7.3 Inequality, Growth and Social Welfare (Gini): Microsimulation of Taxes and Transfers Changes

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A Social Welfare Function Decomposition (Gini)

Following Atkinson (1970), we can write a general social welfare function denoted as:

$$ W = \mu(x*) = \int_0^\infty u(x)w(x)f(x)dx $$

where $x*$ is the equally distributed equivalent level of income which, if given to every individual in the society, results in the same social welfare level as the actual distribution of income. This should satisfy:

$$ \int_0^\infty w(x)f(x)dx = 1 $$

A) Sen (1974) developed a social welfare function taking into account the relative deprivation suffered by the poor relative to the non-poor in the society.

If $u(x) = x$ and $w(x) = [1 - F(x)]$ then applying Atkinson certainty equivalent idea:

$$ W_G = \int_0^\infty u(x)w(x)f(x)dx = 2\int_0^\infty x[1 - F(x)]f(x)dx = \mu (1 - G) $$

where $\mu$ is the mean income of the society and $G$ is the Gini Index.

B) Kakwani et al. (2010) Lini Social Welfare Function:

$$ \log(x^*) = 2\int_0^\infty [1 - F(x)]\log(x)f(x)dx $$

Derived Inequality Measure from a log utility and Weights a la Gini = Lini:

$$ \log(I) = 2\int_0^\infty [1 - F(x)][\log(\mu) - \log(x)]f(x)dx $$

Gini will fall in Brazil with any income increase below the 75th percentile, the Lini is more pro poor.
Growth, Equity (Gini) and Social Welfare

Annual Growth Rates

\[ W_G = \mu (1 - G) \]

\[ \ln(W_G) = \ln(\mu) + \ln(1 - G) \]

\[ \gamma^* = \gamma + g \]

Growth, Equity (Gini) and Social Welfare

Annual Growth Rates

Gini type of SWF Source FGV Social from PNAD microdata
OBS: * Interpolation;

Parallel between Crisis

Growth
Equity
Social Welfare


Growth, Equity (Gini) and Social Welfare

Annual Growth Rates

Gini type of SWF Source FGV Social from PNAD microdata per Capita Normal Labor Earnings
Levels Mean, Equity (Gini) and Social Welfare Annual

Gini

Mean per Capita

Social Welfare

Source: FGV Social from PNADC/IBGE microdata per Capita Normal Labor Earnings

Which Labor Earnings concept to use? Effective (+ Instable) or Normal (+ Traditional)?

Normal Labor Earnings Quarterly PNADC

Effective* Labor Earnings Quarterly PNADC

Source: FGV Social from PNADC/IBGE microdata Labour Income
Dynamic Social Welfare Decomposition Framework by Income Sources
(same thing but with Gini SWF and Concentration Indexes)

Suppose households draw their income from \( k \) sources, then the total mean income would be:

\[
\mu = \sum_{i=1}^{k} \mu_i
\]

Thus, the mean social welfare of the \( i \)th income component would be:

\[
W_i = \mu_i (1 - C_i) = \mu_i E_i
\]

Which on taking logarithms and the first difference gives the growth rate:

\[
\gamma^*_i = \gamma_i + g_i
\]

Where \( \gamma^* = \Delta \ln(W) \) is the growth rate of social welfare for the \( i \)th component;
\( \gamma = \Delta \ln(\mu) \) is the growth rate of average income for the \( i \)th component;
\( g = \Delta \ln(E) \) is the equality growth rate for the \( i \)th component;
Income, Equality and Social Welfare:

Annual Contribution by Component – Disposable Income (2003 to 2015)

(Contribution of each Income Concept to Disposable Income Growth)

<table>
<thead>
<tr>
<th></th>
<th>Mean Income</th>
<th>Equality</th>
<th>Welfare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial income</td>
<td>0.0276</td>
<td>0.0072</td>
<td>0.0349</td>
</tr>
<tr>
<td>Cash Transfers</td>
<td>0.0110</td>
<td>0.0055</td>
<td>0.0165</td>
</tr>
<tr>
<td>Public Pensions</td>
<td>0.0083</td>
<td>0.0016</td>
<td>0.0099</td>
</tr>
<tr>
<td>Poor Elderly/Disability Benefits - BPC</td>
<td>0.0010</td>
<td>0.0013</td>
<td>0.0023</td>
</tr>
<tr>
<td>Wage Bonus + Family Wage</td>
<td>0.0004</td>
<td>0.0003</td>
<td>0.0008</td>
</tr>
<tr>
<td>Unemployment Benefit</td>
<td>0.0004</td>
<td>0.0004</td>
<td>0.0008</td>
</tr>
<tr>
<td>Family Grant (CCT)</td>
<td>0.0013</td>
<td>0.0022</td>
<td>0.0034</td>
</tr>
<tr>
<td>Gross Income</td>
<td>0.0387</td>
<td>0.0127</td>
<td>0.0514</td>
</tr>
<tr>
<td>(-) Direct Taxes</td>
<td>0.0038</td>
<td>-0.0010</td>
<td>0.0028</td>
</tr>
<tr>
<td>Personal Income Tax</td>
<td>0.0018</td>
<td>-0.0013</td>
<td>0.0005</td>
</tr>
<tr>
<td>Social Security Contribution</td>
<td>0.0021</td>
<td>0.0003</td>
<td>0.0023</td>
</tr>
<tr>
<td>Disposable Income</td>
<td>0.0348</td>
<td>0.0137</td>
<td>0.0486</td>
</tr>
<tr>
<td>(+) Indirect Taxes</td>
<td>0.0080</td>
<td>0.0029</td>
<td>0.0109</td>
</tr>
<tr>
<td>Final Income</td>
<td>0.0269</td>
<td>0.0108</td>
<td>0.0377</td>
</tr>
</tbody>
</table>

Source: FGV Social with BRAHMS microsimulations

The Gini index based social welfare grew 4.86% per year. Higher than the respective growth rate associated with initial income (4.36%) and final income (4.47%), but not of gross income (4.91%).

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**BRAZILIAN MAIN INCOME POLICIES (as Cash Transfers)**

*Influenced by the Minimum Wage*

- **Wage Bonus and Family Wage**
- **Unemployment Benefit**
- **Social Security**
- **BPC / LOAS**
- **Bolsa Família**
- **Cash Transfer for the Elderly and the Disabled Poor**
- **Subsidize Low-Income Formal Employees**
- **Non-Experienced Rated Insurance for Fired Formal Employees**
- **Public System that includes a Non-Contributory Rural Retirement; Public Servants; Benefits above the Minimum Have to be Adjusted Only by Inflation**

*Non-contributory cash transfers*  

*Rural retirement is a non-contributory social security program*
Concentration Curves of Cash Transfers ordered by Disposable Income (2015)

Source: FGV Social with BRAHMS microsimulations


Source: FGV Social with BRAHMS microsimulations
Does missing income on data affect distributive trends?  

Share with null and unavailable household income on PNAD

New imputation method, combining regression and stochastic component. Preserves inequality and discontinuities (ex: minimum wage).

From 2001 to 2015 imputation increases the level of mean income, slightly increases inequality indexes and decreases the main poverty indicators but it bridges PNAD and PNADC poverty levels. It does not affect inequality trends in the period.

Income Concepts

MONETARY TRANSFERS
(public pensions and other monetary social benefits)

INITIAL INCOME
(earned income and other private income sources)

GROSS INCOME

DIRECT TAXES
(personal income tax and social security contributions)

DISPOSABLE INCOME

INDIRECT TAXES

FINAL INCOME

Concentration Curves Differences in relation to Disposable Income – (2015)

Source: FGV Social dorm PNAD with BRAHMS microsimulations
Gini Coefficient of Initial and Disposable Income:
Brazil and Other Countries - 2015

Source: OECD

WHAT IS THE IMPACT OF TAXES AND CASH TRANSFERS (SUBSIDIES) IN INEQUALITY?

1. High Tax Burden and transfers constraint production and do not redistribute
2. Public Expenditures in Education and Health redistribute more, but has a low impact at the Brazilian productivity

Including Public Expenditures in Education and Health gini reduction increases 11 pts