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Global trends in educational inequality

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Extended Abstract

1. Introduction

It is difficult to underestimate the importance of education for individuals' lives. Educational attainment is a key characteristic of individuals with a strong positive impact on virtually all relevant life cycle events that social scientists are interested in (e.g. union formation and dissolution, fertility, getting a job, salary, migration, health status and, finally, age at death). Therefore, the spectacular expansion of education we have witnessed all over the world during the last decades has to be welcomed as a major social improvement. This expansion includes rising literacy rates (Crafts 2002) as well as increases in school enrollment rates and in completed years of primary, secondary and college education (Benavot and Riddle 1988, Benavot et al. 1991; Meyer, Ramirez, and Soysal 1992; Ramirez and Meyer 1980; Barro and Lee 2000; Cohen and Soto 2007; Morrisson and Murtin 2009). These worldwide gains on virtually all education indicators are exhaustively described in a recent book by Barro and Lee (2015).

While the levels and trends of overall educational attainment indicators have been well documented, the study of educational *inequality* has received far less attention in the literature. Yet, the way in which education is distributed across the population does have direct implications for individuals' life chances. High levels of educational inequality today will typically generate and amplify inequalities in other welfare domains in the future, hindering social mobility and strengthening the intergenerational transmission of social exclusion and disadvantage (Breen and Jonsson 2005; Esping-Andersen 2009). In this context, it is therefore important to document the levels and trends of educational inequality and to explore whether inequality declines together with educational expansion or not.

In the last years, some studies have aimed to estimate educational inequality measures around the globe and/or its regions (e.g. Castelló and Doménech 2002, Benaabdelaali et al. 2012, Dorius 2013, Meschi and Scervini 2013, Morrisson and Murtin 2013). Virtually all these studies are based on different versions of the dataset from Barro and Lee (see www.barrolee.com), which groups data in 4 or 7 broad educational attainment categories, depending on whether we consider both complete and incomplete educational stages.² Unfortunately, by grouping the data in these coarse categories we lose sight of important variations that might be occurring both within and between education distributions, therefore downwardly biasing the estimated inequality levels – an issue we address in this paper. For the first time, we aim at unraveling global trends in education inequality using micro-level information about individuals' years of schooling. Such fine-grained information will allow

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²Meschi and Scervini (2013) is an exception, but their analysis is restricted to high-income countries.

us to describe global education inequality levels and trends with unprecedented accuracy. For that purpose, we have assembled a large dataset from different – yet comparable – data sources: the census micro-data samples from the IPUMS project, the Demographic and Health Surveys (DHS), the European Social Surveys (ESS) and the International Social Survey Programme (ISSP). Our database consists of 153 census samples and 1,011 household surveys covering 126 countries from the period 1960-2014.

With this wealth of information, we aim to gain understanding on the nature of the variation in years of schooling among countries and recent time periods in several ways. First, we disclose the full pattern of variation in educational inequality and mean years of schooling for all 1164 country-year combinations. Recently, some authors suggested that a J-shaped relationship between average years of education and inequality emerges, as expansion at higher levels of education is likely to cover more selective parts of countries' populations (Meschi and Scervini 2013). Our relatively precise measurement of years of education should be particularly suited to identify such a J-shaped curve. Second, we select a consistent sample of 85 countries for the periods 1995-2004 and 2005-2014 to estimate global educational inequality and decompose this inequality into its within and between-country components. This kind of decomposition has already been explored in the domains of income (Anand and Segal 2014) and health (Edwards 2011), but remains to be unraveled and analyzed for the case of education. Finally, we investigate the contribution that the different educational stages (primary, secondary and tertiary education) have had on global educational inequality – a contribution that changes substantially across countries and over time as education expands. Also here, the precision of our years of education measure should give relatively accurate estimates of the relative role of educational stages in creating global educational inequality.

2. Methods

Variables used

The key variable whose distribution we analyze in this paper is 'Years of Schooling'. The advantage of using this variable is that it allows uncovering the entire education distribution with far more detail than broader educational attainment categories like 'primary, secondary or tertiary education completed'. In particular, this finer detail allows introducing more sophisticated techniques that give a richer and more complete picture of the education distribution across the globe (see below). The disadvantage is that data on years of education does not reach as far back in the past as the Barro and Lee dataset. In order to get a better understanding of how our key variable is distributed around the world, we disaggregate our findings by country, region, year and age. Lastly, we make use of the UNESCO datasets to have detailed information on the country-year durations of educational stages.

Measures and techniques

For our analysis we use the Theil index, a member of the group of Generalized Entropy measures of inequality. Assuming we have a distribution of years of schooling $\{y_1, \dots, y_n\}$, the Theil index is defined as

$$T(y_1, \dots, y_n) = \frac{1}{n} \sum_{i=1}^n \frac{y_i}{\bar{y}} \ln \left(\frac{y_i}{\bar{y}} \right)$$

where \bar{y} represents the mean years of schooling of the distribution. The Theil index has been used in a myriad of studies for its additive decomposability property. In other words: when the population is partitioned in several mutually exclusive groups, the index can be decomposed as:

$$T = T_W + T_B$$

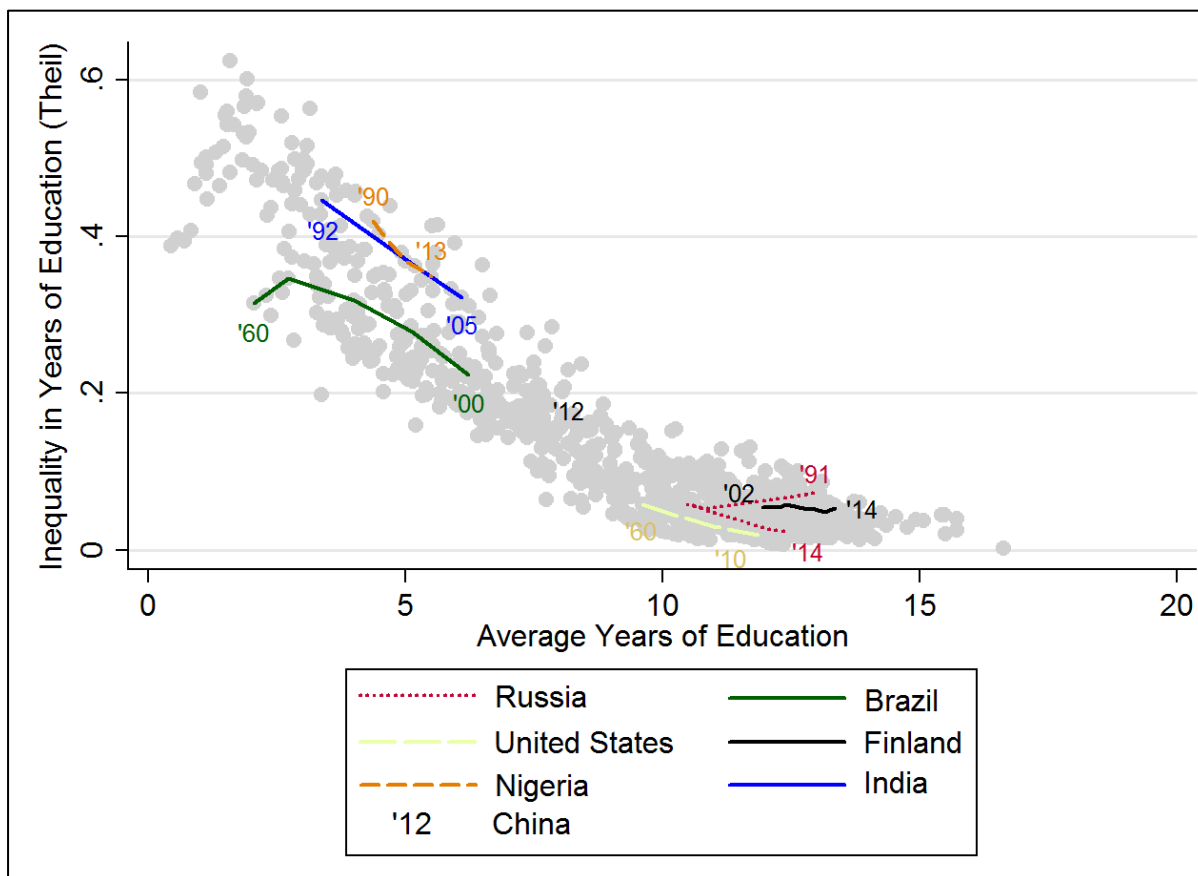
where T_W and T_B are the within and between groups inequality components. Lastly, in order to estimate the contribution of the different education cycles to overall inequality we have made use of the STATA package DASP.

3. Empirical findings

Figure 1 shows a scatterplot of the average years of education as well as inequality in these years of education (Theil index) for all countries and time periods for which data was available. It can be observed that average years of education increased over time for the highlighted countries. Similarly, inequality in years of education within these countries has declined consistently across time too. There also appears to be a clear negative relationship between average years of education and inequality in years of education across country-periods. Even though our measure of years of education should be particularly suited to detect a J-shaped relationship between both, no J-shape emerged from the curves in Figure 1 (in contrast to expectations from some earlier studies).

Our analysis of global educational inequality for the periods 1995-2004 and 2005-2014 confirms reductions in the unequal spread of education across the world's individuals. Figure 2 displays, for both periods, Theil-expressed levels of global educational inequality and its within- and between-country components. Both reductions in inequality between and within countries were responsible for decreasing global educational inequality. In general, variation between countries accounts for around 30% of inequality, whereas around 70% is attributable to variation within countries. At the same time, inequality within countries became responsible for a relatively larger share of global educational inequality over time (although only slightly), altogether providing support for the argument that educational levels are converging between countries across the globe. Finally, once decomposing the sources of educational inequality according to educational stage, one notices that tertiary education has become a relatively more important source of global educational inequality over time, but its role remains relatively limited (Figure 3). This relatively small role could increase in the future as tertiary education expands and becomes responsible for an ever larger share of the global educational distribution.

Figure 1. Average Years of Education and Inequality in Education for all datasets collected



Each dot represents a dataset for a given country and year (1164 datasets); Markers indicate periods; lines based on same data source within each country (e.g. all DHS)

Figure 2. Change over Time in Global Educational Inequality

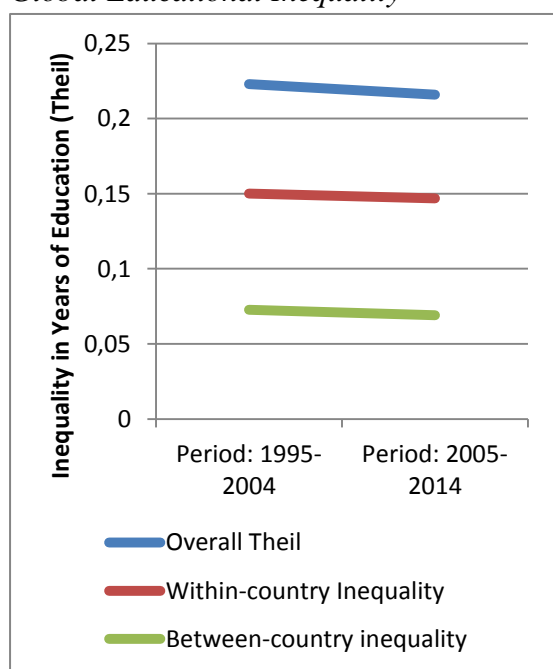
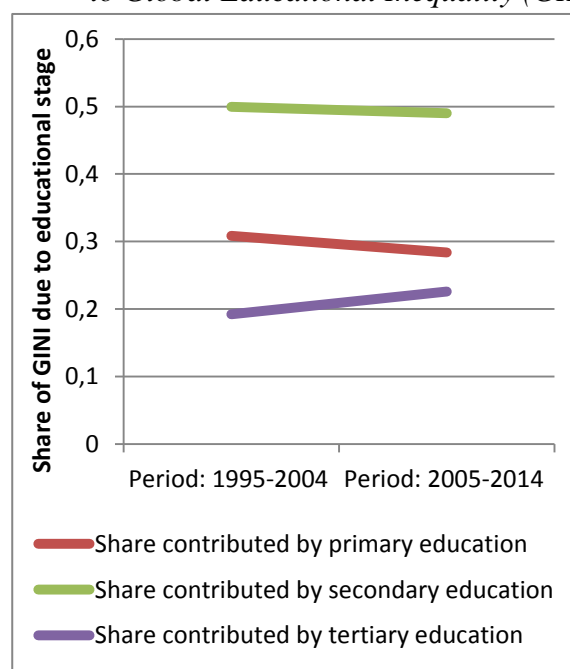


Figure 3. Contribution of Educational Stages to Global Educational Inequality (GINI)



Source: Authors' calculations based on IPUMS, DHS, ISSP, and ESS data using DASP package in STATA12

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