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The Vast Majority Income (VMI): **A New Measure of Global Inequality**

By Anwar Shaikh and Amr Ragab

Introduction

GDP per capita is by far the most popular measure of international levels of development. It is fairly well understood and widely available across countries and time. But it is also recognized that GDP per capita is an imperfect proxy for important factors such as health, education and well-being. An alternative approach has been to work directly with the variables of concern, as in the UNDP Human Development Index (HDI). The HDI combines GDP per capita with life expectancy and schooling into a single composite index. But, the HDI is difficult to compile. Moreover, because it is an index, it cannot tell us about the absolute standard of living of the underlying population: it can only provide rankings of nations at any moment in time and changes in these rankings over time.

It turns out that the rankings produced by the GDP per capita and the HDI are quite highly correlated. Given that GDP per capita also provides an absolute measure of income; it is understandable that it remains so popular. Both the GDP per capita and the HDI measures suffer from that fact that "they are averages that conceal wide disparities in the overall population" (Kelley, 1991). As a result, it becomes necessary to either supplement these measures with information on distributional inequality as in the Gini coefficient, or to directly adjust GDP per capita and other variables for distributional variations.

Sen (1976) derives (1-Gini) as the appropriate adjustment factor for real income. Since a higher inequality implies a lower (1-Gini), this penalizes regions or countries with higher inequalities. The 1993 HDI used this procedure to adjust GDP per capita in various countries. Subsequently, it was extended to encompass the variables in the HDI using discount factors based on the degrees of inequality in their specific distributions. Later, the index incorporated gender-based adjustments by discounting a country's overall HDI according to the degree of gender-inequality (Hicks, 2004).

The above measures of welfare will be re-examined in light of our own finding that inequality-discounted GDP per capita can be interpreted as a measure of the relative per capita income of the first seventy per cent of a nation's population. This Policy Research Brief introduces a new measure of worldwide income and inequality, which we call the Vast Majority Income (VMI).

The Vast Majority Income: a Combination of Income and Inequality Information

As indicated above, GDP per capita has the great virtue of being an absolute measure of average national income. But, because the distribution of income and consumption can be highly skewed within countries, we cannot use average income as representative of the income of the vast majority of the population. This is particularly true in the developing world, where there can be a large discrepancy between the two incomes. Indeed, a rise in GDP per capita can be attended by a worsening in the distribution of income, so that the standard of living of the vast majority of the population may actually decline even as GDP per capita rises.

Consider an example in which there are five people with dollar incomes of $5, $10, $15, $20, and $50, respectively. The per capita income of the vast majority that is the first 80 per cent of the population is the average of the first four incomes, which is $12.5 per person. By comparison, the overall average is $20. Their ratio is 0.625 (= $12.5/$20), which tells us that GDP per capita is a poor proxy for the vast majority income or VMI. Moreover, if this ratio varies over time, then the trend of GDP per capita would also be an unreliable guide to the progress of the VMI.

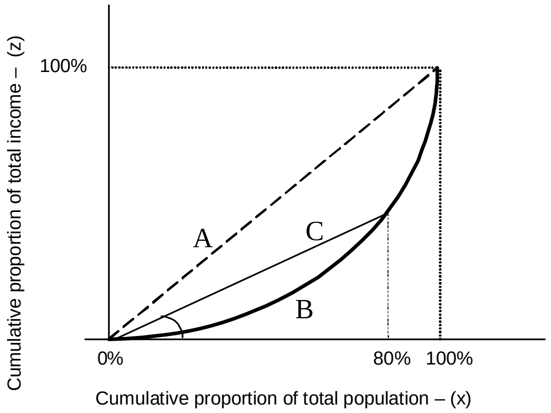
What we need, therefore, is a direct measure of the standard of living of the vast majority. As noted above, this can be derived directly from income distribution data, and has a simple representation on the Lorenz curve. The Lorenz curve is a plot of the cumulative population proportion (x) on the horizontal axis and the cumulative income proportion (z) on the vertical axis based on an ordered ranking of individual or group incomes. In our previous example, when individuals are ranked by income from the lowest to the highest, the first 20 per cent of the population (the first person) will have five per cent of total income; the 40 per cent (the first two people) of the population will have 15 per cent of total income, and so on.

The resulting Lorenz curve will be therefore "bowed-inward" as in curve B below (Lampert, 2001, pp. 23-26). If instead all individuals had the same income, the resulting curve would be the 45-degree line A (the line of equality) in Figure 1 (next page).

One way to summarize the underlying degree of inequality is to divide the area between the 45-degree line of equality (line A) and the actual inequality curve (curve B), by the area under the line A. This is the Gini coefficient G (Lampert, 2001, pp. 26-27). Under complete equality the Lorenz curve would be on the 45-degree line, so that G = 0 per cent. At the other extreme, under complete inequality the first four people would have zero incomes and the last would have $100, so that the Lorenz curve would run along the x-axis until it jumped to 100 per cent of cumulative income at 100 per cent of the population. In this case the area below the curve would be the same as that under line A, so that G = 100 per cent. In general the Gini Coefficient lies somewhere between 0 and 100, with higher Gini's representing higher degrees of *inequality.*[1] It should be obvious that we could work equally well with (1-G) instead, which is a measure of *equality*. This is given by the area under curve B divided by the area below line A, so that a higher (1-G) represents a higher degree of equality.

Figure 1

The Lorenz Curve



As a ratio of two areas, the Gini coefficient does not have much intuitive appeal. Neither do other interpretations of it, such as "the expected distance between two randomly drawn incomes over twice the mean" (Subramanian, 2004, p. 7). Moreover, since the Gini coefficient only captures the degree of inequality but not the level of income, the two dimensions are typically presented separately. It is therefore useful to note that the ratio of the per capita income of any population subgroup to the average is a particularly simple and intuitive way of taking *both* dimensions into account.

Consider our previous example in which there were five people with incomes of $5, $10, $15, $20, and $50, respectively. Then in order to compute the per capita income of the vast majority, i.e. the first 80 per cent of the population, we average the first four incomes to get $12.5 per person, as compared to the overall average which is $20. The ratio of the vast majority income to the overall average (VMIR) is therefore 0.625 (= $12.5/$20). But we can also work backwards by first summing the cumulative income proportion of the first four quintiles (0.05 + 0.10 + 0.15 + 0.20 = 0.50) and dividing them by the corresponding cumulative population proportion (0.80) to get 0.625, which is also the ratio of the vast majority per capita income to the average. This is useful because the cumulative income proportion is the y-axis of the Lorenz curve and the cumulative population proportion its x-axis. Therefore, the vast majority income ratio (VMIR) is simply the slope of the ray through the origin to the point on the curve which represents 80 per cent of the population, which is the slope of the line C in Figure 1. Multiplying the VMIR by the average income per capita ($20) then gives us the actual level of the vast majority income per capita ($12.5). In this way we can use international income inequality data to calculate the VMIR and use the appropriate average per capita measure from national income accounts to calculate the level of the vast majority per capita incomes in any given year.[2]

The same procedure would obviously apply to the relative income ratio (IR) for any proportion of the population, such as the bottom quintile or decile.[3] But, we have chosen to focus on the per capita income of the vast majority (the first 80 per cent) of the population. This in part because average per capita income is often implicitly taken to be a proxy for the vast majority per capita income, and we wish to demonstrate that the two can differ markedly. It is also because the notion of the income of the vast majority has obvious political resonance in any modern political system, and we wish to explore such links in subsequent works.

Our distribution data is derived from the World Income Inequality Database published by the United Nations University and the World Institute for Development Economics Research. The data is quite mixed, and has uneven temporal coverage for earlier years and for most non-OECD countries. In this paper we use the largest consistent data on the distribution of Personal Disposable (PD) income we were able to construct for 69 countries (643 observations). To complement this, we use Net National Income per capita (NNIpc) rather than GDP per capita as the appropriate measure of average national income per capita. NNI is more appropriate because it includes the factor income accruing from the rest of the world but excludes depreciation (which should not enter into personal income).

A more detailed description of sources and methods is provided in Shaikh and Ragab (2007, Data Appendix).

International Variations in Absolute Vast Majority Incomes (VMI)

If the countries in our sample are ranked by their real NNIpc, Luxemburg ($37,736), Norway ($31,283) and the US ($28,153) will be at the top, and Ethiopia ($697) and Cambodia ($494) at the bottom. In Figure 2, we display the real VMIs for the same set of countries, with the countries listed in the same order (i.e. in rank order of their real NNIpc). As before, we have Luxemburg ($30,000), Norway ($22,000) and the US ($21,000) at the top end, and Ethiopia ($500) and Cambodia ($300) at the bottom. But now it can be seen that Norway's VMI is larger than that of the US, even though its NNIpc is smaller. Thus in terms

Figure 2

Real VMI Per Capita Across Countries, 2000 (Incomes Converted to US-$ using PPP-Exchange Rates)

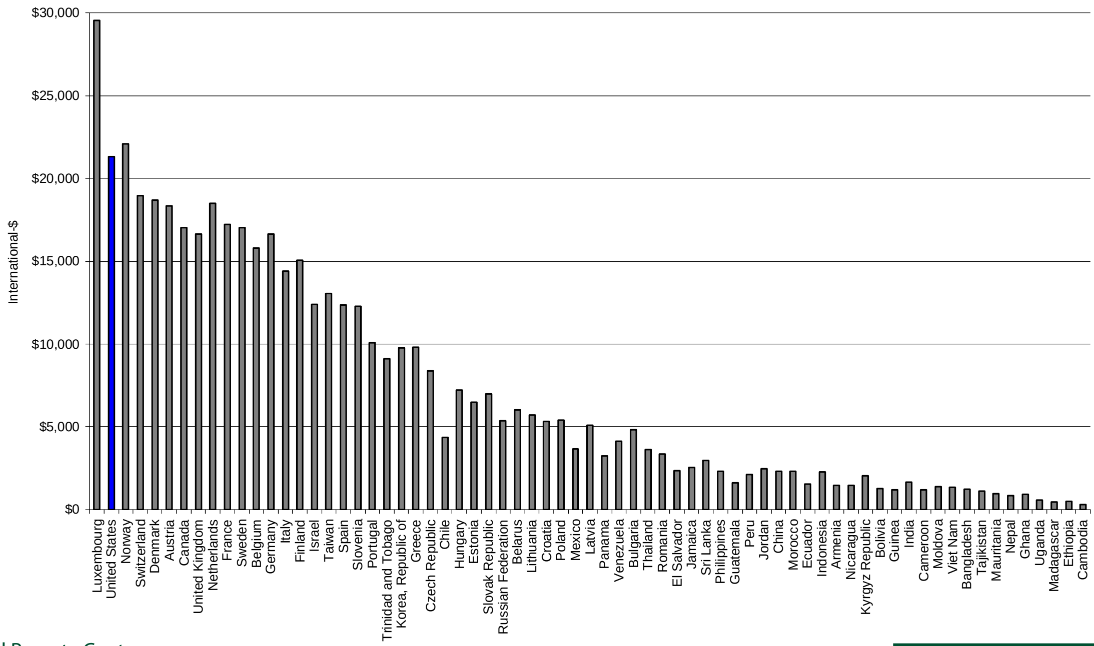
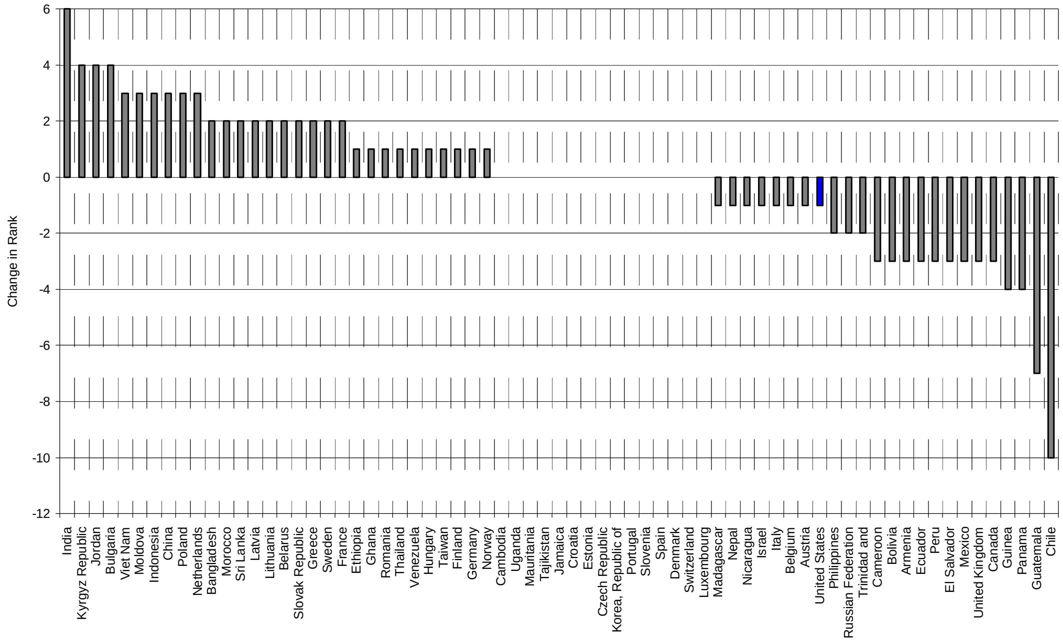


Figure 3

Change in Rank due to Using VMI instead of NNI



of VMI, Norway moves up to second place, and the US falls to third place. This is because the inequality of income is considerably higher in the US. Chile provides an even more striking example of the negative effects of inequality: in terms of the conventional measure of NNIpc, Chile is similar to Hungary; but in terms of the VMI, it is similar to Venezuela.

Figure 3 displays the differences between the two rankings (NNIpc rank – VMI rank). Countries are listed in order of this ranking difference. India appears at the top of this list because it moves up 6 places. Jordan and Bulgaria each move up 4 places, and Vietnam, the Netherlands and China each move up 3 places. At the other end, Mexico, the UK and Canada each fall 3 places. For instance, Canada is ranked 7th in the world in terms of NNIpc, but 10th in the world in terms of VMI. Thus it falls 3 places when we move from the former measure to the latter. Panama falls 4 places, Guatemala 7 places, and Chile appears at the bottom of the list because it falls 10 places.

Table 1 displays the coefficients of variation of average, vast majority (bottom 80 per cent) and affluent minority (top twenty per cent) per capita incomes. We find that the relative per capita income of affluent minority (AMI) has a considerably lower coefficient of variation (82 per cent) than the vast majority incomes (96 per cent). The rich, it seems, are more alike across nations than are the rest of their fellow citizens.

Table 1

Coefficients of Variation of Real Rer Capita VMI, AMI and NNIpc

	NNI	VMI	AMI
For the 69 countries in the Sample	89.4	95.9	82.2

Finally, it is useful to note that VMIR, the relative per capita income of vast majority, and (1-G), are both measures of equality which have the same bounds: zero per cent in the case of perfect inequality, and one hundred per cent in the case of perfect equality. The former is given by the slope of a ray C in Figure 1, while the latter is the ratio of the area under curve B divided by the area below line A. We might therefore expect that there would be some sort of relation across countries between these two measures. But our data reveals a particularly striking and surprising fact: *in every nation*, ranging from the richest country in our sample (Luxemburg) to the poorest (Cambodia), the ratio of the VMIR to (1-G) is almost exactly 1.1. Another way to put it is that the per capita income of the vast majority of the population is always equal to about 1.1 times its "inequality-discounted average income per capita": VMI = 1.1 (NNIpc) x (1-G). This "1.1 Rule" is shown in Figure 4 (next page).

In a more extensive work (Shaikh and Ragab, 2007) we demonstrate that the "1.1 Rule" also holds over time in all countries. We also show that a particular "econophysics" approach to income distribution, discussed by Dragulescu and Yakovenko (2001) can be used to predict both the level as well as the international and intertemporal constancy of the "1.1 Rule". Furthermore, we demonstrate that the relative per capita income of the bottom seventy per cent is essentially equal to (1-G) in every country. This provides a simple and intuitive meaning for (1-G), which is in effect the relative per capita income of the first seventy per cent of the population in any given country. In this light, the suggestions by Amartya Sen and Douglas Hicks that countries be compared in terms of their "inequality-adjusted average per capita incomes" (NNIpc (1-G)) turns out to be equivalent to comparing them in terms of the real per capita incomes of the first seventy per cent of the population. This is an intuitive and appealing common metric.

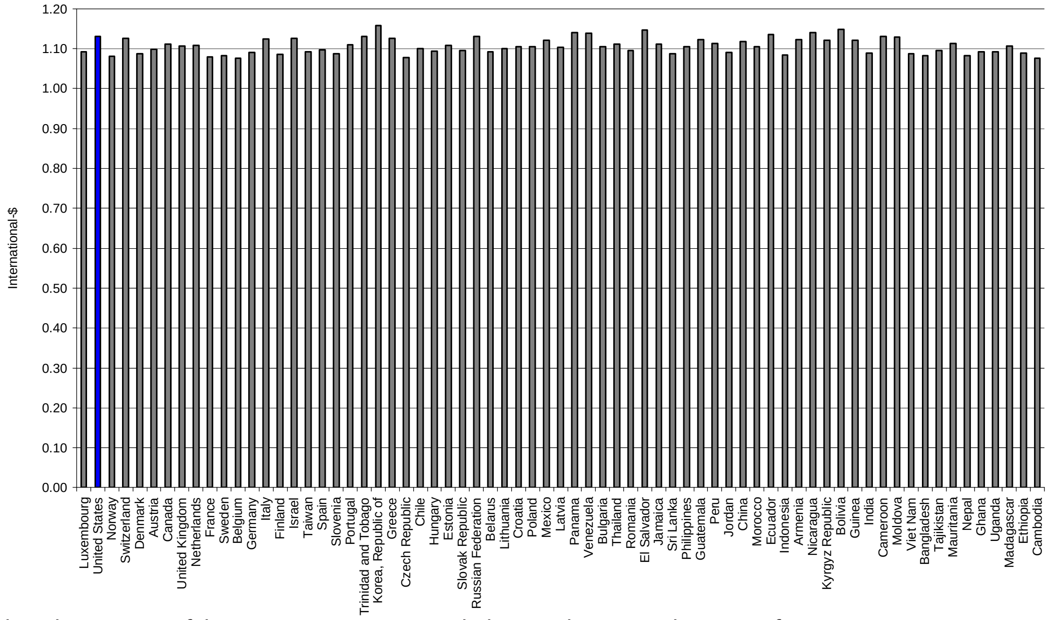
Conclusions and Policy Implications

Income levels and income inequality tend to be treated separately, the former through average per capita income measures such as GDP per capita and the latter through inequality measures such as the Gini coefficient. We demonstrate that the per capita income of any fraction of the population combines these two aspects in an intuitively useful manner. Of particular interest is the real per capita income of the vast majority or the first eighty per cent of any nation, which has obvious significance in making international comparisons.

Several interesting patterns come to the fore. For instance, per capita NNI and VMI both vary greatly across countries. Second, the variations are not proportional, because the ratio of VMI to NNI also varies considerably across countries. Thus average income measures are *not* good proxies for vast majority incomes. Indeed, ranking nations by the latter rather than the former can give rise to substantial differences in ranking. For instance, while Norway's real NNI per capita in 2000 is 10 per cent lower than that of the US; the real per capita disposable income of Norway's vast majority is 4 per cent higher. An even greater contrast exists between Mexico and Venezuela: Venezuela's real GDP per capita is 6 per cent lower, but its VMI is 13 per cent higher. Another interesting finding is that the incomes of the rich are more equal

Figure 4

VMIR/(1-G) Across Countries, 2000



across nations than the incomes of the vast majority. A particularly striking finding is that VMI/NNI = 1.1 (1-G) in every country in the sample, from the richest to the poorest. This means in every country the per capital income of the first 80 per cent of the population (VMI) is roughly equal to 1.1 times the "inequality-discounted average income" (NNI x (1-G)).

These results give rise to two broad policy conclusions and a research question. First, it is important to conduct international comparisons in terms of VMI or some similar measure of discounted real income per capita, because such a combination of the level of income and the degree of inequality places us on a common international scale. This validates the kinds of comparisons undertaken in the 1993 Human Development Report. Second, since the gross per capita income of any fraction of the population (except the very rich) depends directly on the product of GDP per capita and (1-Gini), both growth and inequality reduction (as measured by increases in (1 – Gini) contribute *equally* to improving the standard of living of the vast majority. Taxes and subsidies then appear as further means of adjusting the income distribution. Of course, this immediately gives rise to a perennial question: what is the relationship between economic growth and changes in inequality? Our measures and our theoretical results provide us with the means for taking a fresh look at this important debate.

This research is part of an ongoing project to analyze international inequality. International comparisons tend to focus on either the national average or the very poor (e.g. those living on less that $2 per day). The VMI adds a new dimension because it combines information on income levels and their distribution into a single measure, which is the per capita income of the vast majority of the population. We believe that this will ultimately shed new light on important issues such as the relationships between inequality and development. ■

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1. Since Lorenz curves can cross, it is possible to have curves with different distributions yielding the same Gini. Thus the Gini is not an absolute indicator of inequality.

2. The same procedure would apply equally well to the distribution of per capita consumption.

3. If we designate the population and income of the i[th] group (e.g. second quintile, or fifth decile, etc.) by X_i and Y_i respectively, and the corresponding totals across all groups by X, Y, then the cumulative population and income proportions from zero to the i[th] group are X_i/X and Y_i/Y respectively. But then the ratio $(Y_i/Y)/(X_i/X) = (Y_i/X_i)/(Y/X)$ = the per capita income of the i[th] group over the per capita income of the whole.

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