Assessing Redistribution within Social Insurance Systems. The cases of Argentina, Brazil, Chile, Mexico and Uruguay

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Introduction

- Impact of pension and unemployment insurance programs on the distribution of lifetime labor income in Latin America.

- Five country case studies:
  - Argentina: Moncarz (2011)
  - Brazil: Zylberstajn (2011)
  - Chile: Fajnzylber (2011)
  - Mexico: Moncarz (2011)
  - Uruguay: Forteza and Mussio (2011)
What do we do:

- Non-behavioral micro simulations. Variants:
  - Other countries: simulate newborn individuals.

- Estimate dynamic econometric models of contributions to social security and labor income.

- Run Monte Carlo simulations of expected life-time labor income and net transfers to social security.

- Compute indicators of distribution and redistribution of income
What do we find:

- There is considerable variation across countries in terms of the amount of redistribution identified.
- The programs that redistribute more are not necessarily the ones that make the greater contribution to reducing inequality.

Impact of Social Security on the Ginis of lifetime formal labor income:

- Chile: four points reduction.
- Brazil and Uruguay: two points reduction.
- Mexico: no change.
- Argentina: more than one point increase (!)
Outline

- The programs
- Data
- Methods
- Results
- Concluding remarks
### The programs

#### Old-age pension programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Type of program</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>PAYG</td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td>PAYG</td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td>Individual Accounts</td>
<td>IA plus subsidies to supplement low pensions.</td>
</tr>
<tr>
<td>Mexico</td>
<td>Individual Accounts</td>
<td>IA plus matching contributions (&quot;cuota social&quot;) and minimum pensions.</td>
</tr>
<tr>
<td>Uruguay</td>
<td>Mixed</td>
<td>Mixed two-tiers program. First tier: PAYG-DB. Second tier: individual accounts. Low income workers may opt to redirect half of their contributions to individual accounts.</td>
</tr>
</tbody>
</table>
## Unemployment insurance programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Type of program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>Traditional common pool</td>
</tr>
<tr>
<td>Brazil</td>
<td>Parallel individual accounts and social insurance programs.</td>
</tr>
<tr>
<td>Chile</td>
<td>Integrated individual accounts and social insurance program.</td>
</tr>
<tr>
<td>Mexico</td>
<td>No UI</td>
</tr>
<tr>
<td>Uruguay</td>
<td>Traditional common pool</td>
</tr>
</tbody>
</table>
There seems to be considerable diversity in terms of design of these programs.
<table>
<thead>
<tr>
<th>Country</th>
<th>Type of data</th>
<th>Time period</th>
<th>Coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>Rotating panel survey</td>
<td>1995-2003</td>
<td>Urban. 60% of population</td>
</tr>
<tr>
<td>Brazil</td>
<td>Rotating panel survey</td>
<td>2002-2010</td>
<td>Six metropolitan areas. 25% of population. (We focused on private sector workers)</td>
</tr>
<tr>
<td>Chile</td>
<td>Administrative data</td>
<td>1981-2009</td>
<td>Population affiliated to the SS system in 2002 = 70% of working-age population.</td>
</tr>
<tr>
<td>Mexico</td>
<td>Rotating panel survey</td>
<td>2000-2004</td>
<td>Total population.</td>
</tr>
<tr>
<td>Uruguay</td>
<td>Administrative data</td>
<td>1996-2004</td>
<td>2004 BPS-covered workers = 45% of labor force</td>
</tr>
</tbody>
</table>
Methods

Four steps:

(i) Estimation and simulation of labor status and labor income models.

(ii) Computation of social security contributions and pensions.

(iii) Computation of pre- and post-social security lifetime income.

(iv) Computation of income distribution measures.
Estimation and simulation of models

- Labor income models:
  - Second and following periods:

\[
\ln w_{it} = \rho \ln w_{it-1} + \beta_1 \ln d_{ur_{it}} + \beta_2 a_{it} + \beta_3 a_{it}^2 + \beta_4 x_{it} + \beta_5 \delta_t + v_i + e_{it}
\]

- First period:

\[
\ln b_i = \alpha_1 + \alpha_2 a_i + \alpha_3 a_i^2 + \alpha_4 \hat{v}_i + \varepsilon_i
\]
Contribution status

- Linear probability models
  - Second and following periods
    - Two-equation model:
      \[
      C_{it} = x_{it}' \beta^0 + \eta_i + \varepsilon_{it} \quad \text{if} \quad C_{it-1} = 0
      \]
      \[
      C_{it} = x_{it}' \beta^1 + \eta_i + \varepsilon_{it} \quad \text{if} \quad C_{it-1} = 1
      \]

- One-equation model:
  \[
  C_{it} = x_{it}'(1 - D_{it})\beta^0 + x_{it}'D_{it}\beta^1 + \eta_i + \varepsilon_{it}
  \]
  \[
  D_{it} = 1 \quad \text{if} \quad C_{it-1} = 1; \quad 0 \quad \text{otherwise}
  \]
First period

\[ C_{it} = x_{it} \alpha_1 + \hat{\eta}_i \alpha_2 + e_{it} \]

Modeling duration (Chile)

\[
\ln(\text{Length}_{it}) = \alpha + \beta_1 \cdot \text{Age}_{it} + \beta_2 \cdot \text{Age}_{it}^2 + \beta_3 \cdot (\text{Age}_{it} \cdot \text{Female}_i) + \beta_4 \cdot (\text{Age}_{it}^2 \cdot \text{Female}_i) \\
+ \beta_5 \cdot t + \eta_i + \varepsilon_{it}
\]
Computation of social security contributions and pensions

- OASDI and UI programs, but assuming no disability and no survivors.
- Individuals are assumed to claim benefits as soon as they are eligible.
- Enforcement: in Argentina and Uruguay we also simulated a weak enforcement scenario = vesting period condition is not enforced.
Computation of pre- and post-social security lifetime income

- **Pre-SS lifetime labor income:**

\[
W_{preSS} = \sum_{a=0}^{a=r-1} p(a)W(a)(1+\rho)^{-a}
\]

- **Social Security Wealth**

\[
SSW = PB + UB - SSC
\]
\[
PB = \sum_{a=r}^{a=\text{max age}} p(a)B(a, r)(1 + \rho)^{-a}
\]

\[
UB = \sum_{a=0}^{a=r-1} p(a)UB(a)(1 + \rho)^{-a}
\]

\[
SSC = \sum_{a=0}^{a=r-1} p(a)C(a)(1 + \rho)^{-a}
\]
Post-SS lifetime labor income

\[ W_{\text{post SS}} = W_{\text{pre SS}} + SSW \]
Computation of income distribution measures

- Distribution of SSW and SSW/pre-SS income
- Plot SSW and pre-SS income (local progressiveness)
- Lorenz and concentration curves for pre- and post-SS lifetime labor income.
- Gini and concentration indexes
- Reynolds-Smolenski index of net redistributive effect.
Results

- I skip the econometric models used for simulation of lifetime labor income.
- Distribution of SSW and SSW/pre-SS income
<table>
<thead>
<tr>
<th>Country</th>
<th>Income</th>
<th>P1</th>
<th>Median</th>
<th>P99</th>
<th>Skewness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>222.8</td>
<td>4.1</td>
<td>121.8</td>
<td>1460.2</td>
<td>5.5</td>
</tr>
<tr>
<td>SSW</td>
<td>-27.6</td>
<td>-103.5</td>
<td>-16.1</td>
<td>-0.9</td>
<td>-1.4</td>
</tr>
<tr>
<td>SSW/Income</td>
<td>-16%</td>
<td>-23%</td>
<td>-17%</td>
<td>-6%</td>
<td>0.3</td>
</tr>
<tr>
<td>Brazil</td>
<td>143.3</td>
<td>0.0</td>
<td>48.1</td>
<td>1533.5</td>
<td>22.3</td>
</tr>
<tr>
<td>SSW</td>
<td>-19.8</td>
<td>-258.2</td>
<td>-2.4</td>
<td>4.2</td>
<td>-23.4</td>
</tr>
<tr>
<td>SSW/Income</td>
<td>6%</td>
<td>-30%</td>
<td>-6%</td>
<td>196%</td>
<td>3.2</td>
</tr>
<tr>
<td>Chile</td>
<td>95.2</td>
<td>2.1</td>
<td>62.9</td>
<td>440.8</td>
<td>1.9</td>
</tr>
<tr>
<td>SSW</td>
<td>4.5</td>
<td>-3.3</td>
<td>4.4</td>
<td>9.4</td>
<td>-0.3</td>
</tr>
<tr>
<td>SSW/Income</td>
<td>28%</td>
<td>-1%</td>
<td>8%</td>
<td>331%</td>
<td>7.8</td>
</tr>
<tr>
<td>Mexico</td>
<td>63.8</td>
<td>0.6</td>
<td>48.5</td>
<td>259.9</td>
<td>1.7</td>
</tr>
<tr>
<td>SSW</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.6</td>
<td>6.2</td>
</tr>
<tr>
<td>SSW/Income</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>2%</td>
<td>6.7</td>
</tr>
<tr>
<td>Uruguay</td>
<td>175.1</td>
<td>1.3</td>
<td>89.3</td>
<td>1211.4</td>
<td>20.1</td>
</tr>
<tr>
<td>SSW</td>
<td>-3.6</td>
<td>-77.3</td>
<td>-0.2</td>
<td>17.1</td>
<td>-2.9</td>
</tr>
<tr>
<td>SSW/Income</td>
<td>8%</td>
<td>-13%</td>
<td>-1%</td>
<td>147%</td>
<td>13.5</td>
</tr>
</tbody>
</table>
Social security wealth and life time income
Pre- and post-SS life time formal labor income
Gini and Reynolds-Smolenski indexes

<table>
<thead>
<tr>
<th>Country</th>
<th>Gini before SS</th>
<th>Gini after SS</th>
<th>RS-Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>0.5504</td>
<td>0.5638</td>
<td>-0.0132***</td>
</tr>
<tr>
<td>Brazil</td>
<td>0.7630</td>
<td>0.7435</td>
<td>0.0198***</td>
</tr>
<tr>
<td>Chile</td>
<td>0.4991</td>
<td>0.4606</td>
<td>0.0388***</td>
</tr>
<tr>
<td>Mexico</td>
<td>0.4787</td>
<td>0.4786</td>
<td>0.0002***</td>
</tr>
<tr>
<td>Uruguay</td>
<td>0.6004</td>
<td>0.5822</td>
<td>0.0187***</td>
</tr>
</tbody>
</table>
The Argentinean Paradox I

SS increases Ginis, even if SSW is decreasing in income...

Graphs by pop_group2
The Argentinean Paradox II

but SSW/income is mostly increasing in income

Graphs by pop_group2

pre-SS labor income (thousands 2010 USD)
Extensions and robustness checking

- Weak enforcement scenario in Argentina and Uruguay. Main result: SS does not impact on Gini in Argentina and reduce it in two percentage points in Uruguay.

- Lower discount rates (1 and 2 ppa) in Argentina and Uruguay. Main result: with 1 ppa discount rate and weak enforcement, Argentinean SS reduces Gini in about 1 point.
Fajnzylber (2011) separately reports the impact of pension and UI programs on income distribution in Chile.

Main results: both programs progressive, but UI much smaller impact because of small size.
Conclusions

- Much redistribution is taking place through the social security systems in Argentina, Brazil, and Uruguay, very little in Mexico and something in between in Chile.
- Therefore, DB-PAYG programs redistribute more than DC-individual account programs.
- However, programs that redistribute more do not seem to be the same that contribute more to the reduction of inequality.
The Chilean individual savings accounts program, combined with the recently reformed solidarity pillar, is the one that contributes more to reducing inequality in this group of countries.

The Argentinean program is the most puzzling: it performs much redistribution, but it fails to reduce inequality, and it might even exacerbate it.