Demographic Change and Economic Development at the Local Level in Brazil

Ernesto F. L. Amaral
Daniel S. Hamermesh
Joseph E. Potter
Eduardo L. G. Rios-Neto

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Population Research Center, University of Texas at Austin.
Center of Development and Regional Planning, Federal University of Minas Gerais.

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The main focus of the demographic dividend (DD) literature has been on the direct impact of the decreasing dependency ratio on economic development.

However the age and education composition of the Brazilian labor force is also undergoing drastic shifts with great regional variation.

“Baby boom” studies suggest that large cohorts in the US depressed earnings, and effects increased with education.

The main question is whether these compositional shifts in Brazil have had an effect beyond the formal labor force equations estimated by DD studies.
Data

- Municipalities are aggregated to the micro-region level, yielding 502 comparable areas across the four censuses.
- **Age** is categorized in four groups: 15–24, 25–34, 35–49, and 50–64.
- **Educational attainment** is classified in three groups according to completed years of schooling: 0–4, 5–8, 9+.
- We calculate the proportion of men in each one of the 12 age-education groups for each year and micro-region.
Proportion of Men with 25–34 Years of Age and 9+ Years of Schooling in 502 Brazilian Micro-regions, 1970–2000 Censuses
Proportion of Men with 35–49 Years of Age and 0–4 Years of Schooling in 502 Brazilian Micro-regions, 1970–2000 Censuses
Estimation of Models

- We rely on the **variation** in the distribution of males by age and education within each area, at a point in time, to identify the effects of interest (fixed-effects models).

- This approach is made possible by the differences across areas in the changes in the relative sizes of the cells.

- The **dependent variable** is the logarithm of the mean real income of male workers in a group.

- Equations estimated in this study are **inverse demand functions**, which indicate the impact of exogenous changes of the demand for labor on wage rates.
Main Models

- **OWN-EFFECTS**: within each area (i), at each time (t), income is predicted by the proportion of people in each one of the age-education cells (c). Giving 12 regressions:

\[ W_{itc} = \beta_0 + \beta_1 X_{itc} + u_i + \theta_t + \varepsilon_{itc}, \ i = 1...K; \ t = 1...T \]

- **CROSS-EFFECTS**: adding cross-proportions.

\[ W_{itc} = \beta_0 + \beta_1 X_{itc} + \beta_2 X_{itc'} + u_i + \theta_t + \varepsilon_{itc}, \ i = 1...K; \ t = 1...T \]

- We also add interactions of proportions with three year indicators.
Predicted Earnings from Own-Effects Model by Proportion of People in 502 Brazilian Micro-regions, 1970–2000

**1970**

**1980**

**1991**

**2000**
Extra Models

- Estimate models allowing for both time and area fixed effects.
- Add interactions of age-education proportions with micro-region-size indicators.
- Use female labor force participation and migration rate as dependent variables to measure their correlations with own-effect proportions.
- Include female distributions to allow for the cross-effects of their relative quantities on male relative wages.
- Utilize interactions of proportions with major-region indicators.
A Way to Graph the Results

- Too many coefficients to look at.
- Calculate a **simple model**, containing just indicator variables for year and age-education group.

For a given microregion and age-education group, we calculate ratios of the following earnings to those predicted by the simple model:

- 1) Predicted earnings from model with **Own-Effects X Year**.
- 2) Predicted values from model with **Own-Effects X Year X Region**.
- 3) **Observed** earnings.
OWN-EFFECTS X YEAR X REGION
Adults (35–49), Medium Education (5–8), 1970–2000

NORTHEAST
Baixo Parnaiba & Litoral Piauiense (PI)

OWN-EFFECTS X YEAR X REGION
OWN-EFFECTS X YEAR
BASELINE
OBSERVED INCOME

SOUTHEAST
Volta Redonda (RJ)

NORTHEAST
Mata Setentrional (PE)

SOUTH
Porto Alegre (RS)
Are Factor-prices Elasticities Robust?

- **Inter-micro-regional migration** was ignored:
  
  - If we could control for the assumption that migrants move to areas with better job opportunities, the effects would have been even more negative than what was found.

- **Marginal cost** was specified as constant, because there is no information on the scale of production in each area:
  
  - If we could control for the assumption that more skilled workers are located in areas with better job opportunities, we would get even more negative elasticities for these groups.
Conclusions and Implications

- **Relative group size** matters with greatest negative impacts on income for groups with more years of education.

- The increasing relative scarcity of **unskilled workers** is no longer contributing to an increase in their relative earnings.

- Relative supply affects relative wages less than in the past, as implied by fewer negative numbers **over time**.

- Improvement in educational attainment and fertility decline were important factors to **reduce economic inequality**.

- **Compositional approach** of the labor force is fruitful to expand studies in this field of economic development.
Following Work

- **Gravity models** can be used to generate attraction and repulsion measures among micro-regions, in order to control for migration flows.

- Use of instrumental variables in order to estimate the predicted female economically active population, and to include **women** in both sides of the equations.

- We intend to test whether age and education groups in **Mozambique** are competitive in the labor market and present a negative pressure on their own wage.