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How polarized is the global income distribution?

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Abstract: The interest in the level of global inequality has surged in recent years. This paper complements existing estimates of global inequality by providing the first estimates of the level of bipolarization of the global income distribution. During 1975–2010, global bipolarization declined substantially according to 'relative' measures, while it increased according to 'absolute' measures. The results mirror trends in global inequality over the same period.

Keywords: polarization, bipolarization, global polarization, global inequality, polarization measures

JEL Classifications: D31, D63, O15

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1 Introduction

In recent years issues of inequality and globalization, in broad terms, have dominated the global development debate. There is now considerable interest in the economic literature in the level of global interpersonal inequality; that is the level of inequality among all people of the world, ignoring national borders.[1] Notable recent contributions include Atkinson and Brandolini (2010), Bourguignon and Morrisson (2002), Dowrick and Akmal (2005), Milanovic (2002, 2005, 2012), Niño-Zarazúa et al. (2016), Ravallion (2017) and Sala-i-Martin (2006).[2] The underlying methodology involves constructing a distribution of income of all the citizens of the world, using national accounts and/or survey data. Inequality is subsequently measured based on this global interpersonal distribution of income.

It is now well established that during the last few decades income inequality, as captured by standard relative indices such as the Gini coefficient, has declined (Bourguignon 2017; Milanovic 2012; Niño-Zarazúa et al. 2016). This result is robust even after top incomes are taken into consideration (Jorda and Niño-Zarazúa 2016).

Bosmans et al. (2014) and Niño-Zarazúa et al. (2016) extended the analyses of global income trends to include 'absolute' measures.[3] In contrast to 'relative' inequality measures, 'absolute' measures attach importance to the absolute differences in income that typically arise when economies grow. While used infrequently, there have been growing analyses of the implications of such measures (e.g. Atkinson and Brandolini (2010), Bosmans et al. (2014), Ravallion (2003) and Subramanian and Jayaraj (2015)). Preference for 'relative' measures vis-a-vis 'absolute' measures is normative. Amiel and Cowell (1992, 1999a, 1999b), among others, have demonstrated experimentally that people have diverse views regarding how distributions should be ranked with respect to inequality. Niño-Zarazúa et al. (2016) found that when global inequality is measured using 'absolute' measures, inequality has increased substantially over the past four decades.

In this study, we extend this body of research by considering a concept related to, but quite distinct from, inequality–namely polarization. Specifically, we focus on bipolarization, as developed by Foster and Wolfson (1992, 2010) and Wolfson (1994), and extended by Wang and Tsui (2000).[4] Bipolarization essentially captures the presence or absence of a middle class. The importance of a large middle class to a healthy society has been recognized since ancient times (Aristotle, 315 BC). A larger domestic middle class has been associated with higher economic growth, better health and education, higher tax revenue, better infrastructure, better social cohesion and less conflict (Chakravarty 2015). In an interconnected world, a large global middle class may be desirable for similar reasons. Arguably, in light of such concerns and the recent interest in global inequality, an analysis of global polarization is timely. We provide a first set of estimates of global (interpersonal) bipolarization.

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[1] For an excellent critical review, see Anand and Segal (2008)

[2] For historical perspectives, see van Zanden et al. (2014), Firebaugh (2015) and Milanovic (2016)

[3] 'Relative' inequality (or polarization) measures are those which are invariant under equiproportional increases in all incomes; 'absolute' inequality (or polarization) measures are those which register no change when the same absolute amount of income is added to all incomes.

[4] A second, more general approach initiated by Esteban and Ray (1994) and extended by Duclos et al. (2004), conceptualises polarization as clustering around local means of the income distribution, wherever these local means are located.

2 Measures of bipolarization

Two characteristics intrinsic to measures of bipolarization are 'non-decreasing spread' and 'non-decreasing bipolarity'. Under non-decreasing spread, a movement of income from the middle to the tails of the income distribution weakly increases bipolarization, which means that as the distribution becomes more spread out from the middle position bipolarization does not diminish. Non-decreasing bipolarity requires that increased clustering of incomes—either below or above the median—weakly increases bipolarization. Equivalently, a reduction of gaps between any two incomes, both above or both below the median, does not lessen polarization (Chakravarty and D'Ambrosio 2010).

The key similarities and contrasts between inequality and bipolarization measures are evident from these two criteria. The non-decreasing spread criterion confirms that, like inequality, bipolarization increases under transfers of income from the middle to the tails of the distribution. By contrast, increased clustering of incomes increases polarization, but would decrease any inequality measure satisfying the Pigou-Dalton transfer principle, which deems progressive transfers to be equalizing. Thus, polarization and inequality, though related, are quite distinct concepts.

We employ the following four polarization measures: First, Foster and Wolfson (2010)'s measure, which takes the form:

$$P_{FW} = (G^B - G^W)\frac{\mu}{m} \qquad (1)$$

where μ denotes mean income; m is the median income; G^B is the Gini coefficient of a 'smoothed' distribution where all incomes above (respectively, below) m are assigned the mean of those incomes; G^W is a population weighted average of the Gini coefficients of actual incomes above and below m. Second, the 'absolute' version of this relative bipolarization measure is obtained by multiplying it by the median:

$$P_{AFW} = (G^B - G^W)\mu \qquad (2)$$

Third, the relative bipolarization measures of Wang and Tsui (2000) are given by:

$$P_{WT} = \frac{1}{N}\sum_{i=1}^{N}\left|\frac{x_i - m}{m}\right|^r \qquad (3)$$

where individual $i \in \{1, \cdots, N\}$ has income $x_i \in \mathbb{R}_+$ and $r \in (0,1)$.[5]

Fourth, we use an absolute bipolarization measure from a class of measures by Wang and Tsui (2000), which is given by:

$$P_{AWT} = \frac{1}{N}\sum_{i=1}^{N}|x_i - m|^r \quad (4)$$

[5] As r increases, this measure attaches greater weight to deviations from m of incomes above $2m$, and less to deviations of incomes below $2m$.

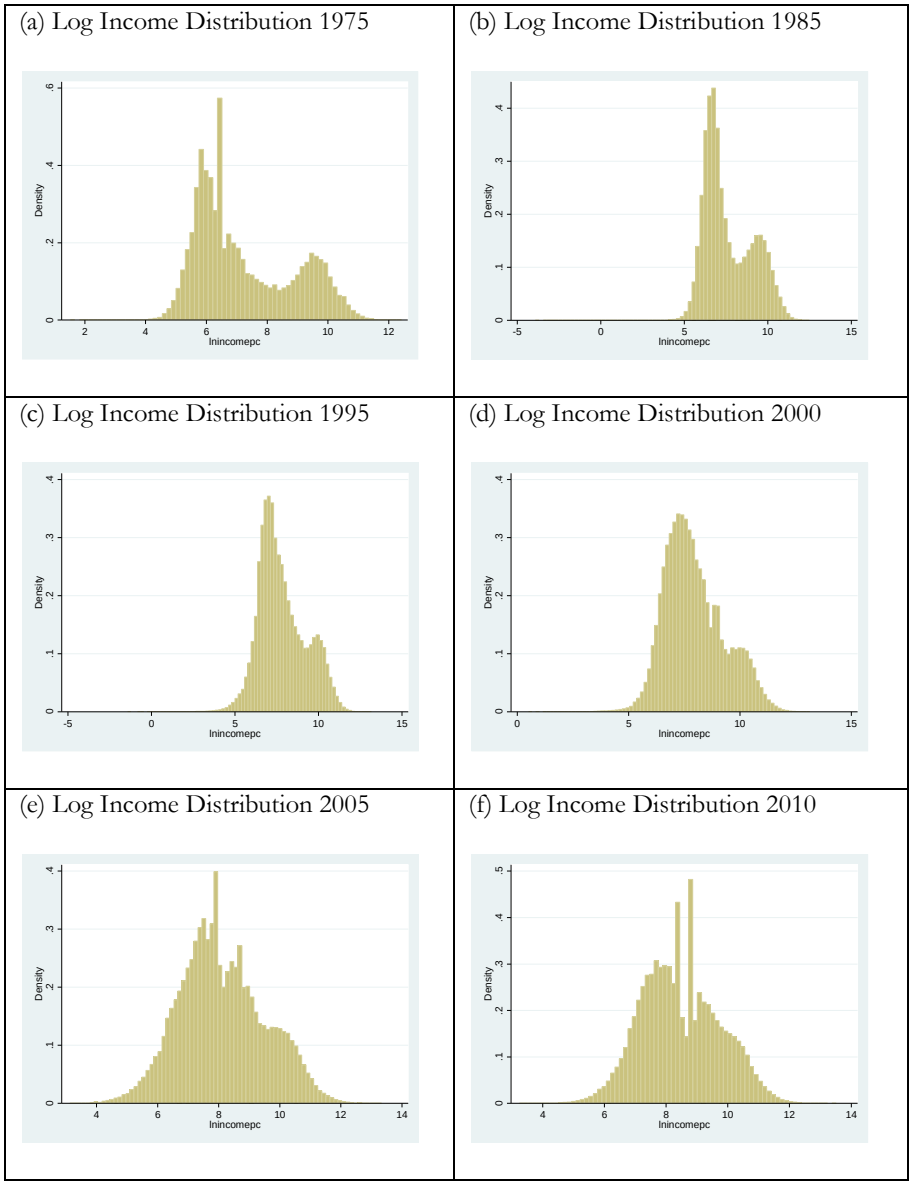
3 Data

We use data from UNU-WIDER's World Income Inequality Database (WIID) to construct synthetic global income distributions for six specific years: 1975, 1985, 1995, 2000, 2005 and 2010, following the approach described in Niño-Zarazúa et al. (2016).

4 Results

Density charts of the global (log) income distribution for each of the six years are provided in Figure 1. Panel (a) suggests that in 1975 the distribution was a bi-modal normal distribution. This remained so through 1985, 1995, and 2000 (panels (b)–(d), though with the bi-modality becoming steadily less pronounced. Panels (e) and (f) suggest that by 2005 and 2010 the bi-modality had all but disappeared and the distributions appear roughly normal.

Figure 1. Global Log Income Densities 1975–2010



Source: Authors' estimations based on the WIID

This trend is broadly confirmed by each of our relative bipolarization measures, presented in Table 1. Bipolarization is found to decrease dramatically over the period, from 2.534 in 1975 to 0.879 in 2010 according to P_{FW}. It also decreased substantially according to P_{WT} for all parameters considered. The decline was strongest for higher values of r which, loosely speaking, are more sensitive to very large deviations of very high incomes from the median. Apart from a very small increase in 2005 according to some relative measures, the decline has been continual and substantial throughout the period analysed.

Table 1. Bipolarization of Global Income Distribution 1975–2010

Measure	1975	1985	1995	2000	2005	2010
P_{FW}	2.534	1.834	1.288	1.064	1.079	0.879
P_{AFW}	1973.841	2296.677	2410.121	2433.682	3033.892	3754.136
P_{WT}						
r=0.2	1.121	1.074	1.035	1.011	1.017	0.985
r=0.4	1.454	1.311	1.194	1.131	1.135	1.052
r=0.6	2.158	1.801	1.536	1.405	1.390	1.213
r=0.8	3.565	2.733	2.185	1.931	1.864	1.508
P_{AWT}						
r=0.2	4.247	4.474	4.672	4.750	4.980	5.242
r=0.4	20.857	22.726	24.314	24.959	27.196	29.797
r=0.6	117.219	130.025	141.156	145.623	163.088	182.907
r=0.8	733.258	821.964	906.175	939.977	1070.524	1209.550

Source: Authors' estimations based on the WIID

In stark contrast however, 'absolute' bipolarization is found to have increased substantially, and continually from each period to the next, according to both P_{AFW} and to all parametrizations of P_{AWT}.

5 Conclusions

National income distributions are typically well approximated as being lognormal (Lopez et al. 2006). Our analysis suggests that—following an unprecedented period of globalization and increasing interconnectedness between domestic economies—this is now a good approximation of the global income distribution, which has evolved away from the 'twin peaks' discussed by Quah (1996). Strikingly, the trend in global bipolarization during the period 1975–2010 mirrors Niño-Zarazúa et al. (2016)'s results on global inequality: both have steadily decreased in 'relative' terms, but increased in 'absolute' terms. These findings are consistent with a combination of decreasing income gaps between countries—causing inequality and polarization to decline in relative terms, but high growth—causing them to increase in absolute terms.

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