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Abstract

Five decades ago, Simon Kuznets expressed an important hypothesis about the relationship between the degree of income inequality within a country and its level of economic development: the Kuznets's inverted-U hypothesis. The lack of longitudinal data has forced the use of cross-section or pooled datasets in order to draw conclusions about that relationship. In the present note we highlight the lack of international comparability of surveys where the measures of inequality are based, and we show two main findings: 1) data comparability goes on constituting a problem, particularly in what respects to the different welfare indicators used in national surveys, and 2) the procedure usually used to minimize the problem of noncomparability is likely to enforce the bias rather than to solve it.

Keywords: *Inequality, Kuznets's hypothesis, economic development, income distribution*.

Classification-JEL: C21, D31, O15.

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I. INTRODUCTION

Five decades ago, Simon Kuznets (1955) expressed the important hypothesis that income inequality first increases, but after a turning point it decreases in the course of economic development. This premise, usually termed Kuznets's hypothesis or Kuznets's inverted-U, has been widely investigated, but the results of that research are far from well established. In his seminal article, Kuznets (1955) did not set out a formal theory of the relationship between the degree of income inequality within a country and its level of economic development; but he drew an argument, which has subsequently been formalized (for example, Ahluwalia, 1976a, 1976b; Robinson, 1976; Fields, 1979; Braulke, 1983; Anand and Kanbur, 1993).

Kuznets' original hypothesis relied on historical data for the first half of the nineteenth century from only three developed countries, the US, the UK and Germany, and he cautiously concluded that the data appeared to 'justify a tentative impression of constancy in the relative distribution of income before taxes, followed by some narrowing of relative income inequality after the first world war — or earlier' (Kuznets, 1955, p. 5). But, in spite of this caution, the hypothesis has found many supporters, to the point of being considered 'fully confirmed' by Oshima (1970), a 'stylized fact' by Ahluwalia (1976a), and an 'economic law' by Robinson (1976)[1]. The more recent literature has been more cautious, noting the simplicity with which addition of other right-side variables such as education tends to eliminate the statistical significance of the income variables (Bourguignon and Morrison, 1990), but several studies go on supporting empirically the hypothesis, as is the case of Dawson (1997), Li *et al*. (1998), Barro (2000), Thornton (2001), and Huang (2004). On the other hand, the group of earlier refute 'disapprovers' (such as, Adelman and Morris, 1973; Saith, 1983; Papanek and Kyn, 1986) has been increased with other sceptical authors, as for example Hsing and Smith (1994), Deininger and Squire (1998), or Mátyás *et al*. (1998) who labelled the hypothesis as a 'myth'. So, the hypothesis remains a theme of substantial debate in development literature.

There has been much criticism of the studies that have explored the relationship between inequality and the level of development. The main one is associated to three problems: the cross-sectional nature of the tests, the functional form used, and the comparability of the data across countries. The first problem arises from the lack of

[1] Paukert (1973), and Lecallion *et al*. (1984) are other supporters of the Kuznets's hypothesis.

enough longitudinal data, which force the use of cross-section or pooled datasets in order to draw conclusions about a relationship that intends to understand how inequality changes over time, or with level of development within a country (the original Kuznets' hypothesis). Trying to solve this problem, several studies, as for instance Deininger and Squire (1998) and Mátyás *et al*. (1998), have used the panel nature of the data both to estimate regressions that control for country-specific fixed effects on the level of inequality and even to allow for separate inequality paths, and to search for different coefficients for Kuznets processes, across countries. Once these country-specific controls are included, the problem is minimized.

The second problem regarding functional form is particularly relevant for the Kuznets curve tests. Anand and Kanbur (1993) found that the functional form chosen to test the inverted-U hypothesis could have considerable impact on the 'turning point', of the curve, where inequality begins to decline. They also found that the U-shape is significant for some functional forms and not for others[2]. The issue of functional form remains in more recent studies. While Deininger and Squire (1998) reject the presence of the Kuznets curve for the fixed-effects case, they do find it present in the pooled case for their functional form (namely y and $1/y$)[3]. Barro (2000) uses a different functional form (log y and its square) and finds the inverted-U shape present in both the cross-sectional pooled and fixed-effects cases. While it is straightforward to accept one of the U-shaped functional forms that are statistically significant, rejecting a single inverted-U functional form does not mean that the inverted-U does not exist, as it may follow a different functional form.

The present note addresses the third problem: noncomparability of the data across countries So, our main purpose is to highlight some drawbacks of data usually used to test the Kuznets Curve and to show that overlooking those drawbacks or using the usual solution to deal with some of them can lead to biased results. Therefore, the second section outlines the data drawbacks in international inequality comparisons, the third section performs an illustrative test and the fourth section concludes.

[2] Se also Vicente and Borge (2000).
[3] Where y denotes real GDP per capita.

II. DATA CAVEATS IN INTERNATIONAL COMPARISONS OF INCOME DISTRIBUTION

Several authors have questioned the comparability of the inequality data across countries (*e.g*., Anand and Kanbur, 1993; Deininger and Squire, 1996). To minimize the noncomparability, Deininger and Squire (1996) (D&S) compiled a dataset of inequality measures that is consistent in the three following criteria: 1) be based upon household surveys, rather than drawn from national account statistics; 2) be based on comprehensive coverage of all sources of income or all uses of expenditure, rather than, for example, data merely on wages; and 3) be representative of the population at a national level, rather than simply the rural or urban population, or taxpayers. D&S denote the subset of their data that fulfilled the above-mentioned criteria as 'high quality' and a lot of researchers have used either this subset of D&S data (*e. g.,* Li *et al*., 1998; Mátyás *et al*., 1998; Thornton, 2001) or have added some new data which satisfy the criteria to the original D&S 'high quality' subset (*e.g*., Frazer, 2006). Although this can constitute a basis for improving comparability[4] the fact is that many other differences remain in the survey data[5].

Data on personal distribution of income that are used in international comparisons are based on nationally representative surveys but these surveys were not designed by the national agencies to be comparable internationally. So, they generally differ in method and in the type of data collected. The surveys can also differ in the income concept used (gross, disposable, and so forth), and in unit of analysis (individuals, households). Respecting the statistical unit, in spite of the existence of a consensus around the *Canberra Group* that the household should be the basic statistical unit, there are a great lot of surveys based on individuals (see UNU–WIDER, 2005). But even if we only consider the household as unit of analysis, we keep having problems of comparability because households differ in size and in the distribution of income shared among members, and these differ in age and consumption needs. But even though we can adjust for household size, no adjustment can be made for spatial differences in cost of living within countries, because the data needed for such calculations are generally unavailable. Survey questionnaires can also differ in the number of different categories

[4] According to UNU–WIDER (2005, p.13) a re-examination of the sources for D&S 'revealed several instances of mistakenly labeled "high quality estimates", *i.e*., that did not, in fact, meet the criteria that had been set up'.

[5] For a more complete discussion on quality and consistency in income distribution data both within and across countries, see Atkinson and Brandolini (2001).

of consumption goods and in the order they ask questions. Survey quality varies, and even seemingly similar surveys might not be comparable. Differences among countries in the aforesaid aspects could be a serious problem for summary measures of income distribution and for cross-country comparisons based on them. With such biases in comparability, the relationship between the level of development and inequality rests inevitably troubled. If those problems of comparability are not solved in the sample of countries, the differences between countries in measured inequality may reflect to some extent differences in the surveys used, besides the actual differences in inequality.

Because there is no agreed basis of definition for the construction of distribution data the welfare indicator where survey is based is not the same in every country: some countries use consumption/expenditure and others use income. Some authors argue that consumption is usually a much better welfare indicator than income, but others disagree. For instance, according to Deaton and Zaidi (2002) consumption is preferable because the empirical literature on the relationship between income and consumption has established, for both rich and poor countries, that consumption is not closely tied to short-term fluctuations in income, and that consumption is smoother and less variable than income. On the other hand, Atkinson and Bourguignon (2000) argue that there is no clear advantage in using consumption rather than income in studying distributional issues because consumption raises problems of definition and observation, the main conceptual problem being the treatment of durables and the necessity of imputing value for their services.

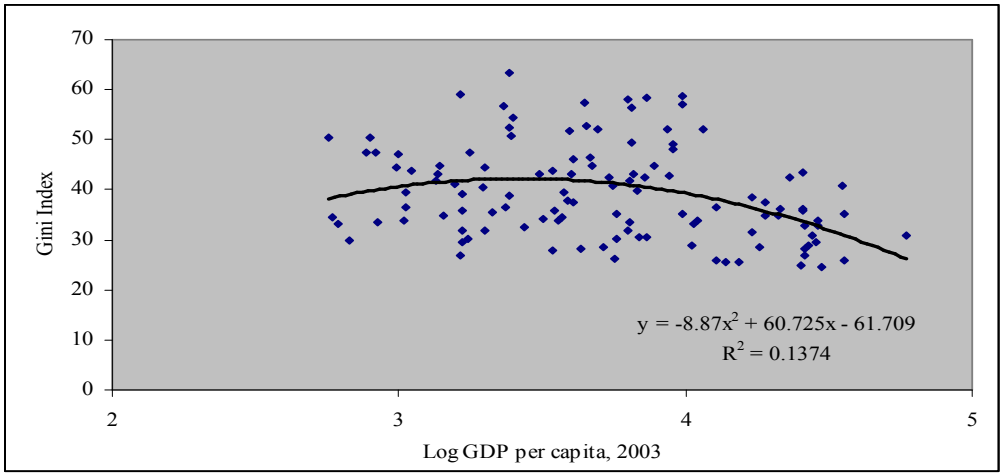
In most industrialized countries inequality is measured with reference to income, and this tradition is followed in many Latin American countries. But, particularly in developing countries, where the rural agriculture sector is large, it is difficult to collect accurate income data, and then, most Asian and African surveys have always collected detailed consumption data. So, the fact that distribution data can be based on both income and consumption poses the main difficulty in the construction of comparable inequality statistics. Deininger and Squire (1996) find that the income-based measures are on average 6.6 points higher and, consequently, they suggested adding 6.6 points to expenditure-based Ginis, and recent authors have followed their advice (for instance, Li

et al, 1998; Li and Zou, 1998; Forbes, 2000; and Chen, 2003)[6]. In a more recent study, Frazer (2006) uses the same procedure of Deininger and Squire (1996) and he finds that, among the 'high-quality' data, the income-based Gini indexes are on average 4.3 points higher than expenditure-based ones, adding this difference to the expenditure-based measures. Although this procedure can improve the estimation of a Kuznets curve, it can't be an accurate solution for the problems associated to the different method where surveys are based, as we illustrate in the next section.

III. INCOME VS. CONSUMPTION/EXPENDITURE

Figure 1 shows data on Gini index and GDP per capita converted to constant 2000 international dollars using PPPs (purchase power parity rates). The data on inequality came from the World Development Indicators (WDI) of the World Bank (2006) and refer to the period between 1995 and 2003[7]. The data on GDP per capita, also came from WDI and refer to 2003.

Figure 1.
The Kuznets' curve for a cross-section of 117 countries



Data source: World Bank (2006).

As it becomes apparent from figure 1 we can regress the level of development proxied by GDP per capita (in log scale and quadratic form) on the Gini index and declare that

[6] Li *et al.* (1998) following D&S (1996) report that, everything else being the same, income-based Ginis are on average greater than expenditure-based Ginis by some 6.6 Gini points. Consequently, in their regressions, they increase expenditure-based Ginis by 6.6 points.
[7] If the country *i* presents only an observation in the 1995-2003 period, we use that number, if the country reports more than one value we use the average of such values.

we gather a Kuznets's curve for a cross-section of 117 countries, based on the usual criteria of statistical significance. As a matter of fact, the equation apparent in figure 1, which refers to the adjusted quadratic line, has coefficients with the right signals and observes the usual criteria of statistical significance at 1% level (see first row of table 2, ahead). The 'turning point' corresponds to a GDP per capita of 2,649 constant 2000 international dollars: a level of development located between the GDP per capita of India and the one of Honduras, in 2003.

However, while GDP data are in principle comparable across countries, the surveys from which the Gini index is calculated are based on two different living standard indicators: whereas all the Sub-Saharan African countries on the left side of the figure use inequality data based on an expenditure/consumption definition, the OECD high-income countries, on the right side of figure 1, build its surveys based on income. These differences also have a systematic geographic pattern: the countries of Latin America, which present a higher inequality, have a clear preference for income, while in the Asian countries the consumption/expenditure based inequality is more often used in national surveys (table 1).

Table 1.
Surveys based on Expenditure and surveys based on Income by region (figure 3)

	Expenditure		Income		Mean
	Number of countries	Gini index	Number of countries	Gini index	Gini index
Latin America	5	44.00	17	52.57	50.63
Asia	14	38.92	3	41.39	39.36
Sub-Saharan Africa	22	44.52	0	---	44.52
Transition Economies	24	32.24	3	26.54	31.60
Middle East and N. Africa	7	37.58	0	---	37.58
High Income	1	42.48	21	32.36	32.82
Total	73	---	44	---	---

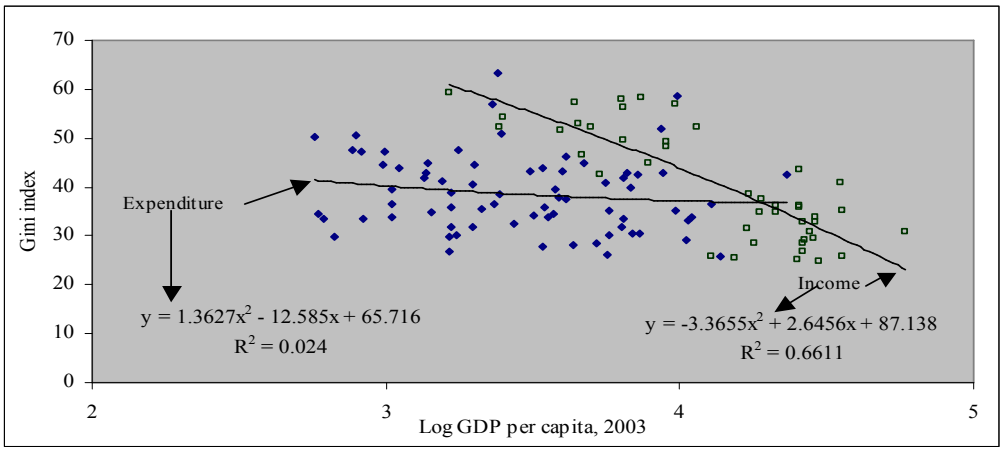
Source: World Bank (2006).

So, in face of those differences, it seems more realistic to consider two subsets of countries each one being built according to the living standard used in its national

survey, instead of considering a unique cross-section (figure 2). But by doing so, the association between inequality and the level of development in each one of these two subsets is problematical, as it becomes apparent from the observation of the regression lines and equations showed in figure and table 2. On the one hand, the dispersion of expenditure-based data shows that the adjustment of a quadratic trend line is a delicate exercise (R squared near zero and no statistical significant *t* tests) and, in addition, the most likely adjusted line has the opposite curvature to the one predicted by the studies that support the Kuznets' curve in a cross-section of countries. On the other hand, although the income-based inequality data allow the adjustment of a quadratic trend line with an R squared higher than 0.6, the *t* tests show that the coefficients are not statistically significant, preventing the estimation of a credible 'turning point'.

Figure 2.

Inequality and level of development considering two different living standard indicators



Data source: The same as figure 1.

Table 2 shows regression estimates not only for the sample of 117 countries and its decomposition in two subsets with Gini indexes based either on expenditure or income, without any correction, but also for the 117 countries sample with the correction proposed by Frazer (2006) and by Deininger and Squire (1996), respectively. As it is apparent in the table, the usual criteria for provide support to the Kuznets curve are present in the sample of 117 countries but not in its subsets. Table 2 shows also that the correction introduced in the large sample enlarges the statistical significance of the estimates.

Table 2.
The relationship between level of development and inequality

Sample	Estimated coefficients of:			Turning point		N
	$LogY_t$	$(LogY_t)^2$	R^2	$LogY_t$	Gini	
117 countries	60.72*	-8.87*	0.137	2,649	42.23	117
	(2.77)	(-3.06)	(9.08)			
Subset of expenditure	-12.59	1.36	0.02			73
	(-0.30)	(0.23)	(0.86)			
Subset of income	2.65	-3.37	0.66			44
	(0.05)	(-0.46)	(40.0)			
Sample corrected as in Frazer (2006)	68.54	-10.29	0.26	2,144	46.00	117
	(3.27)*	(-3.70)*	(19.81)			
Sample corrected as in D&S (1996)	72.72*	-11.05*	0.33	1,958	48.08	117
	(3.52)	(-4.02)	(27.61)			

Source: World Bank (2006). *t* statistics are in parenthesis below the estimated coefficients; *Statistically significant at the 1% level. Below R^2 is the regression F-statistic. Standard errors and covariance matrix are White (1980) heteroskedastic corrected.

The increase of the statistical significance and the displacement of the 'turning point' towards the left and up is an expected result given that expenditure based Ginis are not random but, on the contrary, clustered in the left side of the distribution. Of course, in LDCs measurement errors are thought to be greater for income, which tends to inflate inequality, but on the other hand it is a risky exercise to add the same Gini points to all countries where surveys are based on consumption/expenditure, particularly when that fact improves the statistical significance of the curve, and other researchers find 'no significant difference between the Gini values measured for income net of taxes versus those constructed for expenditures' (Barro, 2000, p.21)..

IV. CONCLUSION

As in time-series studies, the cross-section ones face data limitations too, though the limitations are of another kind. The abovementioned data problems clearly throw doubt on cross-country comparisons of measured inequality and its relationship with the level of development. Some authors, aware of those caveats, divide the extant surveys according to their reliance (Deininger and Squire, 1996) and use the surveys that are

more reliable, while other authors, as it seems to be the case of Barro (2000, p. 14), prefer to 'expand the sample size — even at the expense of some reduction in accuracy of measurement'. However, in the presence of lack of comparability of the data, the use of sophisticated econometric models isn't of much help. So, in our view, a test of Kuznets' hypothesis must pay great attention to the reliability of data, using measures based on the same conceptual base for all countries and variables, whenever possible.

The present note shows two main findings: 1) data comparability goes on constituting a problem particularly in what respects to the different welfare indicators used in national surveys, and 2) the procedure usually used to minimize that problem is not a satisfactory solution given the heterogeneity of the available income distribution statistics. So, a policy implication is that more internationally harmonized data are needed, mainly if we intend to examine the inequality-development relationships rather than to prove, or to refute, that the data can be depicted in a figure with the shape of an inverted-U.

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