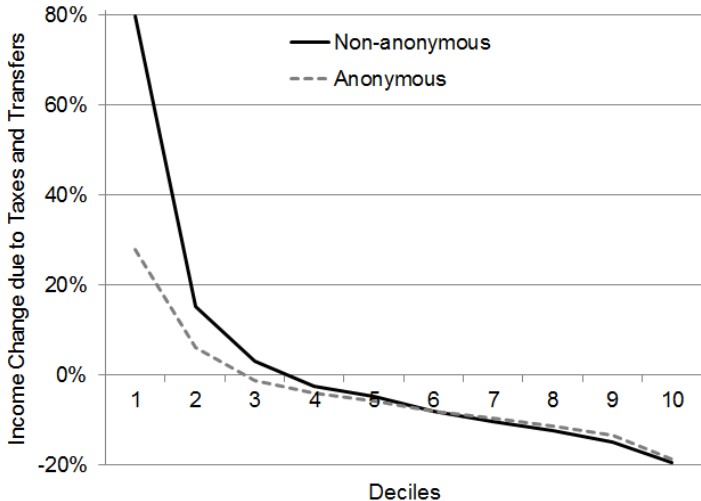


# An Illustration: Brazil

- 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

After taxes and transfers groups

	After taxes and transfers groups						% of Pop.	Mean Income
	< 1.25	1.25–2.50	2.50–4.00	4.00–10.00	10.00–50.00	> 50.00		
Before taxes and transfers groups								
< 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  $\ell_{ij}$  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  $i \leq r$

# Average Proportional Losses: Brazil

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.
Before taxes and transfers groups	< 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  $i \in \{2, \dots, k\}$  and  $j \leq r < i$ , with strict inequality for some  $i$

# Alternative Scenario: Neutral Tax

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

# Fiscal Mobility Matrix: Neutral Tax

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%	20%	7%	4%	1%		5.7%	\$0.74
1.25– 2.50	7%	78%	9%	5%	1%		9.6%	\$1.89
2.50– 4.00		22%	67%	9%	1%		11.3%	\$3.24
4.00– 10.00			16%	81%	3%		33.6%	\$6.67
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:

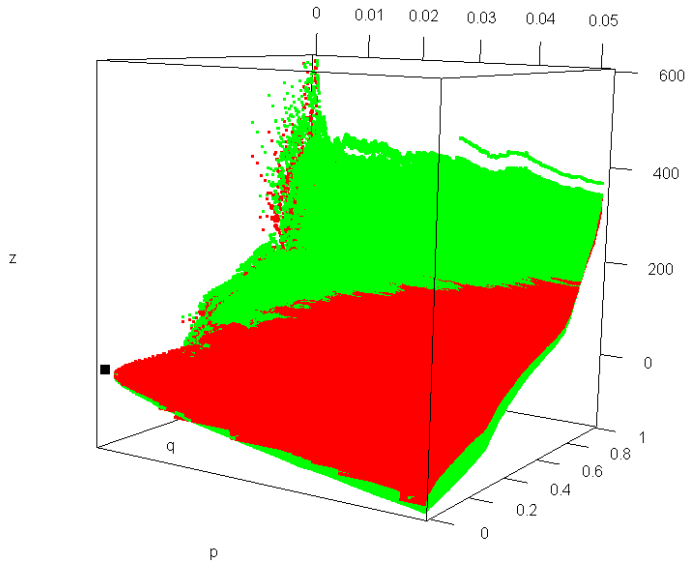
Actual      Neutral Tax

$$(.04) < (.07)$$

$$(0, .15) < (0, .22)$$

$$(0, 0, .11) < (0, 0, .16)$$

# Bourguignon's Welfare Dominance



# Bourguignon's Welfare Dominance

