



## Income inequality in the developing world

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graduates, a pattern consistent with the conceptual model laid out below.

37. Although this deceleration is not evident from Fig. 3, it is detected by the regression equation, as discussed in the online supplement.
38. College Board, *Trends in Student Aid: 2013* (College Board, New York, 2013).
39. C. Avery, S. Turner, *J. Econ. Perspect.* **26**, 165–192 (2012).
40. Three sources of uncertainty should be kept in mind when interpreting these estimates. First, they encompass substantial heterogeneity. Although the average college graduate earns substantially more than the average high school graduate, the least successful college graduates may earn substantially less than the median among high school graduates, and the most successful high school graduates may earn substantially more than the median among college graduates. Second, for students who acquire substantial student debt but do not complete the college degree, it is far from certain that college will prove a good investment. Finally, these calculations assume that the lifetime profile of earnings observed in the year of college graduation will persist throughout the career. As Fig. 3 indicates, this premium has changed substantially over time, so this assumption is only a rough approximation. However, the college premium is so high at present that even with a substantial decline, college would remain an attractive financial proposition on average from a lifetime earnings perspective.
41. R. J. Murnane, *J. Econ. Lit.* **51**, 370–422 (2013).
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43. As with cross-sectional inequality, there is no economically “ideal” level of intergenerational mobility. Even in a society with perfect equality of opportunity, one would expect children of successful parents to have above-average success as adults, simply because many attributes that contribute to success (appearance, intellect, athleticism) are partly heritable.
44. M. Corak, *J. Econ. Perspect.* **27**, 79–102 (2013).
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46. R. Chetty *et al.*, *Is the United States Still a Land of Opportunity? Recent Trends in Intergenerational Mobility* (NBER Working Paper No. 19844, Cambridge, MA, 2014).
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48. Between 2002–2003 and 2012–2013, the sum of federal Pell Grants and loans for higher education increased by 105%, from \$83 billion to \$170 billion in constant 2012 dollars [(38), table 1].
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52. B. T. Hirsch, *J. Econ. Perspect.* **22**, 153–176 (2008).
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54. The extensive involvement of state and federal government in education at all levels also underscores the fact that the distribution of education and skills today is in no sense a “free market” outcome; it is a consequence of both individual and public choices.

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#### SUPPLEMENTARY MATERIALS

www.sciencemag.org/content/344/6186/843/suppl/DC1  
Supplementary Text  
Figs. S1 to S3  
References (55–61)

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#### REVIEW

# Income inequality in the developing world

Martin Ravallion

**Should income inequality be of concern in developing countries? New data reveal less income inequality in the developing world than 30 years ago. However, this is due to falling inequality between countries. Average inequality within developing countries has been slowly rising, though staying fairly flat since 2000. As a rule, higher rates of growth in average incomes have not put upward pressure on inequality within countries. Growth has generally helped reduce the incidence of absolute poverty, but less so in more unequal countries. High inequality also threatens to stall future progress against poverty by attenuating growth prospects. Perceptions of rising absolute gaps in living standards between the rich and the poor in growing economies are also consistent with the evidence.**

**D**evelopment economics emerged as a sub-discipline of economics in the 1950s, and its initial focus was on economic growth, with inequality as a secondary concern. The prevailing orthodoxy for many decades was that a period of rising inequality was to be expected in growing poor countries. Rising inequality was seen to be more or less inevitable and not something to worry about, particularly if the incidence of poverty was falling. Another commonly held view was that policy efforts to reduce inequality were likely to impede growth and (hence) poverty reduction.

The existence of high inequality within many developing countries, side by side with persistent poverty, started to attract attention in the early 1970s. Nonetheless, through the 1980s and well into the 1990s, the mainstream view in development economics was still that high and/or rising inequality in poor countries was a far less important concern than assuring sufficient growth, which was the key to poverty reduction. The policy message for the developing world was clear: You cannot expect to have both lower poverty and less inequality while you remain poor, and, if you choose to give poverty reduction highest priority, then focus on growth.

Other objections could still be raised to high income inequality. The classical utilitarian formulation—whereby social welfare is judged by the sum of utilities, assuming diminishing marginal utility of income—pointed to social welfare losses from high inequality at a given mean. But that did not persuade those who believed that there was a trade-off between equity and growth. A moral defense could also be mounted for the view that inequality is not an important issue for a growing developing country by appeal

to John Rawls’s “difference principle” that (subject to assuring liberty and equal opportunity) higher inequality can be justified as long as it benefits the worst-off group in society (*1*).

The period since 2000 has seen a deeper and more widespread questioning of this long-standing view of pro-poor inequality. New concerns have emerged about the instrumental importance of equity to other valued goals, including poverty reduction and human development more broadly. It appears more likely today that high inequality will be seen as a threat to future development than as an inevitable and unimportant consequence of past progress. The long-standing idea of a substantial growth-equity trade-off has come to be seriously questioned.

This paper reports new estimates of the levels and changes in income inequality measures for the developing world. The new estimates take us up to 2010, embracing the period of higher growth rates in the developing world since the turn of the millennium. In the light of these new data, I revisit past and ongoing debates on inequality in developing countries and the trade-offs with growth and poverty reduction.

#### Income Inequality Measures

To measure inequality in the developing world as a whole, one ignores country borders—pooling all residents and measuring inequality among them. This overall measure will naturally depend on the inequality between countries as well as that within them. Thus, its evolution over time will depend on whether poorer countries are seeing lower growth rates as well as the things happening within countries—economic changes and policies—that affect inequality.

If we are comparing country or regional performance, then we want to isolate the within-country component of inequality as distinct from that between countries. Although there are many inequality measures, not all of them allow a clean separation of the between and within components. For example, such a decomposition is

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not generally possible for the Gini index—a popular inequality index based on the average absolute difference between all random pairs of incomes normalized by the mean. (The exception is when the distributions of different countries do not share any common support, which is unlikely.)

The mean-log deviation (MLD) offers an elegant solution. This is given by the (appropriately weighted) mean across households of the log of the ratio of the overall mean income to household income per person. When all incomes are equal, MLD is 0; the higher the inequality, the higher the MLD. Like the Gini index, MLD is a relative inequality measure in that it depends on ratios of incomes to the mean; this is implied by the scale-invariance axiom of inequality measurement, which says that when all incomes are multiplied by a constant the inequality measure does not change. (We will return to this axiom, which can be questioned.) Also, both measures satisfy the standard transfer axiom for inequality measurement, namely that a small transfer to someone with a lower income will reduce inequality. However, unlike the Gini index, MLD is exactly decomposable by population subgroups.

Inequality is measured by using household surveys. The estimates presented here have their basis in ~900 surveys spanning 1980 to 2010 and 130 countries. The calculations have been done on an updated version of the data set used by (2) for measuring poverty, and (when relevant) the same methods have been used. For over half the surveys, household consumption expenditure (including imputed values for consumption from own-production) was used rather than income, although for brevity the word “income” is used for both. For a given economy, income inequality measures are expected to be somewhat higher than for consumption given the scope for smoothing consumption in the presence of income shocks.

Although household surveys are the only source of data on inequality across households, there are two sources of data on the growth rates in average household consumption or income. The same surveys used to measure inequality compose one source, and the other is the household consumption component of domestic absorption in the national accounts. There is no clear way of ranking these measures; in some developing countries, the measures based on national accounts are considered quite unreliable, whereas elsewhere there are serious concerns about the survey-based measures.

Household surveys may well underestimate the extent of inequality, notably through either the rich underreporting their incomes or through selective compliance in the randomized assignments of the survey instrument whereby richer households are less likely to participate. [The latter problem does not imply that inequality will be underestimated; Korinek *et al.* (3) found that selective compliance leads to an underestimation of inequality in the United States.] Although there are methods that can be used to address

these concerns, they have so far tended to be confined to research studies, and mostly in rich countries. No corrections for these data problems have been made in the primary data used here.

The overall MLD for the developing world in 2010 is estimated to be 0.578. To help interpret this number, imagine a distribution with three incomes: 1, 2, and  $x$ ; for this distribution to have  $MLD = 0.578$ ,  $x$  would need to be 12.73, that is, the richest of three people would need to have over 12 times that of the poorest and 6 times that of the middle income.

Inequality has fallen over this 30-year period. For the earliest year that the data permit an estimate, 1981, MLD was 0.651. (This is equivalent to  $x = 14.79$  in the distribution 1, 2, and  $x$ .) Fig. 1 plots MLD for the developing world as a whole and its between-country component. (The supplementary materials give detailed estimates.)

We see that the overall decrease came with ups and downs and an increase over 2005 to 2010. The variance over time is largely accountable to inequality between countries. Over the period as a whole, the between-country component has fallen, while the within-country component has risen. The latter accounted for 31% of total inequality in the developing world in 1981 but 47% in 2010. However, this pattern has reversed since 2000, with inequality rising between countries but falling on average within countries. Something different seems to be happening since the turn of the millennium. The next section will consider the role played by the higher growth rates since then.

Figure 2 plots the within-country component by region. Latin America and the Caribbean (LAC) have persistently had the highest average inequality of any region. (The mean difference between LAC and other regions falls

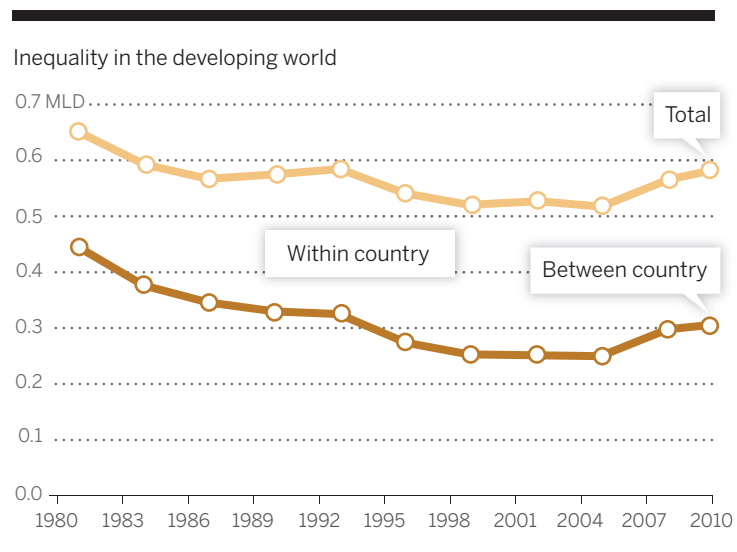


Fig. 1. Inequality in the developing world. Between- and within-country totals are shown.

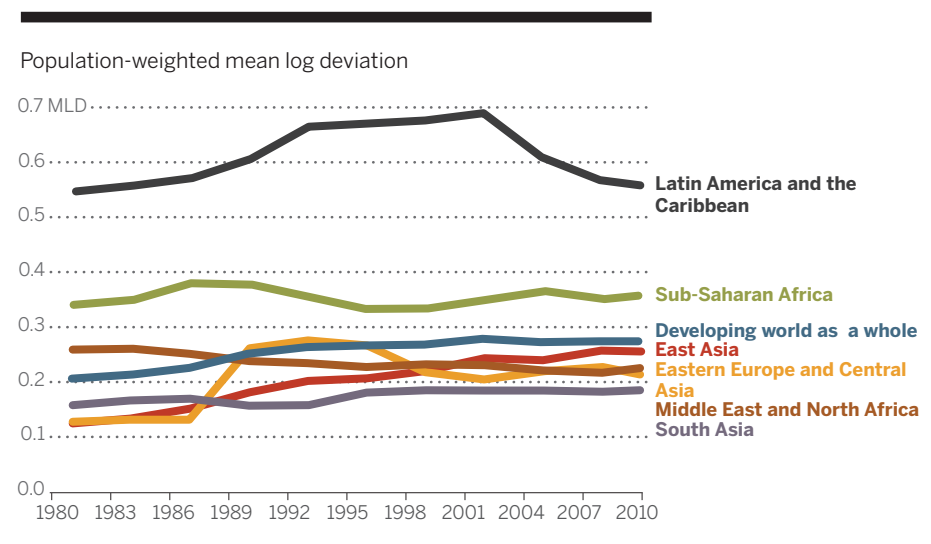


Fig. 2. Population-weighted MLD. Developing-world countries are grouped geographically.

only slightly when one controls for income surveys, which have been more popular in LAC; see supplementary materials.) Inequality was rising in LAC until around 2000 but has fallen noticeably since. Eastern Europe and Central Asia saw a sharp rise in inequality in the 1990s but has seen generally falling inequality since. Sub-Saharan Africa has the second-highest average inequality, although with no clear trend. South Asia has been a region of low inequality, rising somewhat since the early 1990s. East Asia started out as the region with the lowest inequality but has seen a steady rise. The Middle East and North Africa has seen steadily falling inequality.

### Inequality and Growth Across Countries

As is well known, the developing world has seen substantially higher growth rates since 2000. Have the processes of stronger economic growth in developing countries, and the acceleration of growth seen since the turn of the century, put upward pressure on inequality?

The recent signs of rising inequality in the developing world as a whole have coincided with the higher growth rates since 2000 (Fig. 3). However, when we unpack the relationship (exploiting the properties of the MLD), we find two opposing forces: As can be seen in Fig. 4, the higher growth rates have come with higher between-country inequality but lower average within-country inequality. Across the developing world as a whole and taking 3-year periods back to 1981, the periods of higher growth have come with higher between-country inequality ( $r = 0.70$ ), whereas inequality within developing countries has been falling with higher growth ( $r = -0.63$ ). But the latter relationship is rather flat; going from zero growth rate to a 5% annual rate is associated

with a move from an expected rise in MLD of 0.005 (about one-third of the standard deviation in the annualized change in MLD) to no change on average. Growth in average household income appears to be close to inequality-neutral on average.

These are aggregates across countries. I also assembled a data set of the longest spells between two household surveys, and I obtained complete data for about 100 countries. The median year of the first survey is 1989, and it is 2008 for the latest survey. The (unweighted) mean MLD is unchanged at 0.318. (Population-weighted values are slightly lower.) However, the variance has fallen, from a standard deviation of 0.195 to 0.171 for the latest year. Inequality fell over time in 11 of the 13 countries that had MLD greater than 0.576—the aggregate value (including the between country component) in 1990. The annualized change in MLD is negatively correlated with its initial value ( $r = -0.33$ ,  $n = 122$ ), and the same is true for the Gini index ( $r = -0.55$ ;  $n = 122$ ). This pattern of inequality convergence is consistent with other evidence (4, 5). Although measurement errors exaggerate the signs of convergence, it remains robust to the use of an econometric estimator that addresses this concern (5).

These data suggest a small negative correlation between changes in inequality and growth rates among developing countries. The correlation coefficient between the growth rate (annualized log difference) in the survey mean and the annualized change in MLD is  $-0.24$ , which is significant at the 5% level. The use of growth rates from the national accounts instead of surveys drops the correlation to  $-0.04$ . Use of the Gini index rather than MLD gives similar results. Nor did I find evidence of nonlinearity in the

relationship; by regressing the change in inequality on both the growth rate and the annualized change in the squared log mean, I found neither coefficient was significant. (See the supplementary materials for details.) So, again, inequality increases about as often as it falls during spells of growth. This finding is consistent with past evidence that used cross-country comparisons [as surveyed in (6)].

It is not then surprising that there is a strong negative correlation between growth rates and changes in absolute poverty. Across the regional averages used above, the correlation coefficient is  $-0.75$  between growth rates in mean household consumption or income and the annualized changes in the log of the poverty rate for a poverty line of \$1.25 a day at purchasing power parity. Across countries the corresponding correlation coefficient is  $-0.85$ . This is consistent with a large body of cross-country evidence back to around 1990, as reviewed by (6).

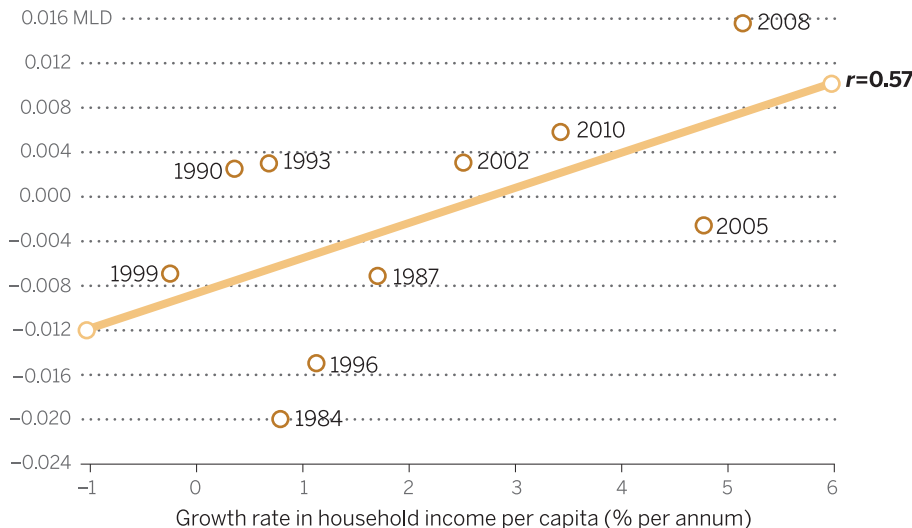
There are a number of caveats that should be noted about this negative correlation. There are measurement errors to consider. There are some rather extreme values in some of the country data that may well reflect such errors. However, the correlation is still high at  $-0.70$  ( $n = 88$ ) if one trims extreme values (dropping absolute log differences per year over 0.5). The correlation is also robust to the use of an econometric correction for correlated measurement errors between the poverty measures and the survey means (supplementary materials). The correlation is lower if one uses growth rates from national accounts instead of those from surveys. (The correlation between annualized log differences in the \$1.25 a day poverty rate and the growth rates in private consumption per capita from national accounts is  $-0.56$ .) Some of the things that are included in the national accounts do not get passed on quickly (or at all) to household living standards. Also, survey dates do not cover entire years as do national accounts. Another caveat is that the correlation tends to be much weaker with use of relative poverty measures, whereby the poverty line rises with average income (consistently with the cross-country relationship between national poverty lines and average income); see (7).

An important caveat is that the fact that we do not see rising inequality on average in growing economies does not imply that inequality can safely be ignored. The rest of this paper points to a number of reasons why inequality should be considered a central development issue.

### Inequality Matters to Progress Against Poverty

Does higher inequality in poor countries permit faster progress against poverty through economic growth? Most development economists would probably have answered “yes” even 10 years ago, but recent development theories and evidence are more suggestive of a negative answer.

Change in inequality in the developing world



**Fig. 3. Change in inequality over time.** Change in MLD plotted as a function of the growth rate in household income per capita.

The performance of developing countries against poverty is quite diverse. Inequality comes back into the story in efforts to explain this diverse performance. We have learned that inequality plays three important roles in influencing the pace of progress against poverty. First, changes in inequality during the growth process have implications for how much that growth affects poverty. By using the country-level data set discussed in the last section, I find that, among growing developing countries in terms of mean household income based on the surveys, those experiencing falling inequality see the \$1.25 a day poverty rate falling at a median rate of about 1.30% points per year versus a median fall of only 0.42% points per year for countries with rising inequality. Either way, poverty incidence tends to fall but at very different rates.

Second, initial inequality reduces the growth elasticity of poverty reduction—the responsiveness of poverty measures to growth in mean income. This is intuitive: The more unequal the original distribution, the smaller the share of the growth accruing to the poor and the lower the poverty reduction arising from that growth; this was demonstrated empirically by (8). The converse holds too: In more unequal societies, the poor tend to be more protected from aggregate economic contractions.

Third, even if inequality does not rise during a period of economic growth, a high initial level of inequality can mean less growth and (hence) less progress against absolute poverty. In the 1990s, we started to see various theoretical arguments that high levels of inequality stifled investment, innovation, and reform. Here, I only provide a sketch of the arguments that have been made; other studies (9, 10) surveyed the arguments and evidence in the literature on how the initial level of inequality influences the subsequent growth rate.

An influential strand of this literature points to the implications of borrowing constraints associated with asymmetric information and the inability to write binding enforceable contracts. Credit market failure that disproportionately affects poor people leaves unexploited opportunities for their investment in physical and human capital, and it is assumed that there are diminishing returns to capital, such that poor people have higher marginal products of capital. (This idea can be extended to also embrace technical innovation, assuming that everyone gets new ideas but that the poor are more constrained in responding.) Then higher current inequality implies lower future mean wealth at a given value of current mean wealth.

Other sources of economic distortions can create costly inequalities. This can happen if a relatively privileged subgroup is able to restrict entry to economic opportunities (including jobs) and thus set the returns to those activities above the market clearing level. Labor-market failures in the form of persistent unemployment can also have lasting adverse consequences for both equity and efficiency. Human capital is developed in part by working; thus, longer spells of unemployment

create a de-skilling that makes it harder to get a job. Unemployment can also be associated with psychological distress and depression. This psychological scarring may also make it harder to get a job.

Another class of models is based on the idea that high inequality restricts efficiency-enhancing cooperation such that key public goods are underprovided, including legally secure property rights, or desirable economic and political reforms are blocked. High initial inequality can also induce costly political economy responses.

Some of the literature has pointed to other aspects of the initial distribution of income be-

sides inequality. It has been argued that a larger middle class helps assure a more diversified economy (especially through greater demand for consumer goods) and that the middle class also tends to be a stronger political force for pro-growth economic reforms. Others have argued that higher current wealth poverty (of which access to land is a key factor) impedes growth, such as through access to credit.

A strand of this new empirical literature on economic growth has tested for inequality as an initial condition, and the results have generally supported the view that higher initial inequality impedes growth. The effect is quantitatively large,

#### Change in inequality

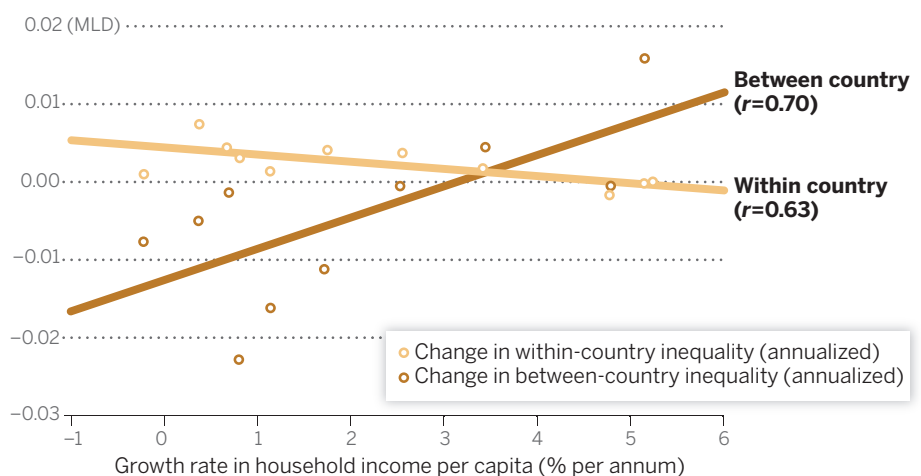


Fig. 4. Changes in inequality between and within countries.

#### Change in Gini index (points per year)

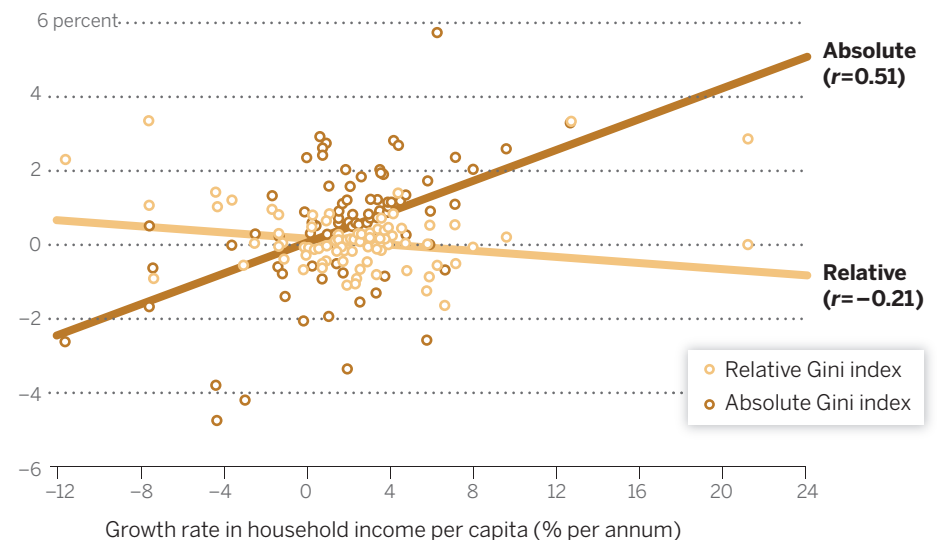


Fig. 5. Changes in Gini index per year. With growth in mean income, the absolute Gini index has tended to rise, whereas the relative index has changed little.

as well as statistically significant; two recent examples are (11, 12).

We have seen that the literature has pointed to various aspects of initial distribution—inequality, the size of the middle class, or poverty—that matter to progress against poverty. These distributional measures tend to be correlated with each other, yet very few studies have tested encompassing models that try to see whether one measure is more important than another. One exception (13) finds that high poverty at a given initial mean matters more to rates of growth in mean consumption in developing countries than inequality or measures of the middle class or polarization. This does not imply that inequality is unimportant but rather tells us that inequality matters to growth in poor countries mainly via its bearing on the extent of initial poverty.

So, the arguments and evidence from modern development economics do not suggest that we should expect any substantial aggregate trade-off between progress against absolute poverty and progress in reducing inequality. Indeed, the evidence suggests that falling inequality tends to come with falling poverty incidence (14).

### Differing Concepts of Inequality

The value judgments made in measuring inequality carry weight for the position one takes on whether economic growth tends to be inequality increasing or not (15). So far, this paper has followed the long-standing practice of relying on relative inequality measures, defined in terms of ratios of incomes or consumptions. By contrast, absolute inequality depends on the absolute differences in levels of living. If the distribution of income among two people changes from \$1000 and \$10,000 to \$2000 and \$20,000, then relative inequality is unchanged, yet the absolute gap between rich and poor has doubled.

Perceptions on the ground that inequality is rising often appear to be referring to the absolute concept. Amiel and Cowell (16) report experiments to identify which concept of inequality is held by people. They found that 40% of the university students surveyed (in the United Kingdom and Israel) thought about inequality in absolute rather than relative terms. [Harrison and Seidl (17) report similar findings for a large sample of German university students.] For the purpose of this paper, I fielded a similar

(confidential) survey to my class of undergraduates at Georgetown University. From the 130 responses (out of 150 students), the class was roughly evenly split between those who thought about inequality in relative terms and those who thought about it in absolute terms.

It is not that one concept is right and one wrong. They simply reflect different value judgments. The relative inequality concept is implied by the scale invariance axiom, whereas the absolute concept is implied by an alternative axiom called translation invariance. The former axiom has dominated practice in the measurement of inequality by economists and statisticians, but the “axiom” is hardly a self-evident truth.

In this light, let us return to the long-standing debates on growth and equity. Finding that the share of income going to the poor does not change on average with growth does not mean that “growth raises the incomes (of the poor) by about as much as it raises the incomes of everybody else,” as claimed by the *Economist* (18). Given existing inequality, the absolute income gains to the rich from inequality-neutral growth will of course be greater than the gains to the poor. For example, for the richest decile in India, the income gain from aggregate growth will be about four times higher than the gain to the poorest quintile; it will be 15 to 20 times higher in Brazil or South Africa.

The empirical finding in the literature that growth tends to be inequality-neutral within developing countries will carry little weight for those concerned about absolute inequality, who prefer translation invariance to scale invariance. One expects an absolute measure to rise with growth and fall with contraction. I confirmed this on the aforementioned country-level data set. Changes in the absolute Gini index show a significant positive correlation with growth rates in either survey means ( $r = 0.51$ ,  $r = 123$ ) or consumption per capita from the national accounts ( $r = 0.75$ ,  $n = 114$ ). Figure 5 plots the relationships. (Absolute Gini indices are scaled by the mean of initial and final years.)

It may well be that past and ongoing debates about the distribution of the gains from growth in the developing world rest in no small measure on this (rarely discussed) conceptual difference in how inequality is defined. Unlike those who see inequality as relative, those who view it in absolute terms will expect to see a trade-off between reducing inequality and reducing poverty. That

does not mean that any policy that is good for one is necessarily bad for the other or that it is impossible to have both; the correlation is just that—a correlation. However, it does help us understand why some growth-promoting and poverty-reducing policy reforms may well come in for serious criticism and even be blocked by a non-negligible number of observers concerned about widening gaps in living standards between the rich and the poor. How policy-makers deal with that critique may matter greatly to progress against poverty.

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### SUPPLEMENTARY MATERIALS

[www.sciencemag.org/content/344/6186/851/suppl/DC1](http://www.sciencemag.org/content/344/6186/851/suppl/DC1)

Fig. S1

Tables S1 to S3

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