An Economic Development Index

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Key words: economic development, indices, income distribution, HDI.
JEL Classification: O10, O57

There is no consensus on what is the best definition of economic development or on the objectives that should be pursued. In part, the difficulty stems from the fact that there exist many variables or combinations of variables, all having sufficient merits to serve as characteristics of

development. The only dimension that has prompted consensus and is almost unanimously accepted is income per capita.

The adoption of a definition of economic development is not a trivial matter; it can have consequences on the teaching of economics, the behavior of economists, their policy recommendations and, obviously, on the wellbeing of the population subject to their actions. For example, if texts teach that development means achieving a Pareto optimum, then generations of economists will act in oblivion of distributional considerations since Pareto criterion is compatible with any distribution. Or if development is defined within the Utilitarian philosophy of aiming at the greatest good for the greatest number of people, then slavery could be accepted or even promoted as a fair production factor.

It is convenient that a development definition have certain characteristics that will make it more acceptable and workable. One characteristic is that it be operational, meaning that it should be possible to use the definition in practice, that it not be extremely theoretical or abstract or devoid of empirical applicability. Another characteristic is that it be relative. This means that economic development should be measured or calibrated with respect to levels achieved by other countries; economic development is not an absolute concept but a relative one. Finally, the definition should be general and easily

acceptable, which implies that its construction combine the minimum number of elements, dimensions or variables; there is a direct relationship between the number of variables included and the loss of consensus.

Development Indexes

Many proposals have been put forth in the past to construct an index reflecting either human development or the level of well being. Some of these proposals didn't even include a measure of income per capita; for example, the Level of Living Index [Drewnowski and Scott (1966)] includes dimensions of nutrition, housing, health, education, environment, and others; or the Physical Quality of Life Index [Morris (1970)] which combines infant mortality, literacy rates and longevity.

The World Bank's favorite indicator is that referred to as the development diamond [see World Bank (2000), ch. 15], which combines four factors or dimensions: life expectation, primary school enrollment, access to safe water, and GDP per capita. Each one of these is assigned to one of the four axes (or half axes) of a cartesian coordinate. Once plotted, the four data points are linked by a line, thus resulting in a diamond shape. In this way each country's development diamond can be compared with the world average, or with

another country. It is, however, very difficult to portray a simultaneous ranking of countries using these diamonds. As to the dimensions involved, they are similar to those used by the United Nations index discussed below, except for the addition of access to safe water. The World Bank also has a specific index for poverty which it uses frequently, defined as the percentage of the population that lives with less than a dollar per capita a day.

In 1990 the United Nations Development Programme began regular publication of several indices in its annual Human Development Report. The first of these indices, and probably the most popular, is the Human Development Index, HDI. It combines three components or dimensions equally weighted: GDP per capita, life expectancy and a measure of the level of literacy. The level of literacy, in turn, is an average of the adult literacy rate (with a weight of 2/3) and the rate of enrollment in primary, secondary and tertiary education (with a weight of 1/3). [Adult literacy is the percentage of population age 15 or over capable of, with reasonable understanding, reading and writing some simple phrase about everyday life]. The three components that go into the index are first normalized to make them fall between zero and one before they are averaged.

Implicitly, the HDI defines development in terms of these three components; it is, however, designed to be more an indicator for human

development rather than an index for economic development. The inclusion of GDP per capita is not questioned but, from the economic point of view, it is possible to debate whether the other dimensions, longevity and the combination of literacy and enrollment rates, are the most adequate variables. Longevity simply represents the number of years lived but not their quality or productivity. Education and literacy are of course important, as many other variables, but why not then include, for example, an adequate job, an adequate house, or price stability, as desirable goals? Some criticisms of the HDI can be found in McGillivray (1991) who early on questioned both the composition and the usefulness of the HDI as a development indicator or as a measure for intercountry comparisons. A suggestion to complement the HDI with distributional aspects was put forth by Hicks (1997), involving the Gini coefficients in the calculation of the HDI, not only for income per capita, but also for the other two dimensions, educational attainment and longevity. Actually, a distributional adjustment had been tried in 1991 by multiplying the variable income per capita by one minus the Gini coefficient before averaging it with the education and longevity components [see UNDP (1998)].

Through the years, the HDI has undergone various modifications and methodological changes [see United Nations (2001)]. Some analysts believe that this can make its credibility suspect [see Qizilbash (2002)] and diminish

its usefulness for intertemporal comparisons. For example, at the beginning, in 1990, the literacy rate was used in the calculation of the educational attainment component of the HDI; in 1991 the variable years of education was added and averaged with the literacy rate; finally in 1995 the enrollment rate was substituted for years of education. Also, in 1990 income per capita above the poverty line had a weight of zero in the HDI; this was changed in the following year making the weight decrease with the level of income. The values used in the normalization of the variables so as to make them fall between zero and one, i.e., the maximum and minimum values (as will be explained below), were altered in 1994. Another modification made was in the methodology of the purchasing power parity used in measuring income.

In response to criticism in the sense that the three dimensions chosen for the HDI were incomplete and could leave out many important variables, or did not cover them inadequately, UNDP began publishing alongside the HDI a variety of indices, some with possible overlaps; for example, the Human Poverty Index One, HPI-1, for developing countries; the Human Poverty Index Two, HPI-2, for countries of the OECD, Eastern Europe and the CIS; the Gender Development Index, GDI; the Gender Empowerment Measurement, GEM; and the Technological achievement Index, TAI.

Economic Development Defined

Which variables or dimensions could we consider important in defining economic development? To approach this problem suppose that, to denote economic development, economists were instructed to choose one (and only one) variable. This could be done, for example, from the list shown in Table 1. Which would they choose? Most probably a high GDP per capita. Now suppose they were instructed to choose two (and only two) variables. Which would they choose? Most surely they would choose a high GDP per capita in first place, and in second place but with less consensus, a good income distribution. Assuming this is the case, we propose the following definition:

A country is economically developed if it has a high GDP per capita and a good income distribution.

In the definition, the adjectives 'high' and 'good' are set relative to other countries. In other words, how much is 'high' in terms of income and what is 'good' in terms of distribution, depends on international experience. The proposed definition can be justified from a theoretical point of view and can also find support in equity considerations; furthermore, it is parsimonious and, as will be seen below, operational.

Obviously, alternative issues or dimensions can always be proposed to be included in the definition, such as the other variables in Table 1 or elsewhere. Notwithstanding the fact that all these might be important issues, the definition must be limited to ease operability and preservation of consensus. In any case, a high GDP per capita and a good income distribution serve to satisfy many additional topics or are correlated with them.

That population used to evaluate the income distribution must be the same population that divides the GDP when calculating GDP per capita; that is, it refers to the population within the geographic boundaries of the country. This avoids the possibility that a country may improve its distribution by excluding certain groups from the population, for example, by excluding immigrants performing the less attractive chores.

The Task for Development Economics

If we accept that economic development implies achieving a high level of GDP per capita and a good income distribution, and that such qualifiers are relative, then the task for economists is to design policies and strategies to catch up with countries deemed developed, that is, with those having better

indices of income and distribution. In most cases, this will require a high growth in income per capita and an improvement in its distribution.

The way development has been defined here refers to a state. But to reach that state a process is required. The problem is that neither theory nor empirical evidence assure us that the movement in the income and distribution indicators should, or can, be monotonic, or if one or both indicators may go through a path where indicators deteriorate temporarily in order to make better progress later. For example, combining high growth with a setback in the distribution indicator.

It is generally easier to reach consensus about the need to maintain a high growth rate, than about maintaining a good distribution. The reason is that there are doubts about the possibility that the distribution may improve in parallel with increases in the level of per capita income. Kuznets (1955) stated his hypothesis whereby income distribution tends to deteriorate in the initial stages of development but improves in the final stages. However, other authors, such as Alesina and Rodrick (1994) or Persson and Tabellini (1994), more in the line of the new political economy, argue that an unequal income distribution sets in motion social and political forces that push for capital taxation with the aim of effecting redistribution or social spending but with negative consequences for investment and growth; in other words, an unequal

distribution tends to retard growth. For other authors [see Solimano (1999), Deininger and Olinto (2000)] a bad income distribution tends to generate social conflicts that may destabilize institutions reducing consumption, investment, and growth; the implication is that a bad income distribution is not sustainable. Barro (1999) finds that the empirical relationship depends on the level of income. Higher income inequality retards growth in poor countries but not in rich countries. In a way, this discussion revives the old debate between efficiency and equity put forth by Okun (1975). In the field of development, the Kuznets inverted U hypothesis plays a role similar to the Philips curve in the macroeconomics and monetary field. Both establish inverse relationships between important variables, as are income and distribution in the case of the Kuznets hypothesis and inflation and employment in the case of the Philips curve. Both were put forth in the middle of the previous century and initially enjoyed a great deal of uncontested empirical support that has weakened over time [see, for example, Stewart (2000)].

Country Ranking

One of the goals of constructing a definition is to be able to classify or rank countries by levels of economic development. In applying the definition we

will parallel the methodology employed in the computation of the United Nations Human Development Index. Therefore, we will first normalize the data for income and distribution and then take their arithmetic average. The HDI's methodology is simple, easy to understand and has been studied extensively. Though we are aware of alternative methods of normalization and weighing (for example, geometric versus arithmetic averaging), we find no compelling reason to depart from the HDI methodology. This will also make comparisons with that index more simple.

Normalized income will be

$$\frac{\log y_i - \log y_{\min}}{\log y_{\max} - \log y_{\min}} \qquad (1)$$

where y_i is the i-th country's GDP per capita and $y_{\max}$ and $y_{\min}$ are the maximum and minimum GDP per capita in the sample of countries. Income is taken in logs, as is done for the HDI, in order to weigh more heavily a fall in income compared to a rise of similar magnitude.

The Gini coefficient will be used to evaluate income distribution. This indicator was chosen because of its popularity and because it is regularly found in the World Bank and United Nations publications. It is true that the share of income accruing to different population quintiles is also an indicator

commonly found in these publications; however, it does not comply with Lorenz criteria and is less a summary measure when compared to the Gini.

The normalized Gini will be

$$\frac{100 - G_i}{100} \qquad (2)$$

where G_i is the Gini measured in percentage terms. If the Gini is not in percentage terms, that is, between zero and 100, but in decimals, then expression (2) will simply become $1 - G_i$.

Variables can be measured by diverse methodologies, for example GDP per capita can be measured at the going exchange rates, at purchasing power parity rates, etc., while the Gini can be calculated per home, per home per capita, per income earner, or for urban or national coverage. The attempts to establish the best method for international comparisons are ongoing but, perhaps, what matters most at this point is that all countries be measured with the same methodology.

Finally, and following what is customary for the HDI, the economic development indicator proposed here will be calculated as the arithmetic average of the previous normalized expressions for income per capita and the Gini

$$\frac{\frac{\log y_i - \log y_{min}}{\log y_{max} - \log y_{min}} + \frac{100 - G_i}{100}}{2} \qquad (3)$$

This formula can be used to rank countries as more or less developed. The quantitative distance between them will have no specific meaning inasmuch as the index produces only ordinal ranking. The country with the highest score will be the most developed, the second score will be the second most developed, and so forth.

To illustrate our indicator we shall use data from Deininger and Olinto (2000, p. 24) that is a subsample of the well-known data base from Deininger and Squire (1996) which was compiled for more than 100 countries. This subsample corresponds to 43 countries for which data on GDP per capita and Gini coefficients are contemporaneous and as recent as possible. Figures are shown in Table 2 for countries with data on income and Ginis available around 1990. For the calculations, the maximum and minimum values for income per capita are set at $y_{\max} = 17579$ and $y_{\min} = 529$. The resulting numerical calculation for the proposed index from expression (3) is shown in the last column in Table 2.

The reason the sample of countries is not as large as we would want is because data on Ginis are not readily available. On the one hand, not all countries calculate their Ginis regularly, or reliably, or with the same methodology; and on the other hand, some do not calculate them for income but for consumption, which hinders comparisons (the distribution of consumption tends to be more egalitarian than the distribution of income).

The first column in Table 3 shows the ranking of countries that results from the proposed index. The second column shows the ranking resulting from the HDI. And the last column in Table 3 shows the ordering that results from using only GDP per capita as an index. Since the income and Gini data taken from Deininger and Squire are dated near 1990, we also used 1990 HDI data (except for Germany which wasn't unified at the time, for which we use 1995 data); the United Nations Development Programme reconstructed HDI for previous years [see United Nations (2001, p. 145-148)] by applying the present day methodology to the past (remember that the HDI methodology has undergone various revisions).

Within the 43 country sample, and according to the proposed index, Norway is the most economically developed country. In contrast, Norway is sixth according to the HDI and third according to the GDP per capita. In some cases there is less difference, as in the case of Canada which is second

according to both the proposed index and the GDP per capita, but first according to the HDI. Finland is third according to the proposed index and eighth according to both the HDI and the GDP per capita. The United states, which ranks first on the GDP per capita scale and second on the HDI scale, falls to the eleventh place according to the proposed index. Unanimously, Uganda is the least developed country in the sample.

Conclusions

Constructing a definition of economic development is not only an intellectual exercise; it has also practical importance because such definition, if accepted, becomes the objective or the mission for economists, as well as a guide for the policies that they design and promote. In other words, economic policy may be very different depending on the adopted definition of economic development. Likewise, the orientation for the teaching of economics will depend on which definition gathers most consensus.

Simplicity and operability are desirable characteristics in a definition; the greater the number of variables or dimensions encompassed, the lesser the consensus and the higher the probability that it will sprawl beyond the scope of economics.

In this framework, and circumscribing to economics, the following definition was proposed: a country is economically developed if it has a high income per capita and a good income distribution. The qualifiers 'high' and 'good' are relative to world experience.

An index was constructed to implement and illustrate the definition with data on GDP per capita and Gini coefficients for a sample of countries. Interesting differences are found in the ranking produced by the proposed index when compared to rankings produced by the United Nations' HDI and the GDP per capita.

The discussion in the paper concerning the availability of data urges that a recommendation be made to multilateral agencies with some statistical coercive power in the world, such as United Nations, World Bank, or the IMF, to standardize and promote a common methodology for calculating Gini coefficients, much in the same way these institutions have been standardizing and promoting a common methodology for the GDP. This would help elevate income distribution as a issue to a level of importance similar to that already enjoyed by GDP per capita, and would allow timely calculations of economic development indicators with distributional dimensions.

Table 1

Without any particular order, the following is a list of concepts or variables that could possibly enter into a definition or an indicator for the economic development of a country:

stable job
well paid job
long life
life free of avoidable morbidity
low infant mortality
low inflation
high GDP per capita
adequate housing
good income distribution
good education level
adequate nutrition
free markets
civil liberties
care of the environment

Table 2. Calculation of the Proposed Index

COUNTRY	GDP/capita	GINI	GDP NORM	GINI NORM	PROPOSED INDEX
Australia	14343	38.7	0.942	0.613	0.777
Austria	11929	23.1	0.889	0.769	0.829
Bangladesh	1315	32.9	0.260	0.671	0.465
Bolivia	1667	42.0	0.328	0.580	0.454
Brazil	4226	56.8	0.593	0.432	0.513
Canada	16917	30.3	0.989	0.697	0.843
Ivory Coast	1409	38.5	0.280	0.615	0.447
Colombia	3206	51.2	0.514	0.488	0.501
Costa Rica	3381	44.0	0.529	0.560	0.545
Germany	13498	28.1	0.925	0.719	0.822
Denmark	13613	33.2	0.927	0.668	0.798
Spain	8738	26.9	0.800	0.731	0.766
Finland	13331	23.6	0.921	0.764	0.843
France	13221	30.9	0.919	0.691	0.805
England	12687	31.2	0.907	0.688	0.797
Greece	6498	35.2	0.716	0.648	0.682
Guatemala	2106	58.7	0.394	0.413	0.404
Honduras	1401	54.3	0.278	0.457	0.367
Indonesia	1784	32.5	0.347	0.675	0.511
India	1184	31.1	0.230	0.689	0.459
Italy	11845	34.0	0.887	0.660	0.774
Jamaica	2409	42.8	0.433	0.572	0.502
Jordan	3372	36.1	0.529	0.639	0.584
Japan	13124	36.3	0.917	0.637	0.777
Korea	5615	33.6	0.674	0.664	0.669
Sri Lanka	2050	38.4	0.387	0.616	0.501
Mexico	5457	55.0	0.666	0.450	0.558
Malaysia	4365	48.4	0.602	0.516	0.559
Netherlands	12272	29.4	0.897	0.706	0.802
Norway	14740	23.4	0.950	0.766	0.858
New Zealand	11634	37.2	0.882	0.628	0.755
Pakistan	1350	31.9	0.267	0.681	0.474
Panama	3111	56.5	0.506	0.435	0.470
Peru	2806	42.8	0.476	0.572	0.524
Philippines	1662	45.7	0.327	0.543	0.435
Portugal	6203	36.8	0.703	0.632	0.667
Sweden	14341	31.9	0.942	0.681	0.811
Thailand	3002	47.9	0.496	0.521	0.508
Tunisia	2756	40.2	0.471	0.598	0.535
Turkey	3462	44.1	0.536	0.559	0.548
Uganda	529	33.0	0.000	0.670	0.335
USA	17579	42.7	1.000	0.573	0.787
Venezuela	6321	47.7	0.708	0.523	0.616

Source: Columns COUNTRY, GDP/capita and GINI come from Deininger and Olinto (2000). Columns GDP NORM, GINI NORM and PROPOSED INDEX correspond to equations (1), (2), and (3) in the text.

Table 3. Economic Development Ranking According to Indices

PROPOSED INDEX	**HDI**	**GDP/capita**
Norway	Canada	USA
Canada	USA	Canada
Finland	Japan	Norway
Austria	Germany	Australia
Germany	Netherlands	Sweden
Sweden	Norway	Denmark
France	France	Germany
Netherlands	Finland	Finland
Denmark	Sweden	France
England	Austria	Japan
USA	Denmark	England
Australia	Australia	Netherlands
Japan	Italy	Austria
Italy	England	Italy
Spain	Spain	New Zealand
New Zealand	New Zealand	Spain
Greece	Greece	Greece
Korea	Portugal	Venezuela
Portugal	Korea	Portugal
Venezuela	Costa Rica	Korea
Jordan	Mexico	Mexico
Malaysia	Venezuela	Malaysia
Mexico	Panama	Brazil
Turkey	Jamaica	Turkey
Costa Rica	Colombia	Costa Rica
Tunisia	Malaysia	Jordan
Peru	Philippines	Colombia
Brazil	Thailand	Panama
Indonesia	Brazil	Thailand
Thailand	Peru	Peru
Jamaica	Sri Lanka	Tunisia
Sri Lanka	Turkey	Jamaica
Colombia	Jordan	Guatemala
Pakistan	Tunisia	Sri Lanka
Panama	Indonesia	Indonesia
Bangladesh	Honduras	Bolivia
India	Bolivia	Philippines
Bolivia	Guatemala	Ivory Coast
Ivory Coast	India	Honduras
Philippines	Pakistan	Pakistan
Guatemala	Bangladesh	Bangladesh
Honduras	Ivory Coast	India
Uganda	Uganda	Uganda

Source: PROPOSED INDEX from Table 2, HDI from United Nations (2001) and GDP/capita from Deininger and Olinto (2001).

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