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Global inequality of opportunity

How much of our income is determined by where we live?

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ABSTRACT

Suppose that all people in the world are allocated only two characteristics over which they have (almost) no control: country of residence and income distribution within that country. Assume further that there is no migration. We show that more than one-half of variability in income of world population classified according to their household per capita in one-percent income groups (by country) is accounted for by these two characteristics. The role of effort or luck cannot play a large role in explaining global distribution of income.

JEL classification: D31; I3; 057

Key words: Global inequality, income distribution, global inequality of opportunity

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1. Setting the stage

In Rawls's *Law of Peoples* (1999) individuals from various countries meet to organize a contractual arrangement regulating their relations in a metaphor similar to the one for the citizens of the same nation from his *Theory of Justice*. They meet behind the veil of ignorance. Imagine now a Rawls-redux similar meeting of all individuals in the world where each is handed only one characteristic that will influence her economic fate: county of residence. We shall ask: how much of her income will be determined by this factor, unrelated to individual effort or desert? Is one's position in global income distribution largely decided by country where one lives?

Assignment to country is "fate", decided at birth, for approximately 97 percent of the people in the world: less than 3 percent of world population lives in countries where they were not born.[2] Moreover as the differences

[2] The stock of migrants around year 2000 is estimated at 165 million (see Ozden et al., 2011). The annual flow of people who move between countries (excluding tourism

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between mean country incomes are large—more than two-thirds of global inequality between individuals is due to national income differences[3]--to what nation one gets "allocated" is indeed of significant import for own life

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and very short visits) is estimated at 11 million which is about $1/7^{th}$ of 1 percent of world population (see Pritchett, 2006, p. 65).

[3] See Milanovic (2002, p.78 and 2005, p. 112), Sutcliffe (2004), Bourguignon and Morrisson (2002, p. 734), Berry and Serieux (2007, p. 84). This result is obtained using the standard (Pyatt) Gini decomposition, which is appropriate in this case because it calculates the between country component assuming that everybody in a given country has the mean income of that country. An alternative decomposition is proposed by Lehman and Yitzhaki (1991) and Frick et al. (2006). Its between component is always equal or smaller than Pyatt's (see Finck et al., 2006, p. 468). For the world however the differences are minimal. Using 2005 global data (see more on them below), the Pyatt between country component is 61.5 Gini points (out of total global Gini of 70), while the Lehman and Yitzhaki is 58 Gini points..

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chances. By being "allocated" to a country, a person receives at least two "public" goods—average income of the country and inequality of income distribution—that are unalterable by own effort. They will be referred to as "circumstances" (Roemer 1998). To be more precise and to account for the fact that not for everybody would citizenship at birth be the same as citizenship in the rest of her life, and moreover citizenship and residence may not coincide, we shall speak of "residence" rather than of "citizenship".

This issue can be set in the more explicitly Roemerian (1998) terms. Income (y) of i-th individual in j-th country can be, in general as in (1), written as a function of country-specific circumstances α's, running from 1 to m (e.g., average income of the country or its level of inequality); own specific circumstances γ's, running from 1 to n (like parental income, gender or race) whose effect also depends on country (hence subscripted by j); person's own effort E_{ij}, and a random shock which can also be called luck (u_{ij}):

$$y_{ij} = f(\alpha^1_{j....}\alpha^m_j; \gamma^1_{ij}...\gamma^n_{ij}; E_{ij}; u_{ij}) \qquad (1)$$

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Focus on two circumstances: m_j = mean income of country *j* and G_j = Gini coefficient of country *j*. Our objective will be to find out how much of income can be explained by them. The formulation as written in (1) assumes that effort is independent of circumstances: in other words, that circumstances affect income only directly, and not indirectly through effort. We could also formulate (1) in such a way that effort appears as an argument in each individual circumstance, $\gamma_{ij}(E_{ij})$. However, as we shall show below, which way effort enters (1) does not matter for our estimation because in the regressions we shall have on the right-hand side only country-specific circumstances, α_j's, which are clearly exogenous.[4] We are thus agnostic as to how effort and individual circumstances interact.

[4] According to Roemer (1998, Chapter 3), conditional on circumstance, people at the same percentile of effort should be rewarded the same (or treated equally). Roemer distinguishes between the relative effort ("degree of effort") and the absolute effort ("level of effort"). The relative effort is the effort expended compared to what is expected with a given set of circumstances. Equality of opportunity requires that the outcomes be the same for each

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Why do we study this topic at all? We have to explain the importance of the topic in stark terms not only because the rationale for studying global, as opposed to national, inequality of opportunities is new, but because the topic itself is poorly understood. We study it because we want to find out whether globally effort pays off or not. The topic of inequality of opportunity is traditionally studied at national level, and recently both the sophistication of the analysis (Bourguignon et. al. 2005) and the coverage of the countries have expanded.[5] Suppose, in a given country, that one's income is entirely determined by her parents'

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percentile of the distribution of effort (that is, for each relative effort) allowing thus the same absolute effort to be rewarded differently.

[5] This is partially due to data availability, but probably more importantly to the unstated view that equality of opportunity is something that ought to hold at the national level or for which only national governments can be held "responsible". But if we extend our consideration to the world as a whole, should not equality of opportunity apply to all individuals regardless of their nationality?

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income. Not only would we deem this unjust but economically the rationale for working hard would be lacking.

But in a globalized world, the same question may be asked as well. Let's one's income depend entirely on her country of birth thus implying that inequality within each country is zero. If she is born in a poor country, she can neither, by her efforts, improve her lot domestically nor globally, because she cannot influence alone her country's growth rate. It thus makes no sense for her to expend effort which will lead to no improvement in income. The only venue that remains is migration. Posed in such extreme terms, it is easy to see why the question is important: not only because it raises ethical issues (is it fair that our incomes should be decided at birth?) but because it has clear economic implications: where should, rationally, efforts of people in poor countries be directed: to work or to migrate?

In Section 2, I describe the source of global income distribution data that help us address these questions empirically, and show some broad regularities about the

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way global income is distributed between countries and income classes. Sections 3 and 4 are the core parts of the paper: they present the analysis that attempts to answer the questions posed above. The last part gives the conclusions.

2. Data and definitions

The data used in the paper come from World Income Distribution (WYD) database constructed to study the evolution of global inequality. The database is composed almost entirely of micro data from representative national household surveys from most of the countries in the world. For the year 2008, which is used here, the data come from 118 countries' household surveys representing 94 percent of world population and 96 percent of world dollar income.[6] (The list of countries, surveys and other

[6] We cannot express the share of the included countries in terms of $PPP income because for most of the countries for which we lack surveys, we also lack PPP data (e.g., Afghanistan, Iraq, Sudan etc.) The dollar incomes however are typically available.

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information about the database is available from the author on request.) The geographical coverage is almost complete for all parts of the world except Africa (see Table 1).[7]

[7] An earlier version of this paper used the same WYD database but with the benchmark year of 2005. The results are quasi identical to the ones reported in Sections 3 and 4 of this paper. We can thus argue that the results hold for at least two annual cross-sections of household surveys across the world.

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Table 1. Population and income coverage of the surveys, year 2008 (in %)

	Africa	Asia	Latin America	E.Europe and CIS	WENAO	World
Population	78	98	97	92	97	94
Dollar income	71	93	98	98	97	96
Number of countries	23	27	18	27	23	118

Source: World Income Distribution database. The data are available at http://econ.worldbank.org/projects/inequality. Note: WENAO is Western Europe, North America and Oceania (Australia and New Zealand). CIS = Commonwealth of Independent States. Eastern Europe includes formerly Communist countries.

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For all countries but one (Singapore) we have micro data which means that any type of distribution (by decile, ventile, percentile; by household or individual) could have been created. All individuals in a survey are ranked from the poorest to the richest according to their household per capita income (or expenditures, depending on what welfare aggregate is used in the survey). In order to provide precise income estimates while making the analysis manageable we combine individuals into corresponding income percentiles and use a relatively dense distribution of 100 data points (percentiles) per country The percentiles range from the poorest (percentile 1 or bottom percentile) to the richest (percentile 100 or top 1 percent).

Since not all countries produce annual surveys, we had to use a "benchmark" year (2008 in this case), that is, try to get 2008 household surveys for as many countries as possible, but where there are no surveys conducted in 2008, to use a year close to 2008. In the event, 89 out of 118 household surveys were conducted in the benchmark year or one year before or after it, and all but 2 surveys were done within two years of the benchmark year. For the

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surveys conducted in non-benchmark years, we adjust reported incomes by the Consumer Price Index of the country so that all amounts are expressed in 2008 local currency units. These amounts are then converted into international (PPP) dollars using the 2008 estimates of $PPP exchange rates for household private consumption provided by the newest round of International Comparison Program. [8] The PPPs are calculated by the Eltöte-Köves-Szulc method. For each percentile of population, we calculate the average annual per capita amount of PPP dollars received as disposable income.[9]

[8] This new round of International Comparison Program (ICP) has led to a sharp upward revision of China's and India's price level, and consequently to the sharp downward revision of their incomes (World Bank, 2008 and Milanovic 2011). The new ICP results have been incorporated in World Bank more recent global poverty calculations. For the data, see http://siteresources.worldbank.org/ICPINT/Resources/icp-final-tables.pdf (accessed June 28, 2011).

[9]Household surveys are either income- or expenditure (consumption)-based. For the simplicity of presentation we

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The fact that each country is divided into 100 groups of equal size (percentiles) is very helpful. This allows us to compare the positions of say, the 23rd percentile of people in China with the 75th percentile in Nigeria etc. It also allows us to define income classes in the same way across countries. To fix the terminology, we shall call each percentile an "income class". Income classes thus run from 1 to 100 with 100 being the highest. Incomes within all percentiles except the very highest one, and sometimes the poorest one, are extremely homogenous. Gini coefficients for *within*-percentile individual incomes are generally less than 1 or 2 (that is, less than 0.01 or 0.02), and it is only for the very top percentile that Gini takes two-digit values.[10] Thus, except for the top 1 percent, *within* all other country/percentiles we deal with

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speak throughout of "income" distribution and "income" position in the world.

[10] Calculated from micro data from 25 surveys (5 from each region) used in our 2008 benchmark year (available from the author).

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individuals whose household per capita incomes are practically undistinguishable one from another.

Figure 1 shows the average percentile incomes for five countries (obviously, the same figure could be done for any of the 118 countries). Consider Germany. Because Germany is a rich country, and its income inequality is moderate, most of its population is highly placed in the world income distribution. The poorest German population percentile has a per capita disposable income of about $PPP 2,200 per year (see the horizontal broken line). All other percentiles' incomes are obviously greater, and the richest percentile has an income per capita of about $PPP 104,000 which places it also in the top world percentile. The same interpretation holds for other countries. Unlike relatively egalitarian Germany, where the ratio between the richest and the poorest percentile is less than 50 to 1, in China, the ratio between the top and bottom percentile is 66 to 1, with the poorest section of the Chinese population having an annual per capita income just under $PPP 300 per year and the richest percentile earning almost $PPP 20,000. Only about 40 percent of the Chinese population is richer than the poorest Germans. This percentage is even

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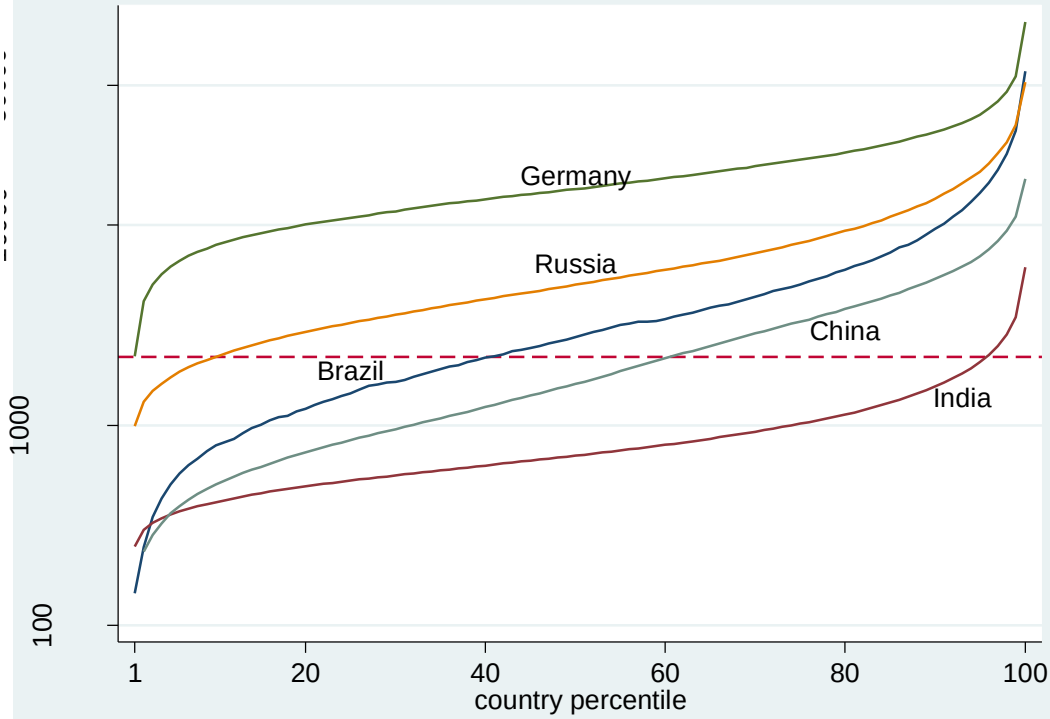
smaller in the case of India. Brazil, with its unequal income distribution, covers almost the entire global spectrum, with the poorest people at less than $PPP 300, and the richest percentile at $PPP 60,000.

Figure 1. Income levels in the world—by country and income class, year 2008



Source: World Income Distribution (WYD). Horizontal axis: country percentiles that run from 1 (poorest) to 100 (richest). Vertical axis: annual household per capita disposable income in 2008 international dollars (in logarithms). Horizontal line drawn at income level of the poorest German percentile.

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3. Predicting income from knowledge of country of residence only

Using the just-discussed data, we can express income level of people belonging to percentile *i* living in country *j*, as follows:

$$y_{ij} = b_0 + b_1 m_j + b_2 G_j + \varepsilon_{ij} \qquad (2)$$

where y_{ij} = annual average household per capita income in \$PPP, m_j = country's GDP per capita in PPP terms, G_j = inequality in income distribution obtained from household surveys and measured by the Gini coefficient, and ε_{ij} = the error term. Both variables on the right-hand side are strictly exogenous to an individual effort: by her efforts, a person cannot affect, in any meaningful way, her country's level of GDP per capita, nor change her country's Ginis. [11] This is both substantively important for

[11] If the regression contained individual circumstances (like gender, race, age) which can plausibly be correlated with effort, the assumptions regarding how efforts enters

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our analysis and econometrically convenient. It should be also noted that our objective here is not a precise "explanation" of income level of each country/percentile (which could be improved if we used more explanatory variables) but rather to find out how much of global income variability can be accounted for by an extremely parsimonious formulation where just a few, undeniable country-specific variables, are used. We use GDP per capita instead of mean income from household surveys in order to avoid "the reflexivity problem" whereby the coefficient on the mean (b_1) would be biased toward 1. [12] This would happen because the arithmetic average of percentile values, which are our dependent variables, is equal to the mean. [13]

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individual income-formation equation such as (1) would matter.

[12] I owe this point to a referee.

[13] The coverage of income or consumption in household surveys is much narrower, since it pertains to the household-sector, than the coverage of GDP. In almost all

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Two specification issues need to be addressed. First, we need to decide whether the regression will take into account countries' population sizes or not. (Notice that Figure 1 implicitly treats population sizes of all countries as same.) Two different points of view are possible. If a person looks at, say, her own income only and asks the question "how well would I have fared had I been born or lived in a different country", then population sizes of countries do not matter. A person simply looks at her current income and compares it with the income that she might have if she were in a given percentile of income distribution in the United States or China etc. From that individual viewpoint, population sizes of China, US or any other country are immaterial. We shall call this approach the "individual viewpoint" (IV). But if we want to look at how the actual world is structured, then clearly population size matters. We call this second approach "the world as it is" (WAII).

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cases, household survey mean is lower than GDP per capita (see e.g., Deaton, 2005).

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Second, in order to test the robustness of the results –in particular, the importance of country of residence for determining individual incomes—we shall use several proxies in addition to our "base case" variable, GDP per capita. Thus we replace GDP per capita by the average number of years of education of the population over the age of 15 (*AYOS*). [14] Education is a strong proxy of average income, but is, of course, a distinct variable. An alternative is to run a simple LSDV (Least Square Dummy Variable) regressions where country dummies replace both the mean income variable and Gini. Here we do not retrieve an overall income coefficient valid across the countries but a coefficient on each country dummy which gives us a "location premium" or "penalty" enjoyed by a country (with respect to one worldwide comparator-country). We also focus on whether such a simple regression explains enough of variability of individual income percentiles across the world.

[14] Data obtained from the 2012 version of World Bank World Development Indicators, in turn partially based on Barro and Lee dataset.

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Table 2 shows the results for the two scenarios (unweighted, IV, and population-weighted, WAII) and three specifications.

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Table 2. How one's income depends on circumstances
(dependent variable: natural log of household per capita income in $PPP for each country/percentile)

	Individual viewpoint (unweighted regressions)			"World as it is" (population-weighted regressions)		
	GDP per capita (in logs)	Average number of years of schooling	Country dummies	GDP per capita (in logs)	Average number of years of schooling	Country dummies
	1	2	3	4	5	6
Proxy for mean	0.868	0.335	----	1.011	0.408	---
country income	(0)	(0)		(0)	(0)	
Gini index (in %)	-0.015	-0.013	---	-0.012	-0.015	---
	(0)	(0)		(0)	(0.14)	
Constant term	0.800	5.779	5.220	-0.711	5.250	5.288
	(0.02)	(0)	(0)	(0.28)	(0)	(0)
Country dummies	---	----	Yes	---	---	Yes
Number of observations	11483	9083	11683	11483	9083	11683

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Number of countries (clusters)	115	91	117	115	91	117
Population weight (in million)	---	---	----	6,133	5,711	6,139
R^2	0.660	0.481	0.733	0.610	0.534	0.657

Note: The regressions are run with the cluster option to adjust for the correlation of within-country observations. In the base-case regressions (1) and (4), there are 115 countries, each with 100 percentiles with the exceptions of Switzerland where the bottom 13 percentiles are missing and Lithuania where 4 percentiles are missing. For two countries (Palestine, Kosovo) there are no data on GDP per capita in PPP terms and they are not included in regressions (1) and (3). For Singapore, we do not have micro data and the country is not included. *p* values between brackets ("0" indicates significance at the level smaller than 0.000). All income variables are in 2008 international dollars. Coefficients on country dummies in regressions 3 and 6 not shown here.

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We consider first the "individual viewpoint" scenario. In the base case (regression 1) elasticity of own income with respect to country's GDP per capita is 0.866. We can call this "the locational premium". Gini coefficient enters with a negative sign, indicating that living in a more unequal country does, on average, reduce one's income. One Gini point increase is associated with 1.5 percent decrease in own income. This reflects the fact that higher inequality numerically benefits fewer people than it harms.[15] Overall, these two circumstances explain 2/3 of variability of individual percentile incomes across the world.

[15] As we shall see below, greater inequality has differential impact depending on where one is in her country's distribution: it benefits richer income classes (whose income goes up) and harms lower income classes (whose income declines). Overall, there are more of the latter and that is why in regressions such as (1) the coefficient on Gini is negative.

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When we use the average number of years of schooling (regression 2), the results change: R^2 drops to 0.48 (the number of countries for which we have data also drops from 115 to 91). The increase of country's average educational level by one additional year of schooling is associated with an increase of individual incomes of more than 30 percent. When we include both *AYOS* and $AYOS^2$, the results (available from the author on request) show that the coefficient on *AYOS* decreases to about 0.25 (25 percent) while the one on $AYOS^2$ is positive but not statistically significant.

Finally, in regression 3, country dummies alone explain almost ¾ of variability of individual percentile incomes across the world. 117 countries are included in the regression. The omitted country dummy belongs to DR Congo (former Zaire) which is the poorest country in the sample, so that the coefficients on individual country dummies show the locational premium that a person, on average, obtains by being a resident of another country that DR Congo. For example, United States's locational premium is 355 percent, Sweden's 329 percent, Brazil's

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164 percent, Russia's 230 percent but Yemen's only 32 percent.

In regressions (4)-(6), we look at the results within the context of the "world as it is". As explained before, this gives us the importance of "circumstances" as actually experienced by the people in the world and thus more populous countries will matter more. The results of population-weighted regressions are not very different from the unweighted. The elasticity of own income with respect to GDP per capita is close to 1, and greater inequality (controlled for income) reduces more people's incomes than it raises. When we use *AYOS*, the locational premium, measured as returns to an additional year of (nation-wide) education, is now higher than in the "individual viewpoint" scenario indicating that more populous countries seem to benefit more from a given increase in the average educational level. When we use country dummies, the individual countries' locational premiums (computed with respect to being a resident of DR Congo) are unchanged. The key result, overall role of country circumstances, measured by R^2, ranges between 53 and 66 percent. In the

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"individual viewpoint" case, the bounds were wider, from 48 percent to 73 percent.

Is the importance of country of residence for one's income increasing or not? To answer that we calculate the standard inequality of opportunity index where people in the world differ by only one characteristic, the country of residence. [16] Global inequality of opportunity is then equal to the between-country component of an inequality statistic. Luckily, we have comparable data on global inter-personal inequality for six benchmark years in the period 1988-2008 and are able to calculate the between-country component. The sample size (countries included in the calculation) is basically the same for all benchmark years but the first. The population covered by the household surveys accounts for more than 90 percent of world population (in all years except 1988). All incomes are expressed in international (PPP) dollars.

[16] For a review of measurement of inequality of opportunity, see Brunori, Ferreira and Peragine (2013), and in particular their section 3.

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Table 3 shows the results of calculation of global inequality of opportunity using Gini and Theil (0) index. Both indexes display more or less steady decline (the exception is the period between 1998 and 2002) although the decline, measured by Theil, is more significant (almost 20 percent over the entire period) than measured by Gini (about 4 percent). This is due to the greater dependence of the Gini on the mode of the distribution. Between-country component as a share of global inter-personal inequality has also gone down over the same period, from accounting for 81 percent of the total to 70 percent. [17] Global inequality of opportunity due to the place of residence is, as seen in the importance of the between-country

[17] The share is shown only in terms of Theil. As is well known, the advantage of Theil over Gini in such decomposition is that it is additively decomposable. In addition, Theil (0) index has a feature, pointed out by Anand and Segal (2008, p. 85), that it is internally consistent: thus the elimination of all between-country inequality would leave within-country inequality component uncharged which is not the case with Theil (1) index.

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component, huge but decreasing. The decrease is, in turn, driven by rapid growth of relatively poor and populous countries, and in particular China and India.[18]

Table 3. Global inequality of opportunity, 1988-2008

(between-country component of global inter-personal inequality)

	Benchmark year					
	1988	1993	1998	2002	2005	2008
(1) Between-country Gini	62.4	62.1	61.7	63.0	61.5	59.8
(2) Between-country Theil	86.2	79.2	76.4	77.3	76.6	67.7
(3) Global inter-personal Theil	107.0	104.9	103.5	104.9	104.2	98.3
(4) Share (in percent) of between-country in total inter-personal inequality (2)/(3)	81	76	74	74	74	70
(5) Population included in calculation (in m)	4477	5146	5427	5795	5917	6142
(6) Included population as % of world population	88	93	92	93	92	92
(7) Number of countries	100	119	121	119	119	118

Note: Between-country component is population-weighted. Theil is Theil (0) or mean log deviation index. Both Gini and Theil are given in percent.

[18] See, for example, Milanovic (2012).

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In conclusion, whatever scenario or specification we select, at least around one-half of variability in real ($PPP) personal percentile incomes in the world can be attributed to two circumstances beyond individual control—namely level of development of one's country of residence, proxied by its GDP per capita or average number of years of education, and inequality of distribution within that country. When we replace both the income proxy and the Gini coefficient by country dummies, reflecting all unobservable country characteristics, the R^2 ranges between 66 and 73 percent. The part which remains for effort and "episodic luck" (to use John Roemer's felicitous phrase) is, within worldwide context, relatively limited. This is true in 2008 despite a steady erosion of the importance of between-country component in global inter-personal inequality.

4. The locational premium across different income classes

By construction the location premium was so far assumed to be equal across all percentiles of income

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distribution, *i.e.*, the same for a given country regardless of person's place in her country's income distribution. But the locational premium need not be uniform across the entire distribution: it may vary between different parts of the distribution. To make the analysis more manageable here, we use income ventiles (each ventile contains 5% of population, ranked from the poorest to the richest).

Table 4 shows the results of regressions similar to (1) but with person's own income ventile held constant.[19] For each ventile separately, we regress ventile income on country's GDP per capita and Gini coefficient. These two characteristics explain about 90 percent of the variability of income. To be clear what it means: if we take all people who are in a given ventile of their countries' income distributions (say, 3rd or 10th ventile) some 90 percent of variability of their incomes will be "explained" by GDPs per capita and Gini coefficients of the countries where they live. In other words, the average income of the people in

[19] Table 4 gives only the results for the unweighted regressions. Population-weighted regressions ("the world as it is") are given in the Annex.

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each ventile will largely depend on mean income of their country and its distribution. [20] The locational premium now varies across ventiles: it is relatively low for the bottom ventile (0.769), after which it rises and at the maximum reaches around 0.88. This means that while the locational premium holds for everyone (people in any ventile are better off if living in a richer than in a poorer country), the premium is less for those in the lowest ventiles of income distribution.

The two country characteristics (mean income and inequality) can also be seen as substitutes: given her income class, a person might gain more by being "allocated" into a more equal society even if its mean

[20] Note that we expect R^2 to be higher when we hold ventiles fixed than when, as in Table 3, we run regressions across all country/percentiles at once. In the former case, we compare only (say) the poorest people in poor and rich countries, and in such a case, country characteristics will be of an overwhelming importance. When we have all country/percentiles together, the rich people from poor counties will "mix" with poor people from rich countries and the role of circumstances will be less.

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income is less. Intuitively, we can also see that if a person is "allocated" to a top income class, then the gain from belonging to a more equal society will be negative. Thus, the trade-off between mean country income and inequality is not the same across income classes. If we look at the bottom income class (as in regression 1 in Table 4), we see that each Gini point increase is associated with 5.75 percent loss of income (greater inequality, with given mean income, will harm the poor). Now, to exactly offset this, a person in the bottom ventile would have to be located in a country whose GDP per capita is about 7.5 percent higher (5.75 divided by the coefficient on mean income in regression 1 which is 0.769). This is the shape of the trade-off faced by those in the lowest ventile. For the second lowest ventile, GDP per capita increase needed to offset one Gini point higher inequality is 5.3 percent.

The "equivalent" GDP per capita increases gradually decline as we move toward higher ventiles and become close to zero around the 16th ventile (see Figure 2). People belonging to the 17th ventile and richer benefit from increased inequality. The trade-off for them works in the opposite direction. To leave them with the same income,

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more unequal national distribution (from which they gain) has to be combined with lower GDP per capita (from which they, like everybody else, lose). For the top ventile, we see that each Gini point change is offset by about 3.2 percent change of GDP per capita in the opposite direction. In other words, for the nationally rich, national distribution matters, but it matters less than for the poorest.

The importance of change in national income distribution (represented by 1 Gini point increase or decrease) displays a U-shaped pattern with a substantially higher left end, as shown in Figure 2. Those for whom national inequalities are important are either those at the bottom who gain from lower inequality, or those at the very top who gain from higher inequality. For those around the middle (ventiles 13 to 18), equality or inequality of national income distributions matters very little because their income shares are about the same in both equal and unequal countries (on this point, see also Palma, 2011). Thus for

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them, the mean income of the country where they live is of crucial importance.[21]

All of this leads us to two conclusions. First, while everybody (the poor, middle class and the rich) benefits from higher mean income, that benefit is proportionately greater for the rich classes. Second, distributional change matters to the poor and to the rich (in the opposite directions, of course) while it is of little importance to the middle class. What seems to matter to the income of the middle class is whether the county is getting richer or poorer---not whether it is becoming more or less equal.

[21] This can be also seen from the fact that the regression coefficient on Gini for ventiles 14-18 is not statistically significantly different from zero (Table 4).

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Table 4. Explaining a person's position in the world income distribution—given her own national income class (ventile)

(dependent variable: natural log of household per capita income in $PPP, year 2008)

(unweighted regressions; "individual viewpoint")

Income class	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
GDP per capita (logs)	0.769	0.830	0.845	0.857	0.865	0.871	0.873	0.878	0.881	0.880	0.885	0.883	0.886	0.886	0.886	0.886	0.885	0.882	0.876	0.862
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Gini	-0.058	-0.044	-0.038	-0.033	-0.030	-0.027	-0.024	-0.021	-0.019	-0.016	-0.014	-0.011	-0.008	-0.006	-0.003	-0.0001	0.003	0.007	0.013	0.029
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0.02)	(0.10)	(0.35)	(0.92)	(0.36)	(0.04)	(0)	(0)
Constant	1.879	1.294	1.098	0.975	0.882	0.809	0.773	0.719	0.680	0.663	0.615	0.611	0.588	0.578	0.571	0.562	0.564	0.575	0.401	0.764
	(0)	(0)	(0)	(0)	(0.01)	(0.02)	(0.03)	(0.04)	(0.05)	(0.06)	(0.08)	(0.08)	(0.09)	(0.10)	(0.10)	(0.11)	(0.10)	(0.10)	(0.25)	(0.03)
Adj. R^2	0.90	0.91	0.91	0.91	0.91	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.89	0.89	0.89	0.89	0.87
No of obs.	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
F value	517	550	45	541	528	520	519	509	502	507	501	503	494	492	487	483	478	473	450	376
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)

Note: GDP per capita in $PPP. *p*-values between brackets.

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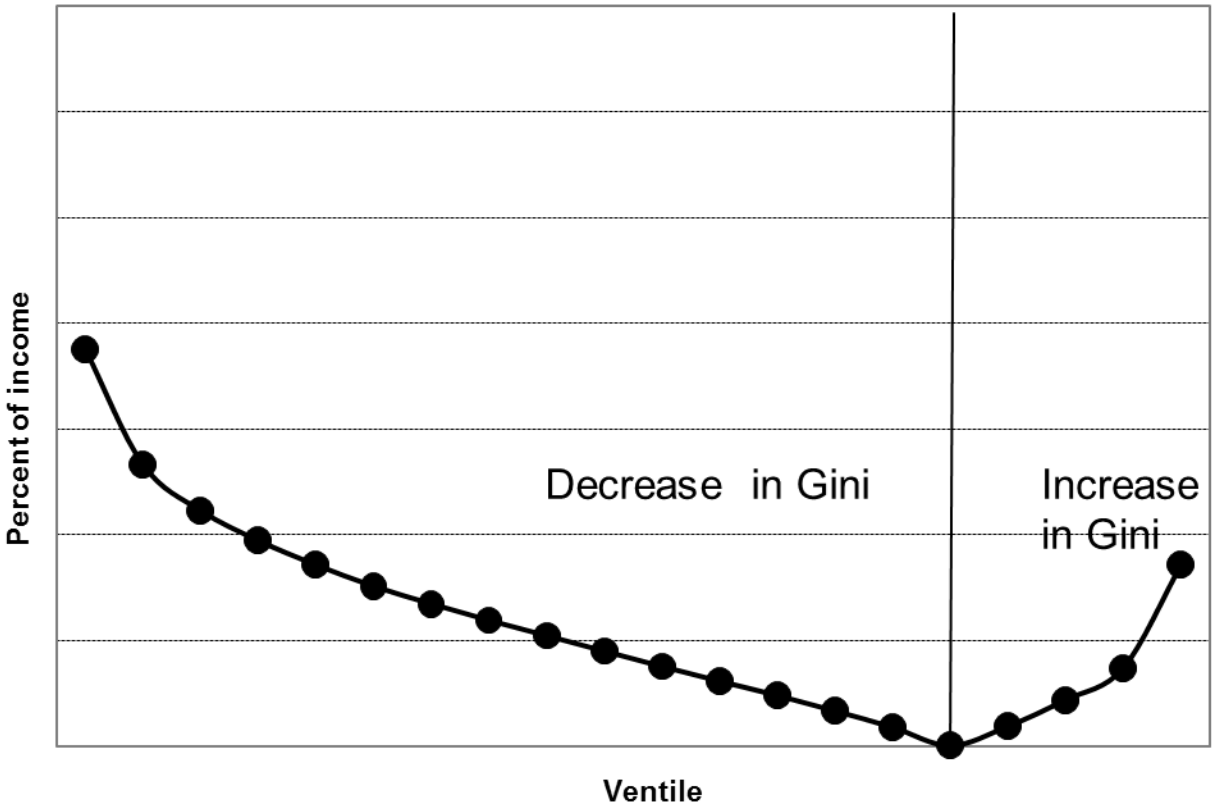
Figure 2. How much is one Gini point change worth

(measured in terms of mean country income)?



Note: Calculated from Table 4.

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5. Conclusions

We shall present the conclusions first in a form of a metaphor, and then list them specifically.

A metaphor. Imagine global income distribution as a long pole, similar to a flag-pole, on which income levels (percentiles) are marked from the bottom, around the subsistence minimum of some $PPP 200-300, to the maximum household per capita income of almost $PPP 200,000. Imagine then each country's distribution to be given by a plaque, running along the pole, and covering the range of that country's income distribution by percentiles: India's plaque, for example, will run from $PPP 250 to $PPP 7,000. Korea's, from $PPP 1,600 to $PPP 80,000, that of the United States from $PPP 2,500 to $PPP 180,000. When a person is born, she gets pinned down to a place on her country's plaque which not only gives her position in national income distribution but also locates her in global income distribution. How can she improve her position? Effort or luck may push her up the national plaque. But while effort or luck can make a

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difference in individual cases, they cannot, from a global perspective, play a very large role because more than one-half of variability in income globally is "explained" by circumstances given at birth. She can hope that her country will do well: the country's plaque will then move up along the global pole, carrying as it were the entire population with it. If she is lucky enough, so that her effort (movement higher up along the plaque) is combined with an upward movement of the plaque itself (increase in national mean income), she may perhaps substantially climb up in the global income distribution. Or—a last possibility—she might try to "jump ship", to move from a lower plaque (poorer country) to a higher one (richer country). Even if she does not end up at the high end of the new country's income distribution, she might still gain significantly. Thus, own efforts, hope than one's country does well, and migration are three ways in which people can improve their global income position.

Let us now go back to the conclusions, more conventionally stated. First and most important, with only one or two circumstances, GDP per capita and income inequality of country of residence, or simply with country

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dummy variables, we are able to account for more than one-half of variability in personal percentile incomes around the world (in only one formulation, is R^2 just marginally less than one-half). The finding holds whether we run regressions simply across countries, or use population weighting. Other features (gender, race, or ethnicity), which are not included in the analysis, would increase the share of circumstance. The role of place of residence calculated here is therefore a lower bound to global inequality of opportunity. The locational premium is very large: compared to living in the poorest country in the world (DR Congo), a person gains more than 350 percent if she lives in the United States, more than 160 percent if she lives in Brazil, but only 32 percent if she lives in Yemen.

Second, the ability to "predict" well a person's income from only these two *country* characteristics holds also for each income class separately. Thus –given income class of a person (her country/income ventile)—the knowledge of the country where that person lives is sufficient to explain about 90 percent of variability of incomes globally. The locational premium is positive for the entire spectrum of national income distributions.

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Third—again given person's own income class—there is a trade-off between GDP per capita of the country and its income distribution. Thus, a person who is in a low income class might prefer to be live in a more egalitarian country even if that country's GDP per capita is less. The opposite, of course, holds for a person in a high income class: she might benefit from a country's inegalitarian distribution more than from its high GDP per capita. But these sharp trade-offs between national inequality and mean income hold mostly for the extreme income classes. For the middle classes, national distribution is relatively unimportant—because income shares of the middle ventiles do not vary much across nations, whether the nations are equal or not. For the middle classes, therefore, mean income of the country where they live will be the key factor in determining their own income level.

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doi:10.1162/REST_a_00432

REFERENCES

Anand, Sudhir and Paul Segal (2008), "What do we know about global inequality?", *Journal of Economic Literature*, vol. 46, No. 1, pp.

Berry Albert and John Serieux (2007), "World economic growth and income distribution, 1980-2000" in *Flat World, Big Gaps* (2007), edited by K.S. Jomo and Jacques Baudot, Hyderabad, India, London; UK and New York, US; Penang, Malaysia: Orient Longman, Zed Press and Third World Network, pp. 1-23.

Bourguignon, François and Christian Morrisson (2002), "The size distribution of income among world citizens, 1820-1990", *American Economic Review*, September, pp. 727-744.

Bourguignon François, Francisco H.B. Ferreira and Marta Menéndez (2007), "Inequality of Opportunity in Brazil", *Review of Income and Wealth*, vol. 53, pp. 585–618.

Brunori, Paolo, Francisco Ferreira and Vito Peragine (2013), "Inequality of opportunity, income inequality and

Review of Economics and Statistics Just Accepted MS.
doi:10.1162/REST_a_00432

economic mobility:some international comparisons", World Bank Policy Research Working Paper 6304, January.

Deaton, Angus (2005), "Measuring poverty in a growing world (or measuring growth in a poor world)", NBER Working Paper 9822, *Review of Economics and Statistics*, vol. 1, pp. 1-19, February 2005.

Frick, Joachim, Jan Goebel, Edna Schechtman, Gert G. Wagner and Shlomo Yitzhaki (2006)," Using Analysis of Gini (ANOGI) for Detecting Whether Two Subsamples Represent the Same Universe: The German Socio-Economic Panel Study (SOEP) Experience", *Sociological Methods and Research*, Vol. 34, No. 4, May, pp. 427-468.

Jackson, Ben and Paul Segal (2004), "Why inequality matters", A Catalyst working paper, Catalyst: London, UK.

Milanovic, Branko (2002), "True world income distribution, 1988 and 1993: First calculations based on household surveys alone", *Economic Journal*, vol. 112, No. 476, January, pp. 51-92.

Review of Economics and Statistics Just Accepted MS.
doi:10.1162/REST_a_00432

Milanovic, Branko (2005), *Worlds Apart: Global and International Inequality 1950-2000,* Princeton University Press.

Milanovic. Branko (2012), "Evolution of global inequality: from class to location, from proletarians to migrants", *Global Policy*, vol. 3, No. 2, May, pp. 124-133

Milanovic, Branko (2011), "Global inequality recalculated and updated: the effect of new PPP estimates on global inequality and 2005 estimates", *Journal of Economic Inequality*, 2011. Published online 16 November 2010.

Palma, José Gabriel (2011), "Homogeneous middles vs. heterogeneous tails, and the end of the 'inverted-U': the share of the rich is what it's all about", Cambridge Working Papers in Economics (CWPE) 1111. Available at http://www.econ.cam.ac.uk/dae/repec/cam/pdf/cwpe1111.pdf . Forthcoming in *Development and Change,* vol. 42, No. 1.

Ozden, Caglar, Christopher Parsons, Maurice Schiff and Terrie Walmsley (2011), "Where on Earth is Everybody? The Evolution of Global Bilateral Migration 1960-2000," *World Bank Economic Review,* vol. 25, no.1, pp. 12-56.

Review of Economics and Statistics Just Accepted MS.
doi:10.1162/REST_a_00432

Pritchett, Lant (2006), *Let their People Come*, Center for Global Development, Washington.

Ravallion, Martin (2000), "Should poverty measures be anchored to the national accounts?", *Economic and Political Weekly*, 34 (August 26), pp. 3245-3252.

Rawls, John (1971), *A theory of justice*, Cambridge, Mass.: Harvard University Press. Revised edition published in 1999.

Rawls, John (1999), *The law of peoples*, Cambridge, Mass.: Harvard University Press.

Roemer, John E. (1998), *Equality of opportunity*, Harvard University Press.

Sutcliffe, Bob (2004), "World Inequality and Globalization", *Oxford Review of Economic Policy*, vol. 20, No. 1, pp. 15-37.

Review of Economics and Statistics Just Accepted MS.
doi:10.1162/REST_a_00432

World Bank (2008), *Global Purchasing Power Parities and Real Expenditures: 2006 International Comparison Program*, Washington, D.C.: World Bank.

Yitzhaki, Shlomo and Robert I. Lerman (1991). "Income Stratification and Income Inequality," *Review of Income and Wealth*, vol. 37(3), September, pp.313-329.

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Annex 1. Explaining a person's position in the world income distribution—given her own national income class (ventile)

(dependent variable: natural log of household per capita income in $PPP, year 2008)

(population-weighted regressions; "world as it is")

Income class	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
GDP per capita (logs)	0.849 (0)	0.949 (0)	0.981 (0)	1.000 (0)	1.011 (0)	1.023 (0)	1.029 (0)	1.040 (0)	1.038 (0)	1.042 (0)	1.045 (0)	1.045 (0)	1.045 (0)	1.043 (0)	1.042 (0)	1.039 (0)	1.035 (0)	1.028 (0)	1.017 (0)	0.980 (0)
Gini	-0.061 (0)	-0.045 (0)	-0.038 (0)	-0.034 (0)	-0.030 (0)	-0.026 (0)	-0.023 (0)	-0.016 (0)	-0.016 (0.01)	-0.013 (0.05)	-0.009 (0.16)	-0.005 (0.41)	-0.002 (0.75)	0.001 (0.86)	0.005 (0.51)	0.008 (0.26)	0.011 (0.10)	0.014 (0.02)	0.018 (0)	0.025 (0)
Constant	1.216 (0.01)	0.148 (0.78)	-0.190 (0.75)	-0.405 (0.51)	-0.556 (0.39)	-0.680 (0.30)	-0.772 (0.26)	-0.950 (0.21)	-0.945 (0.18)	-1.020 (0.15)	-1.100 (0.13)	-1.156 (0.12)	-1.191 (0.11)	-1.212 (0.10)	-1.224 (0.10)	-1.211 (0.10)	-1.169 (0.10)	-1.077 (0.12)	-1.155 (0.08)	-0.349 (0.56)
R^2	0.92	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
No of obs.	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115	115
F value	390 (0)	368 (0)	324 (0)	303 (0)	287 (0)	276 (0)	267 (0)	267 (0)	257 (0)	266 (0)	268 (0)	267 (0)	261 (0)	253 (0)	246 (0)	243 (0)	239 (0)	239 (0)	231 (0)	205 (0)

Note: GDP per capita in $PPP. *p*-values between brackets ("0" indicates significance at the level smaller than 0.000).