Gini Coefficients of Education for 146 Countries, 1950-2010.

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Gini Coefficients of Education for 146 Countries, 1950-2010

Thomas Ziesemer[1]

Abstract

We provide Gini coefficients of education based on data from Barro and Lee (2010) for 146 countries for the years 1950-2010. We compare them to an earlier data set and run some related loess fit regressions on average years of schooling and GDP per capita, both showing negative slopes, and among the latter two variables. Tertiary education is shown to reduce education inequality. A growth regression shows that tertiary education increases growth, Gini coefficients of education have a u-shaped impact on growth and labour force growth has an inverted u-shape effect on growth.

JEL classification numbers: E24, I24, I25, O15, Y1
Keywords: Human capital distribution, education inequality, growth, new data.

1 Introduction

The main purpose of this paper is to provide five-yearly data of Gini coefficients of education for 146 countries for the years 1950-2010. These data are based on data by Barro and Lee (2010, 2013). Earlier similar data had been provided by Thomas et al. (2000a,b), Castelló and Doménech (2002) and Földvári and van Leeuwen (2011). They have provided data sets with Gini coefficients for years of education in the population at age above 15 calculated from the data in Barro and Lee (1997, 2001) for five-year intervals ending in 2000 or earlier. Wail et al. (2011), Crespo-Cuaresma et al (2012, 2013) also have made such a data set differentiating by age and sex and going to 2010.[2] It is not clear from their paper that they also have the macro-versions. Sauer and Zagler (2014) did so for the period until 2005. Castelló and Doménech (2014) also have updated there data set. A curiosity here is that none of these authors give a download possibility for their data and therefore some have done at least partly duplication work. An exception are Jorda and

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[2] A somewhat different format is the data set by Morrison and Murtin (2010) for 78 countries 1870-2010.

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Alonso 2015, who calculate not only Gini's and other measures, for 1970-2010, but also offer a www address. The main purpose of this paper is to make the Gini data for 1950-2010 publicly available because this format has the greatest overlap with that of widely used World Development Indicators starting in 1960.

2 Methodology

We use the Barro and Lee (2010) data for no schooling, and total and completed primary, secondary and tertiary education. In order to be compatible with WDI data, we have turned the country codes ROM, ROU, COG in Barro/Lee (2010) into MDA, ROM, ZAR from the WDI, for Republic of Moldova, Romania, and Democratic Republic of Congo respectively. We use the formulas A-1 in Thomas et al (2000b) and Castelló-Climent (2004) to calculate the Gini coefficients of education. Similar formulas can be found in Thomas et al (2000a). These Gini coefficients can be found in the excel file at http://www.merit.unu.edu/docs/ginipublicexcel.xls or is available from the author upon email request. We compare them to those of Castelló and Doménech (2002) in Figure 1.[3] Deviations are due to data revisions in the more recent version of Barro and Lee (2010). As we have found a very good correlation with the data of Castelló and Doménech (2002), we continue using our own data in some regressions below.

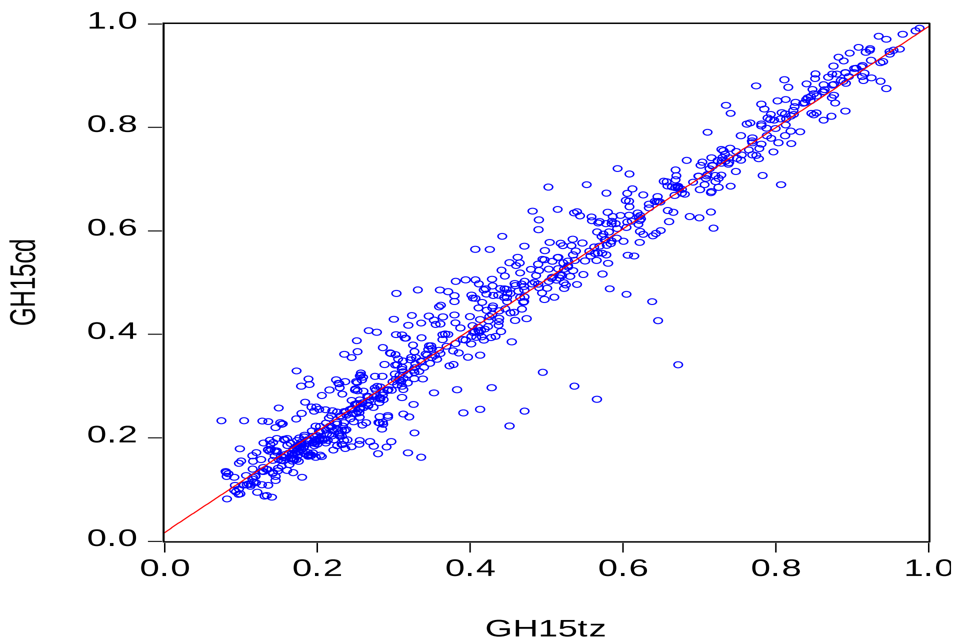

Figure 1: Comparison of our data for Gini coefficients of education, gh15tz, with those of Castelló and Doménech (2002), gh15cd, for the years 1960-1995.[4]

[3] For a comparison of the data of Castelló and Domenech (2002) with those of Thomas et al (2000a,b) see Ziesemer (2011).

[4] The last observation in the data set of Castelló and Doménech (2002) and Barro and Lee (2001) is for 1999, whereas in Barro and Lee (2010) the closest is for 2000.

3 Some data analysis

For the following regressions we use the Nearest Neighbor Fit or Loess (also known as Lowess) technique. We estimate a local linear regression using a bandwidth of 30% of the sample, meaning that the regression is repeated again and again for 30% of the observation and the result is attributed to the middle observation of these 30 percent, leading to a non-linear result. As the WDI do not include Reunion and Taiwan we omit them in the regressions, but they are included in the data set. In Figure 2 we reproduce an important result of Thomas et al (2000b) using our updated Gini coefficients. Gini coefficients of education go to zero when average years of schooling go the highest values achieved so far. Investment in comprehensive education inevitable reduces the inequality.

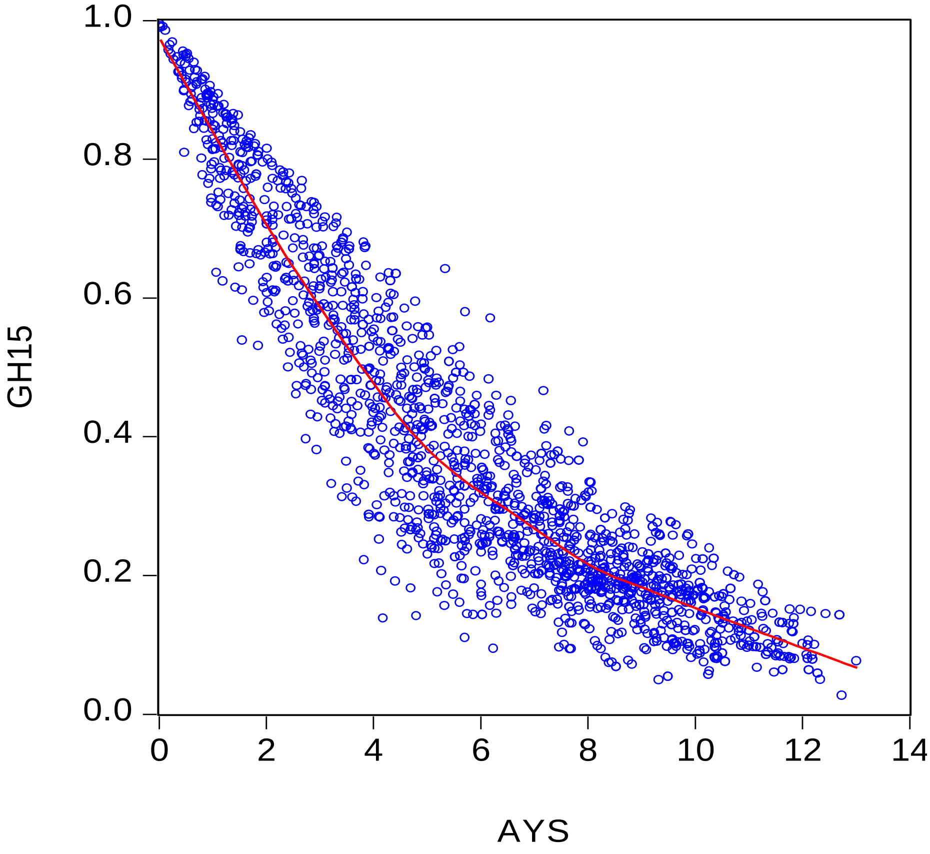

Figure 2: Higher average years of schooling lead to lower Gini coefficients of education in a panel of 144 countries.

The relation between Gini coefficients of education and GDP per capita is shown in Figure 3. Until roughly \$20000 (constant 2000) the Gini coefficients are falling at a decreasing rate.

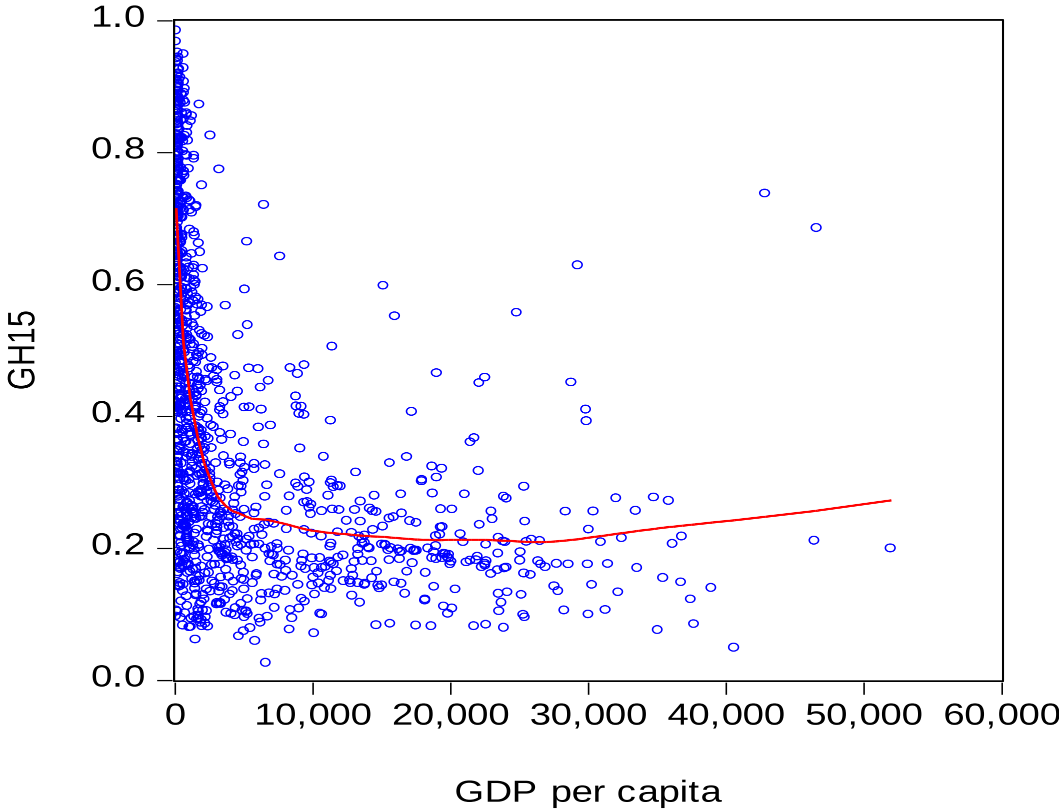

Figure 3: For a panel of 144 countries 1960-2010 Gini coefficients of education are falling to 0.21 until a GDP per capita reaches about $20000.

As we have regressed Gini coefficients of education on average years of schooling and GDP per capita, we also regress the latter two on each other in Figure 4a in the same Mincerian form as Barro and Lee (2010) did, but here without control variables. If the GDP variable is taken without logs in Figure 4b there is an increasing slope in the relation between GDP and average years of schooling.

We would like to point out though that the regressions of Figures 2-4 may have two-way causality and therefore a multi-equation analysis - perhaps together with other variables such as the policy analysis in Ziesemer (2011) - will be carried out in future research to get better information on causality then single equation regression can offer.

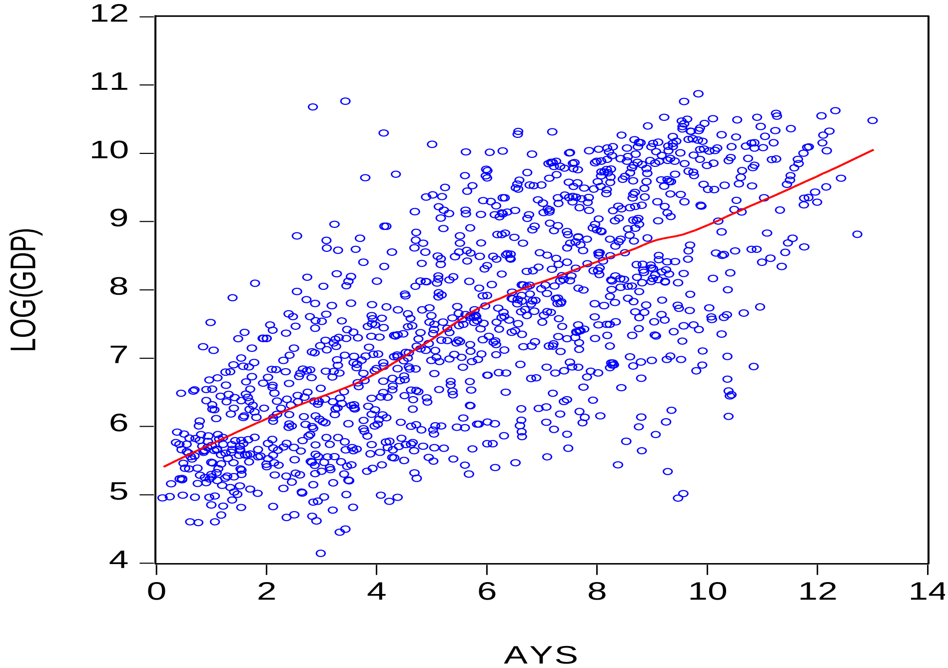

Figure 4a: Average years of education are positively and linearly correlated with the log (GDP per capita)

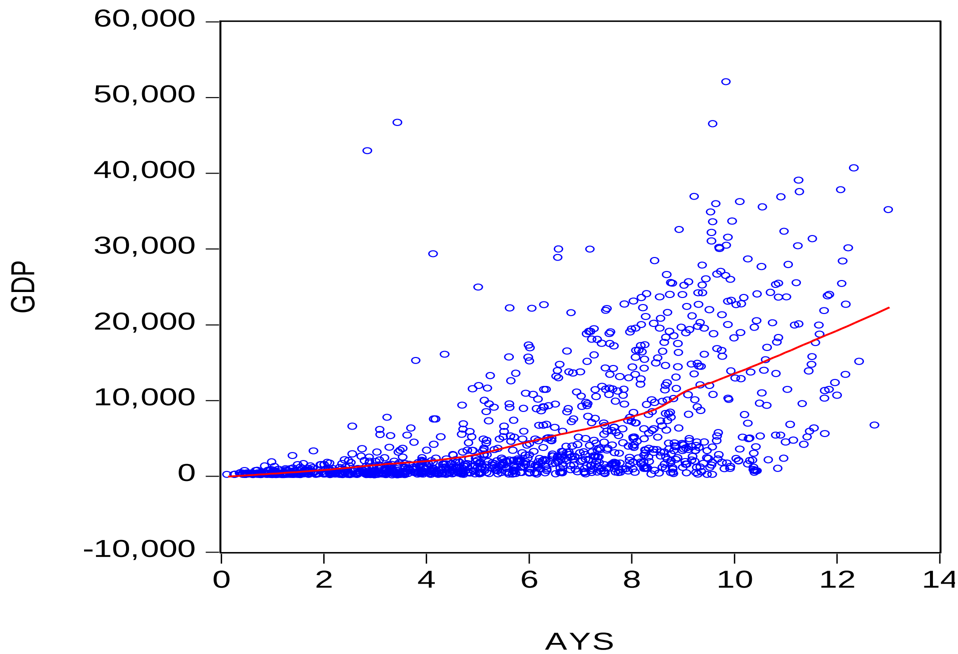

Figure 4b: Average years of education are correlated with the GDP per capita with an increasing slope.

Gini coefficients of education and growth

Figure 5 indicates that there is no obvious relation between education Gini coefficients and growth without control variables.

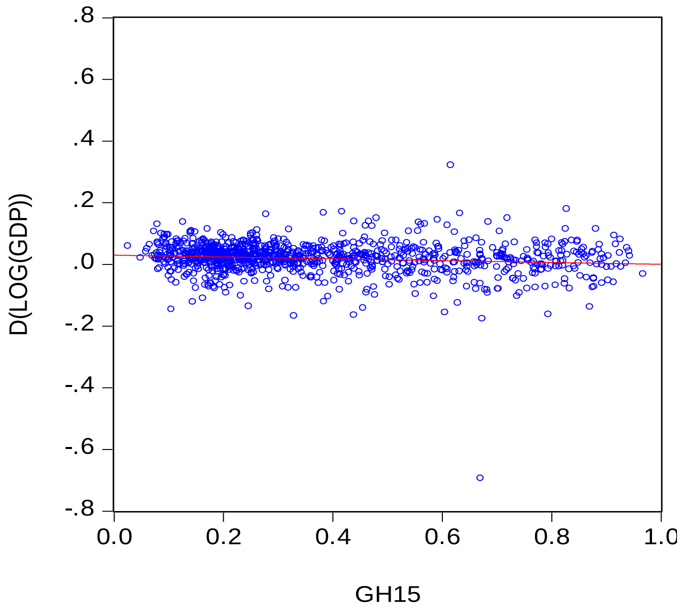

Figure 5: Without control variables Gini coefficients of education have no impact on growth

When control variables are added, this may be different in a cross-section regression (Castelló and Doménech 2002). A growth regression with country fixed effects using the orthogonal deviation version of the system GMM method seems to support this for our panel data:[5]

$$log(gdppc) = 0.8log(gdppc(-5)) - 0.12GH15 \tag{1}$$

However, adding period fixed effects or a time trend changes the sign of gh15:[6]

$$log(gdppc) = 0.73log(gdppc(-5)) + 0.32GH15 + 0.0045t+constant \tag{2}$$

Adding other control variables such as investment, labour force growth and school enrolment for tertiary education confirms this counterintuitive result but also yields an answer from the interpretation of the following regression:[7]

[5] p-values are 0.0000 and 0.0941. Instrument specification c, log(gdp(-10)), gh15 implies absence of over-identification constraints. Periods: 7 (1975-2005). Countries: 135. s.e. of regression is 0.144598.

[6] p-values are 0.0000, 0.0043, 0.0000. Instrument specification c, log(gdp(-10)), gh15, @trend implies absence of over-identification constraints. Periods: 7 (1975-2005). Countries: 135. s.e. of regression is 0.143175.

$$log(gdppc) = 0.43log(gdppc(-5)) + 0.31log(gfcfgdp) + 5.15d(log(lf)) - 105.2d(log(lf))^2 + 0.084log(seter(-5)) + 0.01t - 1.074gh15 + 1.81gh15^2 + constant \quad (3)$$

Labour force growth decreases growth only if higher than 2.45 percent. Investment and tertiary education enhance growth with decreasing marginal product because of the logarithm. Education inequality also enhances growth if Ginis are higher than 0.296. In a phase of development where the greatest country differences stem from tertiary education, the latter and education inequality enhanced by it may both be positive for growth. However, if tertiary education grows inequality decreases as can be seen here:

$$gh15 = c + 0.82gh15(-5) + 0.019d(log(gdppc(-1))) – 0.0047logSETER(-5) \quad (4)$$

GPD per capita growth is insignificant.[8] Therefore we do not have to use lagged instruments for the Gini coefficients in the above equations, because growth does not affect them. The latter relation is in line with the data plot between Gini coefficients and tertiary enrolment in Figure 6. More tertiary education leads to more equality. The growth regression above therefore has two education effects: tertiary education can enhance it directly, but the reduction in inequality reduces growth because of the u-shape effect of inequality.

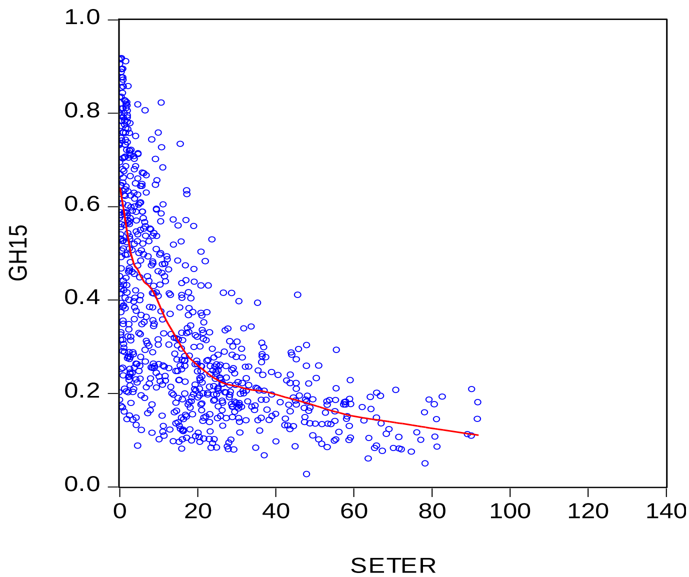

Figure 6: The plot relation between tertiary enrolment and Gini coefficients is negative.

[7] p-values are 0.0000, 0.0000, 0.0001, 0.0003, 0.0020, 0.0000, 0.0187, 0.0003. Instrument specification c, log(gdp(-10)) log(gfcfgdp(-1)) d(log(lf(-1))) d(log(lf(-1)))^2 log(seter(-5)) @trend gh15 gh15^2. gh15 implies absence of over-identification constraints. Periods: 4 (1990-2005). Countries: 112. s.e. of regression is 0.110658.

[8] p-values are 0.0000, 0.4358, 0.0268, 0.0888. Instrument specification c, gh15(-10), d(log(gdp(-1))), seter(-5)^2, seter(-5)^3, period fixed effects implies absence of over-identification constraints . Periods: 7 (1980-2010). Countries: 129. S.e. of regression: 0.018641.

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