



The Census Microdata Wealth Index: An Application to Predict Education Outcomes in Developing Countries

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OBJECTIVE

The goal of this paper is to develop a valid and consistent measure of socioeconomic status at the household level using assets and housing microdata available from IPUMS-International.

RESEARCH QUESTIONS

1. Is the asset-based index internally consistent when applied to international census microdata?
2. Is the asset-based index a valid measure of socioeconomic status?

BACKGROUND

- Income and expenditure data is often used as a measure of socioeconomic status, but this data can be inconsistent (especially in developing countries), costly to collect and less readily available in censuses.
- The asset-based approach resolves many of these problems and has been used, particularly by the Demographic and Health Survey (DHS) to analyze inequalities and outcomes.
- Previous research provides empirical evidence of the appropriateness of the asset index in representing a household's socioeconomic status by comparing rankings based on the asset index to those based on expenditures and income.
- A practical issue in developing a census asset index is heterogeneous variable availability across samples.

DATA

| Country | Year of Data | |
|--------------|--------------|------|
| | IPUMS-I | DHS |
| Brazil | 2000 | 1996 |
| Colombia | 2005 | 2005 |
| Peru | 1993 | 1992 |
| Senegal | 2002 | 2005 |
| South Africa | 1996 | 1996 |

| Examples of Variables | | |
|-----------------------|---------------------|--------------------------|
| Asset ownership | Access to utilities | Dwelling characteristics |
| Telephone | Electricity | Wall material |
| Computer | Water supply | Floor material |
| Bicycle | Type of sewage | Roof material |

Sources:

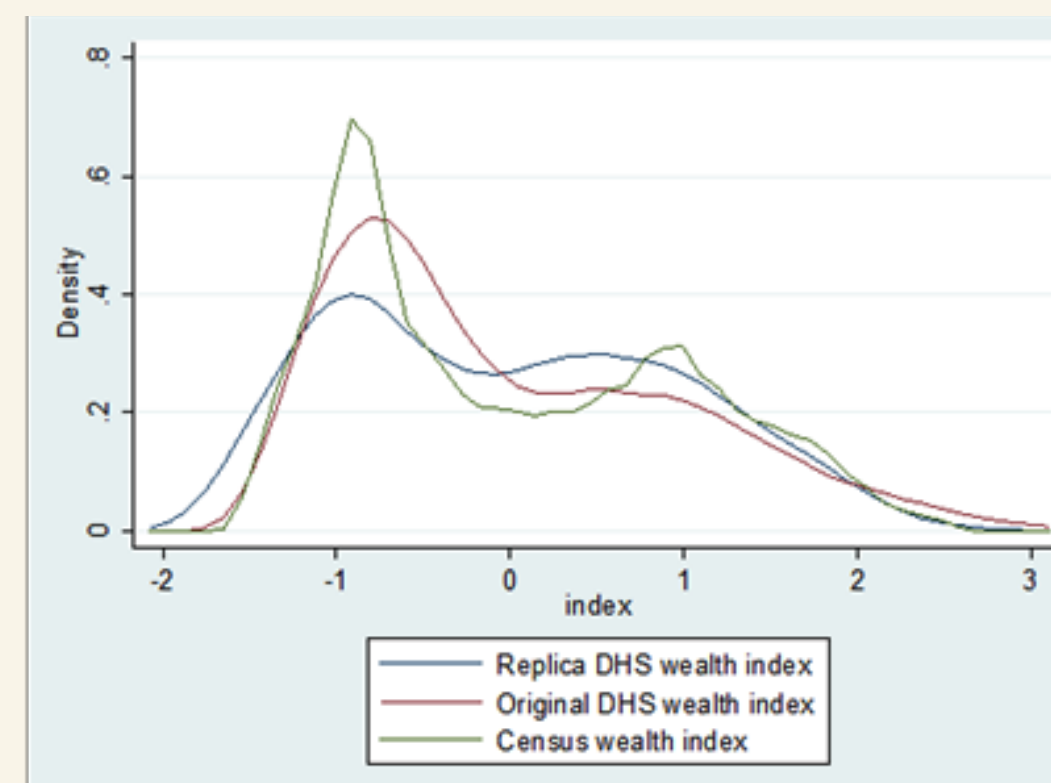
Minnesota Population Center. Integrated Public Use Microdata Series, International: Version 6.0 [Machine-readable database]. Minneapolis: University of Minnesota, 2010.

<http://www.measuredhs.com/>

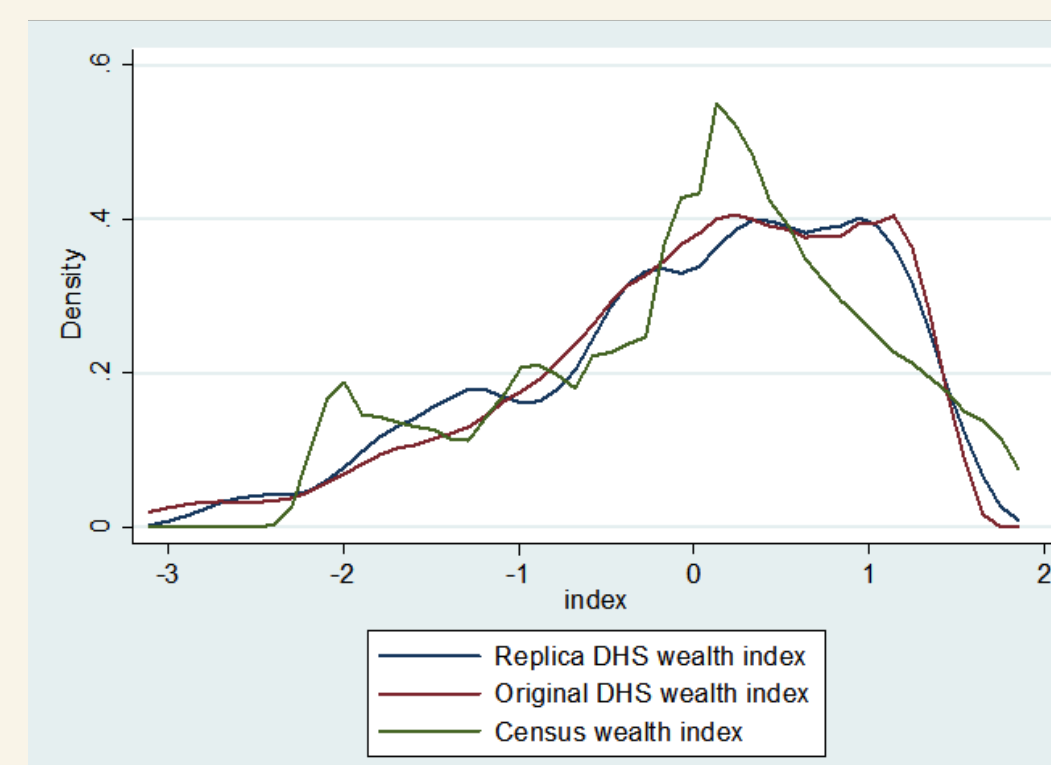
METHODOLOGY

- Calculation of the asset index is performed using Principal Component Analysis (PCA).
1. Internal consistency
 - We perform a stepwise elimination of variables with the smallest PCA scoring factor (in absolute value). After each elimination, the index is recalculated with the remaining variables. We verify the agreement of each ranking using Spearman rank correlations and compare the internal consistency of the indices using Cronbach's alpha.
 - Kernel density estimation show the resulting asset index distributions and the agreement of results using census microdata with comparable DHS data.

Senegal kernel density distributions



Brazil kernel density distributions



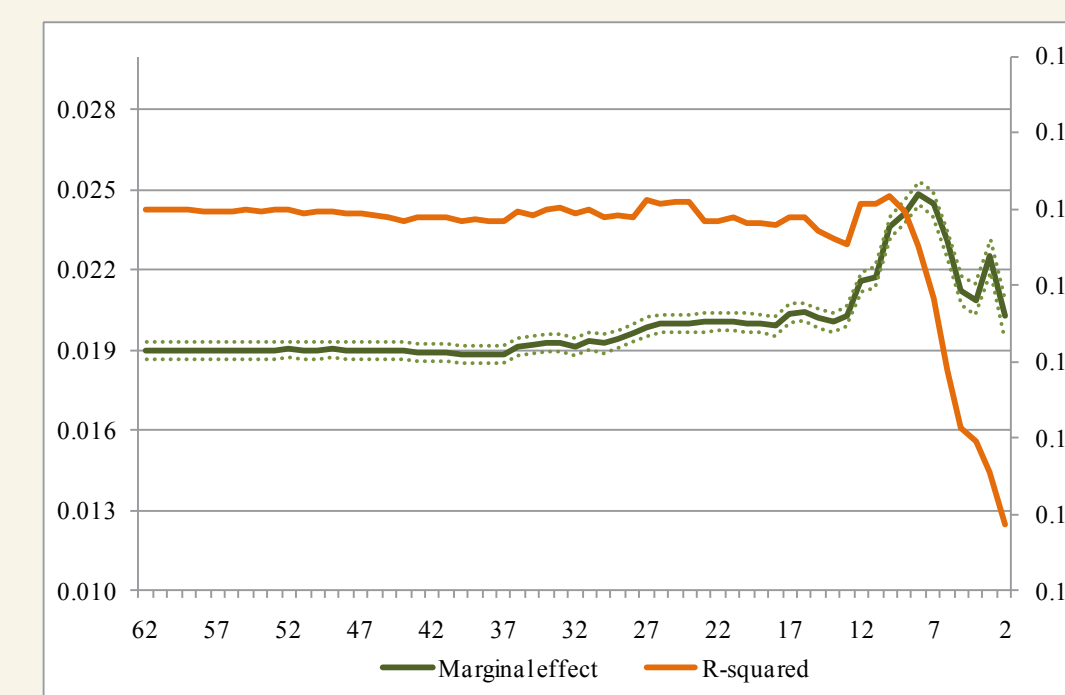
2. Validity

- We compare distributions of enrollment and attainment by quintiles using both the census and DHS wealth index. Then, we estimate a probit regression for school enrollment using the wealth index and other independent variables.

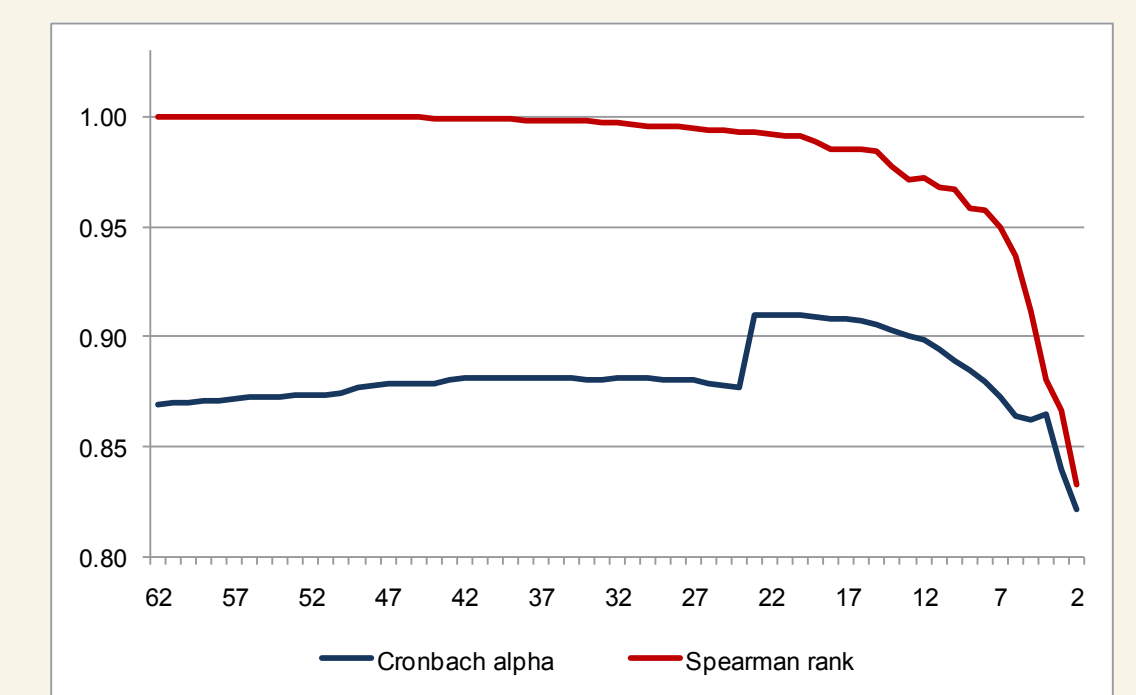
RESULTS

1. Internal consistency

The effect of stepwise elimination of variables on the school attendance regression for Colombia

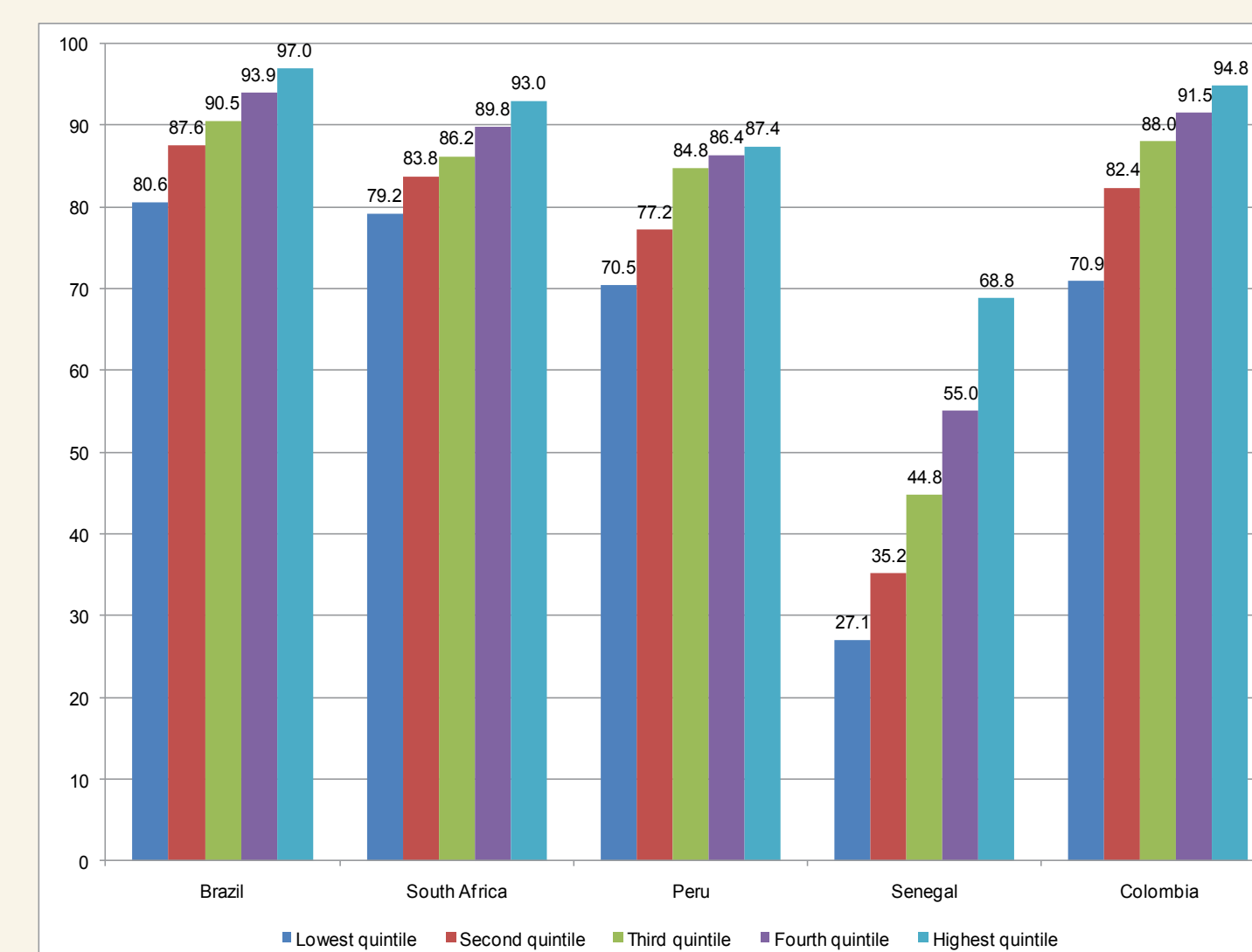


The effect of stepwise elimination of variables on the school attendance regression for Colombia

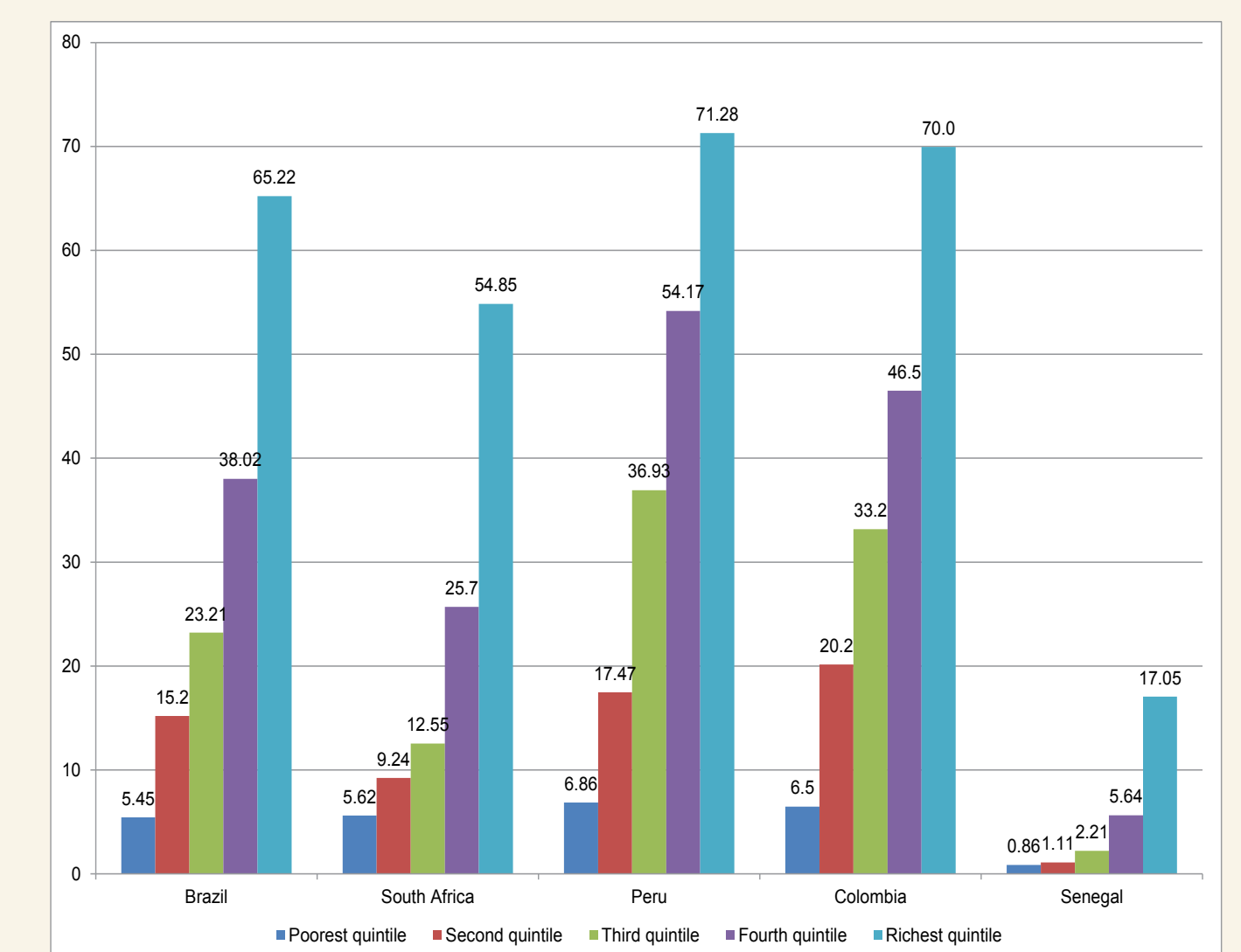


2. Validity

School enrollment by quintiles, according to the census microdata wealth index



Percent secondary school completion by census wealth index quintiles



CONCLUSIONS

- The stepwise procedure results and kernel density distributions show that we are consistently measuring the unobserved socioeconomic status at the household level and that this distribution is relatively similar to the DHS measure.
- The probit regression for children's school enrollment indicates that the effect of the wealth index is positive and statistically significant.
- We indeed observe differences in school enrollment and educational attainment across the asset index quintiles, showing consistently that households at the top of the distribution have better outcomes than those at the bottom.
- An important practical implication from our results is that the stepwise elimination procedure provides a starting point to determine which household variables contribute the most to household socioeconomic status and are necessary to obtain a valid asset index. After replicating this process to more IPUMS-I samples, stronger conclusions may be drawn regarding which of the remaining core variables are essential for a valid index.