The Evolution of Income Distribution in Brazil: Different Characteristics of the Agricultural Sector

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Distribution of per capita household income in Brazil, from 1995 to 2009
Evolution of Poverty

- All households: \( z = \text{R$200.00} \)
- Rural households: \( z = \text{R$140.00} \)

\( z = \text{poverty line} \)
Figure: Average and Gini index of per capita household income: total and rural areas.
**Figure:** Poverty headcount ratio $H = FGT(0)$: total and rural areas
Figure: Poverty measures FGT(1) and FGT(2): total and rural areas
Figure: Average and Gini index of per capita household income: total and agricultural households.
Decomposition of per capita household income

\[ G = \frac{2}{n\mu} \text{cov}(i, x_i) \]

\[ C_h = \frac{2}{n\mu_h} \text{cov}(i, x_{hi}) \]
Decomposition of the per capita household income

\[ G = \sum_{h=1}^{k} \varphi_h C_h \]

\[ \Delta G = \sum_{h=1}^{k} (C_h^* - G^*) \Delta \varphi_h + \sum_{h=1}^{k} \varphi_h^* \Delta C_h \]
Decomposition of per capita household income

Per capita household income divided in 9 components:

1. CSM: Civil servants and military personnel
2. EMP: Other employees
3. SLF: Self-employed workers
4. YER: Employers
5. PE1: Official pensions and retirements
6. PE2: Others pensions and retirements
7. DON: Donations of other households
8. RNT: Rents
9. IBF: Interest, the *Bolsa Família* program, etc.
### Decomposition of per capita household income

**Table: All households 2003-2009**

<table>
<thead>
<tr>
<th>Share</th>
<th>$\varphi(2009)$</th>
<th>$C(2009)$</th>
<th>$\Delta G = -0.042$</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSM</td>
<td>11.3%</td>
<td>0.746</td>
<td>-8.5%</td>
</tr>
<tr>
<td>EMP</td>
<td>40.9%</td>
<td>0.435</td>
<td>51.1%</td>
</tr>
<tr>
<td>SLF</td>
<td>13.4%</td>
<td>0.473</td>
<td>6.5%</td>
</tr>
<tr>
<td>YER</td>
<td>10.6%</td>
<td>0.836</td>
<td>13.2%</td>
</tr>
<tr>
<td>PE1</td>
<td>18.8%</td>
<td>0.564</td>
<td>12.9%</td>
</tr>
<tr>
<td>PE2</td>
<td>1.3%</td>
<td>0.493</td>
<td>2.4%</td>
</tr>
<tr>
<td>DON</td>
<td>0.4%</td>
<td>0.391</td>
<td>-0.9%</td>
</tr>
<tr>
<td>RNT</td>
<td>1.6%</td>
<td>0.774</td>
<td>2.0%</td>
</tr>
<tr>
<td>IBF</td>
<td>1.7%</td>
<td>-0.105</td>
<td>21.2%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>0.539</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Decomposition of per capita household income

Table: Agricultural households 2003-2009

<table>
<thead>
<tr>
<th>Share</th>
<th>$\varphi(2009)$</th>
<th>$C(2009)$</th>
<th>$\Delta G = -0.043$</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSM</td>
<td>2.6%</td>
<td>0.671</td>
<td>2.1%</td>
</tr>
<tr>
<td>EMP</td>
<td>27.5%</td>
<td>0.372</td>
<td>9.9%</td>
</tr>
<tr>
<td>SLF</td>
<td>26.8%</td>
<td>0.538</td>
<td>-19.9%</td>
</tr>
<tr>
<td>YER</td>
<td>18.8%</td>
<td>0.920</td>
<td>55.1%</td>
</tr>
<tr>
<td>PE1</td>
<td>20.0%</td>
<td>0.589</td>
<td>7.4%</td>
</tr>
<tr>
<td>PE2</td>
<td>0.4%</td>
<td>0.501</td>
<td>0.6%</td>
</tr>
<tr>
<td>DON</td>
<td>0.5%</td>
<td>0.232</td>
<td>-0.5%</td>
</tr>
<tr>
<td>RNT</td>
<td>1.3%</td>
<td>0.878</td>
<td>-1.0%</td>
</tr>
<tr>
<td>IBF</td>
<td>2.1%</td>
<td>-0.073</td>
<td>46.3%</td>
</tr>
<tr>
<td>Total</td>
<td>100.0%</td>
<td>0.526</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

The different characteristics of the agricultural sector
Distribution of occupied persons’ earnings in Brazil from 1992 to 2009
Figure: Average and Gini index of the distribution of occupied persons’ earnings in Brazil, from 1992 to 2009: total, agricultural and non-agricultural sectors.
Figure: Evolution of the average age of occupied persons with positive earnings in Brazil, from 1992 to 2009: total, agricultural and non-agricultural sectors
**Figure**: Evolution of average weekly working hours of occupied persons with positive earnings in Brazil, from 1992 to 2009: total, agricultural and non-agricultural sectors.
Figure: The growth of average schooling of occupied persons with positive earnings in Brazil, from 1992 to 2009: total, agricultural and non-agricultural sectors

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The different characteristics of the agricultural sector
Figure: Gini index and mean absolute difference of schooling of occupied persons with positive income in Brazil, from 1992 to 2009.
Occupied persons

\[ G = \frac{\Delta}{2\mu} \]

\[ C = \frac{\sigma}{\mu} \]
Figure: Relation between the mean absolute difference and the average schooling of occupied persons in Brazil, from 1992 to 2009.
**Figure**: Evolution of the Gini index of schooling of occupied persons in Brazil, from 1992 to 2009: agricultural and non-agricultural sectors.
Figure: Evolution of the coefficient of variation of schooling of occupied persons in Brazil, from 1992 to 2009: agricultural and non-agricultural sectors.
Figure: Evolution of the standard deviation of schooling of occupied persons in Brazil, from 1992 to 2009: agricultural and non-agricultural sectors.
Figure: Evolution of the mean difference of schooling of occupied persons in Brazil, from 1992 to 2009: agricultural and non-agricultural sectors.
Figure: Relation between the mean absolute difference and the average schooling of occupied persons in Brazil, from 1992 to 2009.
Figure: Relation between the mean absolute difference and the average schooling of occupied persons in Brazil, from 1992 to 2009: total, agricultural sector and non-agricultural sector.
Figure: Evolution of average earnings and multiples of the real minimum wage, Brazil from 1992 to 2009.
Figure: Evolution of the real MW and of 3 quantiles of the occupied persons’ earnings distribution in Brazil, from 1992 to 2009.
Figure: Inequality measures of the occupied persons’ earnings distribution in Brazil, from 1992 to 2009.
Figure: Percentage of the total income appropriated by $1^+$ and $50^-$ in the occupied persons’ earnings distribution in Brazil, from 1992 to 2009.
Earnings equations for agricultural and non-agricultural sectors:

- $\ln(\text{earnings from work})$
- female
- age and $\text{age}^2$
- schooling $(E)$ and $Z(E - 10)$
- $\ln(\text{weekly working hours})$
- self-employed, employer, employee without labor contract
- black, mulatto (or mixed race), asian
- North, MG+ES+RJ, SP, South, Midwest
- rural residence
Earnings Equation:

\[ Y = \text{earnings} \]
\[ X = \text{any continuous explanatory variable} \]

Being \( \Theta \) the value of the other terms of the equation, it is possible to write

\[ \ln(Y) = \beta X + \Theta \]

Fixing the value of all other explanatory variables, it follows that

\[ \frac{dY}{Y} = \beta dX \quad \text{or, approximately} \quad \frac{dY}{Y} = \beta \Delta X \]

The earnings inequality (relative variations) tends to increase with the absolute value of \( \beta \) and with the dispersion (variations) of \( X \).
Effects:

$$100[\exp(b) - 1]$$

Earnings equations for agricultural and non-agricultural sectors
Figure: Returns to schooling: up to 10 years and over 10 years for occupied persons in Brazil, from 1992 to 2009.
Figure: The effect of being female, black or mulatto on occupied persons’ earnings in Brazil, from 1992 to 2009.
Figure: The effect of being asain on occupied persons' earnings in Brazil, from 1992 to 2009.
Figure: Regional effects (relative to the Northeast) on occupied persons’ earnings in Brazil, from 1992 to 2009.

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Figure: The effect of not having a labor contract or being self-employed (employee with contract taken as reference) on occupied persons’ earnings in Brazil, from 1992 to 2009.
Figure: The effect of rural residence on occupied persons’ earnings in Brazil, from 1992 to 2009.

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The different characteristics of the agricultural sector
Inequality between six regions (North, Northeast, MG+ES+RJ, SP, South and Midwest) or between 27 Federation Units (FUs).
Figure: Gini index of occupied persons’ earnings distribution referring to the inequality between six regions or between 27 FUs in Brazil, from 1992 to 2009.
Figure: Theil’s L and T indexes of occupied persons’ earnings distribution referring to the inequality between six regions or between 27 Federation Units (FUs) in Brazil, from 1992 to 2009.
Figure: Percentage of the Gini index of occupied persons' earnings distribution referring to the inequality between six regions or between 27 FUs in Brazil, from 1992 to 2009.
Figure: Percentage of the Theil’s T and L indexes of occupied persons’ earnings distribution referring to the inequality between six regions or between 27 FU's in Brazil, from 1992 to 2009.

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Thank you!

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