ESTUDIOS DE ECONOMÍA APLICADA VOL. 28-2 2010 PÁGS. 1-14

World's Growth and Inequalities

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ABSTRACT

After intensive research, the relationship between (mean) growth and (relative) inequality is unresolved, and it will be unresolved because by definition relative inequality is mean independent. In this paper we review some recent empirical literature about the inequality and growth relationship and provide some additional interpretations about the choice of different measures of inequality by using a simple graphical tool called the poorest and richest triangle. The main conclusion of the paper is that, although in the most recent decades scholars may perceive either an increase or a decrease of the world inequality depending on the concept chosen, the world inequality is in any case disturbing because it has increased dramatically in the long term whatever the concept used.

Keywords: World Income Distribution, Measurement of Inequality.

Crecimiento mundial y desigualdades

RESUMEN

Después de una intensa investigación, la relación entre el crecimiento (medio) y la desigualdad (relativa) permanece sin resolver, y no se resolverá porque por definición la desigualdad relativa es independiente de la media. En este artículo revisamos algunos trabajos reciente sobre la relación entre crecimiento y desigualdad y proporcionamos algunas interpretaciones adicionales sobre la elección entre las diferentes medidas de desigualdad, mediante el uso de una sencilla herramienta denominada el triangulo del más pobre y del más rico. La principal conclusión obtenida es la de que, aunque en las últimas décadas los académicos puedan percibir un alza o una reducción de la desigualdad según el concepto que elijan, la desigualdad mundial es inquietante en cualquier caso porque su aumento en el largo plazo ha sido espectacular cualquiera que sea el concepto que se emplee.

Palabras clave: Distribución de la renta mundial, medición de la desigualdad.

Clasificación JEL: D31.

Artículo recibido en noviembre de 2009 y aceptado en abril de 2010.
Artículo disponible en versión electrónica en la página www.revista-eea.net, ref. ə-28209.

* We dedicate this paper to the memory of our colleague and friend, Jesús Santamaría Fidalgo. We are grateful for comments from the anonymous referees and acknowledge the financial support of the project VA114A08 (Consejería de Educación. Junta de Castilla y León).

1. INTRODUCTION

Anand and Segal (2008) have recently reviewed the literature on global income inequality, concluding that the rise or fall of world inequality in the last decades depends on the estimation methods and datasets used. However, as pointed out by Capéau and Decoster (2004), this quarrelling about facts contrasts with the silence about norms. This paper focuses on the relevance of the choice of a measure (or meaning) of inequality. After arguing in section 2 about which inequality path might be expected from world economic growth, section 3 introduces the literature on global income inequality emphasizing the lack of robustness of different measures. In section 4 we employ a simple graphical tool to explain the norms underlying the most commonly used inequality measures and in section 5 we interpretate the secular and recent trends in world inequality on the light of the previous discussion. Finally, the last section concludes the paper.

2. THE INEQUALITY AND GROWTH TRADE-OFF

Kuznets (1955) "5 per cent empirical information and 95 per cent speculation" was right after all. As recently claimed by Lundberg and Squire (2003) the evolution of growth and inequality must surely be the outcome of an interdependent process or, in the words of García-Peñalosa and Turnovsky (2006) one thing is clear: An economy's growth rate and its income distribution are both endogenous outcomes of the economic system.

Kuznets speculation was introduced by saying that inequality in the secular income structure is a puzzle with at least two groups of pieces, the concentration of savings and the industrial structure. After considering some factors counteracting the concentration of savings (political decisions and demographic trends, social mobility or human capital) and because he had no evidence at hand that would permit a reasonably rough but determinate conclusion, Kuznets focused in the second source of the puzzle, the shift away from agriculture.

From the empirical information Kuznets (1955: table 1) defined an initial world with some per capita income (50) and distribution by *deciles* (4.5+*d* percent), and several final worlds depending on the extent of the growth (2x50 or 4x50) and on whether inequality remained constant or increased (–1+2*d* percent). And from the speculation he deduced that, in general, as the proportion of the traditional sector drifts downwards, the inequality (measured by the difference between the shares of the extreme quintiles) tends first to widen and then to diminish (Kuznets, 1955:15). Kuznets curve is a good idea, but in general cross-sections and time-series tests have gathered controversial results not only because of new and handy evidence and other groups of forces, but also because of alternative specifications. Even within the simple processes described below, the turning point of some paths would disappear if inequality were computed by the ratio (instead of the difference)

of extreme quintiles. It is also possible to obtain different shapes if a new process begins before the old one has concluded or by mixing regions following different processes.

After early work on the coefficient of variation (Swamy, 1967), the Gini index (Knight, 1976) and the log variance (Robinson, 1976), the "pure population shift case" was formalized by Anand and Kanbur (1993) who also derived the conditions for there to be a "turning point" for the three mentioned measures and also for the mean logarithmic deviation and Theil and Atkinson indices. As summarized by Fields (1993: 1233), when the distribution within the high-income sector is more unequal than the distribution within the low-income sector, inequality in the economy either (a) increases monotonically or (b) increases up to some point and then decreases. Further conditions for there to be a local extreme and an inflexion point, including the cases of inequality decreasing and unbiased technological progress, can be found in Vicente and Borge (2000).

The above works have been considered "somewhat mechanical", in contrast to another strand of theoretical literature (interested in) the formal modeling of growth and distribution; see Kanbur himself (2000). However, rather than another strand, what the new literature have done was to investigate on the other groups of forces of which Kuznets had no evidence at hand. The literature is impressive. A searching for equality/inequality and growth/development within the ISI WOK, which only takes into account journal papers, yields more than a thousand hits, eighty percent of which dates from the last decade.

Inequality is again in macroeconomic models due to the improvements in the tractability of individual behaviors of heterogeneous agents interacting in imperfect markets and outside the markets (Bertola et al 2006). There is a lot to learn from classical, neoclassical, …, endogenous, political and unified theories and growth models: Growth can be egalitarian or not depending on the saving propensities and the returns to scale (or in more general sense on the preferences and the technological process) and inequality can be harmful or not for growth depending on the origin of the agents heterogeneity and the political system. In short the inequality and growth trade-off will depends on the nature of every economic and political process.

Egalitarian growth may be feasible and desirable depending on the slopes of the possibility frontier (the Okun's big trade-off, 1975) and on the political will. A steep slope means that total income will increase if some accumulated resources are moved from the rich to the poor, which will not occur if the political will is to preserve the status quo. And for the same reason inequality could be harmful for growth if the slope were flat and the political will were rawlsian.

In the words of Kuznets besides the legislative interference and political decisions, the successful great entrepreneurs of today are rarely sons of the great and successful entrepreneurs of yesterday. As is only to be expected, the empirical literature remains inconclusive despite improvements in data availability and econometrics tools. Inequality may be bad for growth (Deininger and Squire, 1996

or Person y Tabellini, 1994), good for growth (Li and Zou, 1998 or Forbes, 2000), good at the beginning and bad later on (Barro, 2000). It depends of the specification (Banerjee and Duflo, 2003) or on other factors (Lunberg and Squire, 2003).

3. THE SIMULTANEOUS RISE AND FALL OF INTERNATIONAL INEQUALITY

Whilst early calculations of international inequalities used data on national per capita incomes collected by the United Nations (Andic and Peacock, 1961), the following calculations of world income distributions (Grosh and Nafziger, 1986) have been using non official compilations (Jain, 1975 and Kravis et al, 1978) and this is still the standard (Deininger and Squire, 1996; Heston et al, 2006 and WIDER, 2007).

More than fifty years later we can still say with Kuznets (1955:1) that "the field of study has been plagued by looseness in definitions, unusual scarcity of data, and pressures of strongly held opinions". Besides the preliminary discussions as to whether "divergence, big time" becomes a "convergence, period" or not, when population weights and within countries distributions are taken into account, the inequality: now you see it, now you don't (Loungani, 2003) is usually attributed to the pitfalls in the use of secondary dataset (Atkinson and Brandolini, 2001). When such pitfalls are discounted (Bourguignon and Morrisson, 2002, Milanovic, 2005, Sala-i-Martin, 2006, and references) it appears that some kind of consensus is arising about the world inequality trends. As summarized by Dollar (2004) global inequality (among citizens of the world) has declined modestly, reversing a 200 year old trend toward higher inequality, although there is no general trend toward higher inequality within countries.

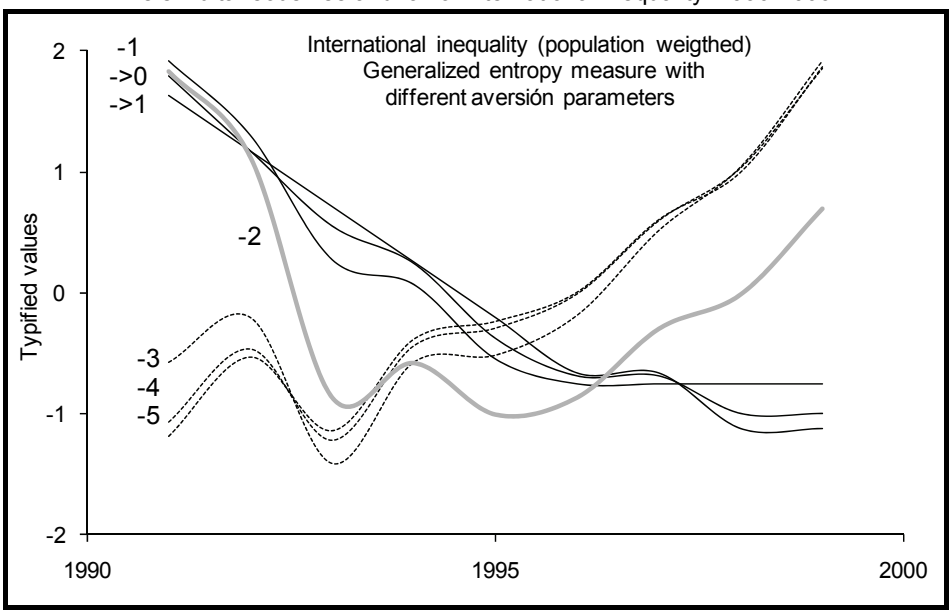
Surprisingly such emerging consensus has not taken into account the normative debate vis-à-vis the inequality measures used. Robustness of results is a central point in the inequality measurement field (Silber, 1999 or Cowell 2003 for references) and testing the relevance of the choice between alternative inequality measures has a long tradition (Champernowne, 1974).

As pointed out by Capéau and Decoster (2004:17-18) the trend in the international (population weighted) inequality previously reported by Milanovic or Sala-i-Martin, among others, is obtained by using a generalized entropy measure of inequality with the 0, 1 and 2 aversion parameters, but disappears when the parameter used is lower than -3 o above 3[1]. In order to facilitate the comparison

[1] Their interpretation is that the fast growth of urban China and India and the crisis of the Central and Eastern European countries produce two regressive divergences at the lower and higher ends of the distribution, that might be counteracted by the progressive convergence between this two areas, when inequality is measured using moderate values of the aversion parameter ("a higher parameter tends to give more weight to transfers at the top of the income distribution and *vice versa*").

between indices regardless of their different scales we plot in the figure 1 the typified values of the Capéau and Decoster calculations, from where it can be seen the reversal on the shape of the world inequality trend, from rising to falling, at a parameter near of -2[2].

FIGURE 1
The simultaneous rise and fall of international inequality. 1990-2000.



Data source: Non typified values taken from Capeau and Decoster (2004: table 5).

4. THE MAXIMIN AND MINIMAX NORMS

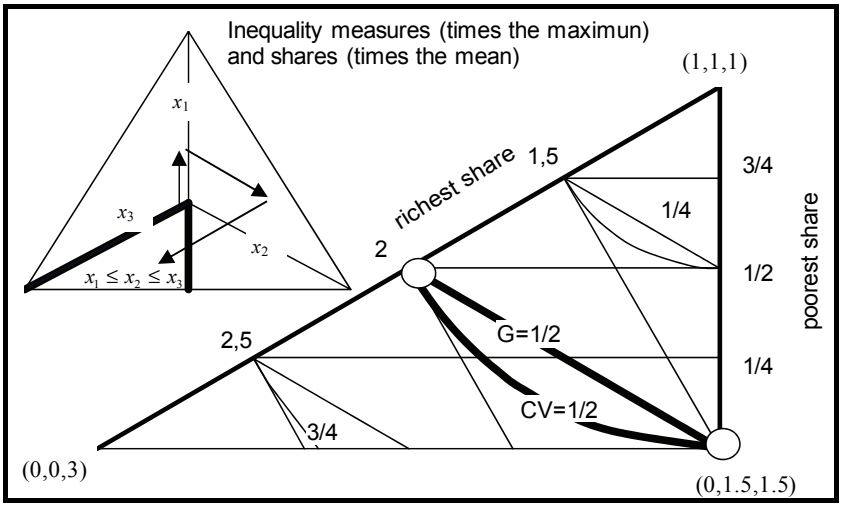
In order to provide additional interpretation to these reversals we will use the poorest and richest triangle (PRT) that represents all possible relative distributions between three groups of equivalent size[3]. All shares are measured in times de mean. The richest' share goes from one to three and it is invariant for points lying on a given perpendicular line to the hypotenuse, these lines represent the minimax norm that only take into account the status of the richest (Temkin, 1993). The poorest' share is invariant along a given perpendicular line to the minor side, these

[2] There is another reversal from falling to rising at a parameter near of 4.

[3] The PRT is one of the six symmetrical areas of the simplex (Vicente and Rubio, 2006). The simplex was introduced in the field of inequality measurement by Kolm (1966: fig. 8) and popularized by Sen (1973: diagrams 3.3 y 3.4). The contours of more commonly used inequality measures were depicted by the first time by Blackorby and Donaldson (1977: fig. 2 y 1978: fig. 4) and Cowell (1985:, fig. 4).

lines represent the maximin norm that only take into account the status of de poorest (Rawls, 1971). The Gini index is halfway between the maximin and minimax norms, while the coefficient of variation —or Euclidean distance to equality— *is more Rawlsian* when dealing with left skewed distributions (close to the minor side of the PRT) and *less Rawlsian* when dealing with right skewed distributions (near the hypotenuse).

FIGURE 2
The Gini and Euclidean (CV) norms in the PRT.



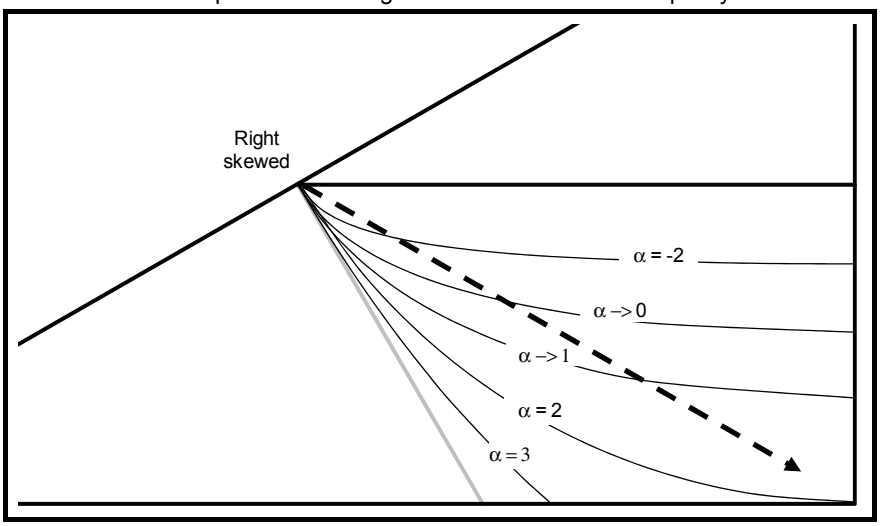
In general, any given member of the Entropy (or Welfare) family is not absolutely *more or less Rawlsian,* because the underlying norm depends on the kind of asymmetry of the distribution under scrutiny. In the figures 3 and 4 we represent the contours of the Entropy (α) and Atkinson ($1 - \alpha$) families when the distribution are completely right o left skewed.

Let us consider for instance three areas with the same population size: one is China (and India) and the other two are the Poorest and Richest halves of the rest of world. Starting from an initial state in which China is like the poorest third, the growth of China will follow the path described by the arrow in figure 3[4]. Such a growth path is not robust in a Lorenz sense, as it is progressive in a Temkin sense, neutral in a Gini sense and regressive in a Rawls sense. All the Entropy measures of inequality will perceive the beginning of the process as progressive and its end as regressive, and the greater the parameter of the entropy measure the later the turning point. Thus, for example, for a parameter value of –2 a turning point in the

[4] The same path represents also a faster growth of China and India, when the other two areas evolve at the same rate.

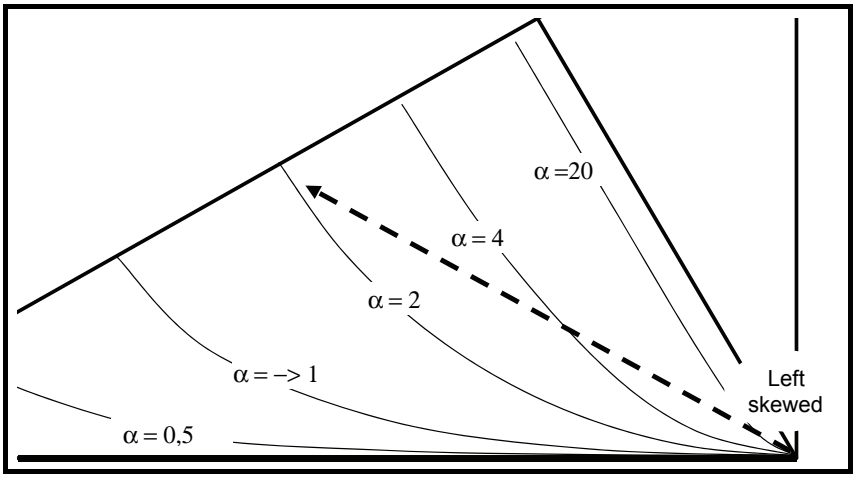
world inequality path might be expected at the early stage of the growth process of poor countries.

FIGURE 3
The impact of China's growth on international inequality.



Let us now consider three different areas also with the same population size: Countries such as Central and Eastern European ones (CEEC) and the Poorest and Richest halves of the rest of the world. Starting from an initial state in which the CEEC are like the richest, stagnation of the CEEC, while the other two areas grow at the same rate, will produce an inequality path as described by the arrow in Figure 4. In this case the Entropy measures will consider the stagnation to be progressive at the beginning but regressive if it is deep or lasting enough, and the lower the parameter the later the turning point. Thus, for example, for a parameter value of 2, a turning point in the world inequality path might be expected only after a deep crisis in a rich country.

FIGURE 4
The impact of the CEEC crisis on international inequality.



5. SECULAR AND RECENT TRENDS IN WORLD INEQUALITY

Let us consider now the Bourguignon and Morrisson (2002) secular trends and the Sala i Martin (2002) recent trends from which Dollar (2004) deduced the stylized fact that "Global inequality (among citizens of the world) has declined modestly, reversing a 200-year-old trend toward higher inequality".

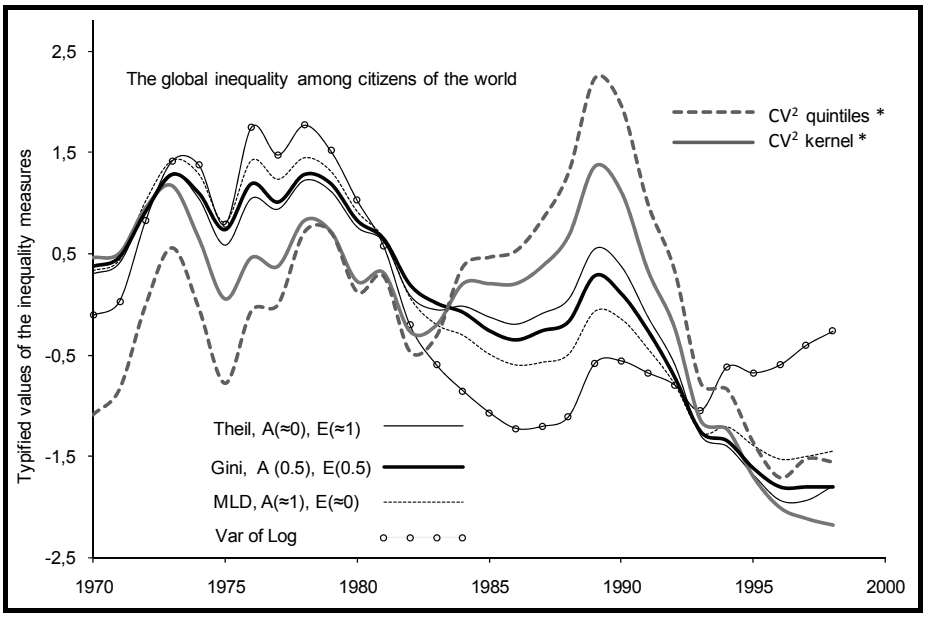
Starting with the recent trends, Sala i Martin (2002:32-33) concludes that "the pattern of global inequality over time is remarkably similar to the evolution of the global Gini or the two Atkinson indexes (0.5 and 1): an increase during the 1970s and a substantial decline during the following 20 years. Overall, the MLD declined by close to 14% over this period"… "The overall pattern of global, across and within-country inequality is confirmed by the use of the Theil Index (or GEI(1))" … "Global inequality, therefore, has fallen substantially over the last twenty years".

It is well known that if the Gini index, for the range of the world-personal-income- distributions, behaves like the Atkinson (0.5) which ranks distributions like the Generalized Entropy (0.5), it can be expected that all the Entropy and Atkinson indices with parameters close to 0.5 will produce similar paths. This is the case of the Theil index that ranks distributions like Entropy (≈ 1) and Atkinson (≈ 0) measures, and of the Mean Deviation of Logarithms that behaves like values of the E (≈ 0) and A (≈ 1). Therefore, it is almost true that "Overall, the MLD declined by close to 14% over this period (1978-1998)". In fact the various inequality measures reported up to this point have declined between 5.1% and 13.4%. However, it is no less true that, as pointed out by Capéau and Decouster (2004, 18) "despite a lack of emphasis … from the author's side (and even less an attempt to explain it), at least some rank reversals were obtained".

Sala i Martin himself recognizes that "the evolution of inequality according to the (squared of the) coefficient of variation" shows "two key differences"… "Firstly, the small increase in overall inequality that occurred for a couple of years in the late 1980s (an increase that was captured by all the previous measures) is now a bit larger. Secondly, the decrease in global inequality during the 1990s is larger according to GEI (2) than it was according to the other measures".

In order to be a little clearer, in Figure 5 we plot the Sala i Martin (2002) calculations using typified values to facilitate the comparison between indices regardless of their different scales. It is obvious that even when entropy parameters are restricted to values between 0 and 2 there is no robust trend of world inequality between 1970 and 1990. Moreover, the inequality trend after 1993 is not obvious either.

FIGURE 5
The world distribution of income. 1970-1998.



Data source: Non-typified values taken from Sala i Martin (2002: tables 1,2,3). (*) The paths of all typified indices superimpose when computed from kernels or quintiles, except for CV^2.

The more recent paper of Sala I Martín (2006) insists "Despite these **small differences across measures**, the overall picture is clear: inequality declined during the last twenty years". But once again his conclusion is based on 5 indices equivalent to entropy measures with parameters between 0 and 1. The only measure used in his 2006 paper which is not within this narrow range, the MLD, shows a "disturbing rise" between 1970 and 2000 which is very similar in magnitude to the fall of the Gini index, which is the only one plotted by Sala I

Martin. It can be adduced that the MLD is not the best inequality measure (Foster and Ok, 1999). In this case, the reasonable thing would be to replace it by the CV^2, a measure used by Sala I Marin in his (2002) paper but omitted in the (2006) one[5].

Let us now look at secular trends. Bourguignon and Morrisson (2002) conclude that "the evolution shown by these indicators (Gini, Theil, MLD and SDL) is unambiguous. World inequality worsened quickly and more or less continuously from 1820 to 1950, pausing only between 1910 and 1929"... "On closer inspection, however, the indicators … reveal a slightly more intricate picture for 1950-1992. Income distribution continued to worsen during the period, improving only between 1950 and 1960 and showing some signs of stability between 1970 and 1992". Once again in order to be a little clearer, we plot in Figure 6 the typified values of different members of the entropy family computed by using the quintile income shares estimated by Bourguignon and Morrison (2002: Table 1)[6].

Inequality worsened continuously since 1820 except during the last fifties and eighties, two decades in which growth was respectively faster and slower than the average. Both falls were preceded by previous intense rises. The first fall was recorded by GE (+) measures, whilst the second was recorded by GE (–) measures. During the early part of the century inequality worsened more than in the second half, when it is valuated by a GE (+) measure, whilst the opposite can be deduced if GE (–) are used. As In fact, the CV^2 follows a path very similar to that of the income share of the richest quintile, whilst the MLD follows a similar path to that of the income share not belonging to the poorest quintile.

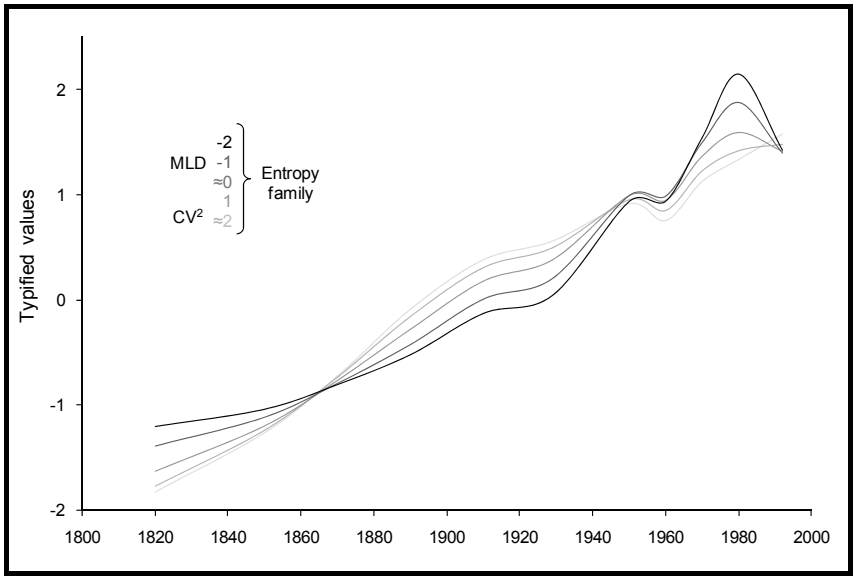
In order to provide additional interpretation of these behaviors, we resort again to the poorest and richest triangle (PRT). The third shares were obtained after proportional redistributions of intermediate quintiles to their adjacents. Figure 7 (top) allows us to appreciate the difference between the horizontal and vertical movements of the fifties and eighties. The first is a transfer from the richest third to the middle third, such that the less Rawlsian the measure used, the bigger the drop recorded in inequality, whilst the second fall is a larger transfer to the poorest that are less valued by measures based on the minimax or Temkim norms.

Finally in the bottom side of the figure 7 we display the secular trend of the world inequality over de map of within-countries inequalities using the WIDER (2007) database in order to provide an order of magnitude of the very high current level of inequality.

[5] This is not, however, due to a lack of space because as mentioned before the Atkinson (1) and the MDL are redundant.

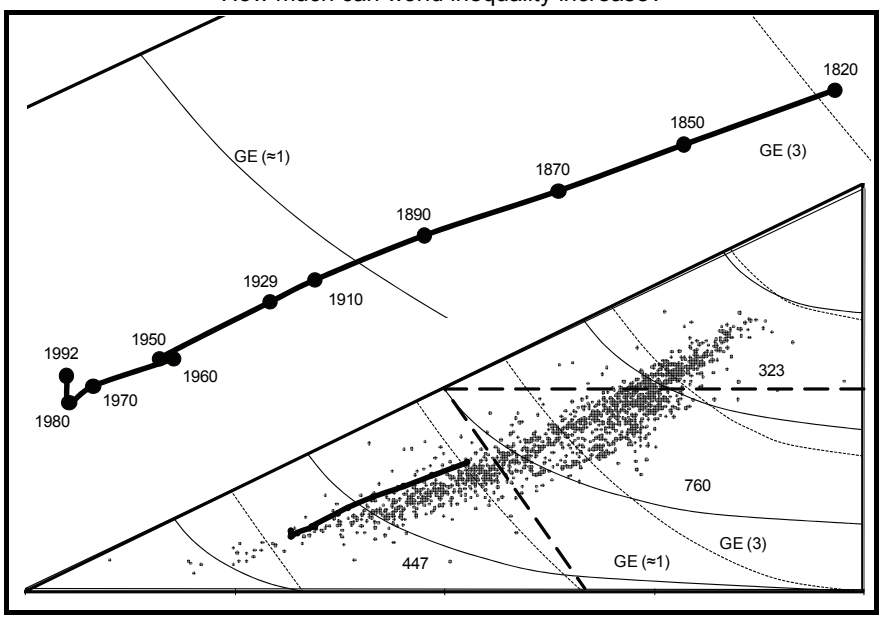
[6] In this sample the Gini index behaves like the CV^2 and the Standard Deviation of Logarithms like the MLD. As mentioned before the MLD behaves like GE(≈0) and the Theil index like GE(≈1). However, in the (Bourguignon and Morrison, 2002) paper the Theil index does not behave like GE(≈1), but unexpectedly behaves like the income share of the top decile.

FIGURE 6
Inequality among world citizens. 1820-1992.



Data source: Quintile income shares taken from Bourguignon and Morrisson (2002: table 1).

FIGURE 7
How much can world inequality increase?



Data source: (top) The same as figure 6, (bottom) Wider (2007) database.

6. CONCLUSION

The predictions that can be deduced from this paper about the growth and inequality relationship is that although, in the short term, economic growth may be accompanied by the simultaneous rise of some aspects of inequality and fall of other ones; in the long term, economic growth will hardly cause a robust rise in inequality, not due to hypothesis type Kuznets, but because inequality has reached historical highs.

Of course, this paper is only about relative inequality; it is obvious that for any given level of relative inequality, economic growth means an increase of the absolute differences. On the other hand, whatever the differences are, one remarkable feature of the current economic growth is that the two ends of the world distribution get to know each other better and better. Both facts could help to explain why the conflict may be intensifying while scholars continue to debate over the rise or fall (of different measurements) of inequality.

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