

Measuring economic growth and development.

How we think about and define development shapes how we perceive the outcomes of different economies. Moreover, it is also going to affect the policies aimed at achieving some desired end. But what is the desired end?

There are two broad methodologies that we will consider in this lecture. The first is the economic growth criterion. According to this methodology, income per person serves as the gauge of progress. The alternative methodology posits that development is much more complex and multifaceted: income is not inclusive of all that matters for economic development.

Economic Growth

Economists use a nation's per capita income as a proxy for measuring the level of development and well-being. The rate of growth of income then serves as a measure of the progress over time.

Those who fall into this camp know that development is determined by much more than average income and growth rates. Dimensions from the economic in addition to the social and political arena also matter. And, each country will value different aspects from these dimensions and will have different vision for what a decent life entails.

Here you can see a list with various components of what some might consider a decent life.

The process of development is not simply about doing more of what is already being done. Less-developed nations are less-developed because of what they are doing: what they produce and export. Development requires structural change. Often this change is painful but bringing about new institutions and better-functioning markets is an essential part of the social and economic transformations that spur progress.

If development is so complex, why do so many economists simply use income as a proxy? Well.... it's simple...and convenient. Look, money is a unit of account which facilitates easy measurement of outcomes which can be monetized. The availability of data is one of the greatest barriers for understanding social and economic phenomena.

How would you measure and collect data, let alone compare or rank, some of the outcomes on this list?

While income is a far from perfect measure of development, there is some empirical evidence which supports the validity of income as a measure of development. Specifically, there exists a correlation between income and key measures of the broader aspirations of social, economic, and political progress. Essentially, the explanation is that many of these broader aspirations are easier to achieve with higher income levels.

Fortunately, data on income is widely available; however, the accuracy (and this is true of all data) is suspect despite efforts to unify methods of collection.

On the next slide you will find two links to publicly available, consistent and reliable series of data provided by the world bank.

Measuring economic growth

Economic growth as a proxy for development can be measured by either income or output. The two most common measures for income and output are Gross national income and gross domestic product.

Income flows between economies and GNI and GDP

Given the globalized world that we live in, GDP and GNI diverge. Reasons for the divergence are international corporate investment, financial flows including speculative hot money flows like those that contributed to the Asian Financial Crisis of 1997, and worker remittances.

The relationship between GDP and GNI depends on the sum of all income inflows into the country from the rest of the world less the sum of income leakages leaving the country and flowing to the rest of the world. The transactions which affect the difference between GDP and GNI are income flows, not the level of imports and exports. If the outflow of income exceeds the inflow, then GDP is greater than GNI. Conversely, if the inflow of income exceeds the outflow of income, then GNI is greater than GDP.

Adjusting GDP and GNI measures for population

The first adjustment is to account for population size. Divide either of these measures by the total population to arrive at a measure of per person income or average income.

Comparing the total GNI of China to that of Brazil is not very insightful in terms of their relative level of development. The total GNI of China and that of Brazil are essentially non-comparable values because of very distinct populations. However, dividing by the population gets us a little bit closer to understanding the average standard of living.

Per capita income is also useful for understanding changes over time. Particularly, how is income changing relative to the population.

The equation here calculates the rate of change of GNI per capita. The rate of change of GNI per capita is shown as the difference between the rate of growth of total GNI and the rate of population expansion. GDP can be substituted for GNI in the equation to determine the rate of change of GDP per capita.

The faster a country's population grows, the more important it is to generate higher rates of growth in total income.

This equation is a mathematical identity, it does not inform us of why income growth per capita is changing; rather, it indicates the consequences of changes in the specific rates of change in either total income or population.

The population adjustment to total income does provide some useful information on a nation's development process. Consider the case of China which has experienced rapid increase in per capita income reflecting massive strides in economic development across many other indicators.

Before advancing to the next slide, record the population, GDP, and GNI per capita of Brazil for the year 2010.

Adjusting GDP and GNI measures for changing prices

In the previous table, you were presented with the nominal values of total income. However, comparing a country's income over time may be misleading because of changing prices. The solution is to convert the nominal value of income to the real value of income.

The wealth of a society that economists wish to measure consists of what is produced in physical terms. But how do you add apples and oranges or bourbon and steak? Prices act as a common unit of measure, allowing us to add together quantities of goods and services that could not otherwise be totaled. Equation 1 shows how to calculate GDP: multiply the market price— P_i — of all the newly produced goods and services— Q_i — then sum across all goods and services.

While using prices as a common unit allows us to add apples and oranges or steak and scotch, it also presents us with another problem, prices change from year to year. If both the P_i 's & Q_i 's change, it conflates the change deriving from changes in physical production and those from variation in prices. How then, do we compare GDP over time? Essentially, what we want to measure are the Q_i 's independent of price changes. To compare across time independent of price changes, we will calculate the value of output in different years using the same prices—prices from a base year. Equation 2 shows us the real GDP for 2010 calculated at 2000 prices, that is 2000 is the base year. This is the real value of 2010 GDP stated in 2000 prices.

The table demonstrates the importance of adjusting for price variation. Compare the percentage change in GDP per capita and real GDP per capita. What do you notice?

During this period Mexico had the smallest percentage change of all countries presented. There are many reasons that Mexico's performance was dismal. One of the most important reasons was the transformation of Mexico into an export-based cheap-labor assembly operation. The transformation resulted from a path-dependent process that culminated in the North America Free Trade Agreement or NAFTA.

Excluding Kenya and Mexico, most countries did quite well. In fact, the period presented can be considered exceptional. There are many reasons, but two important explanations are a commodity boom and spillover effects from China's remarkable growth.

Accounting for income distribution

Income per capita does not actually represent the income of any particular person. It says nothing about the actual distribution of income.

To gain insight on the distribution we can divide the population into groups based off their income. the table decomposes the population into quintiles and presents the share of total income received by the poorest and richest 20% of the population. The first two columns show what percentage of total income was captured by the respective quintile. The third column shows the ratio of quintiles; the further this ratio is from 1 the more unequal the distribution.

We will return to this table again shortly. Before advancing to the next slide record the share of income captured by the richest and poorest 20% of the population in Brazil.

Calculating income inequality

In the previous knowledge check, you should have found that the per capita income of the richest 20% was \$31,000 while the per capita income of the poorest 20% was \$1,564. The top 20% receives 3 times the per capita income as determined using GDP per capita and 20 times the per capita income of the poorest 20%.

The stark differences in per capita income demonstrates the importance of having information on distribution, particularly if one wishes to use per capita income as a measure of development.

The final column in the table shows the GINI coefficient which is another measure of inequality: the GINI coefficient ranges from 0-100. The closer the value is to 0, the more equal the distribution.

GNI and GDP exclude production which occurs in the household. Household production, most often performed by women and children, is underestimated and ignored because these goods and services are not valued by or exchanged in the market.

Interestingly, women and girls spend more time in total hours per week at paid and unpaid employment than do men and boys. In less-developed economies, approximately 2/3rds of women's effort occurs in unpaid work. These invisible activities are estimated to be measured in the tens of trillions of dollars annually.

Growing a home garden does not contribute positively to GDP, but the production processes that spew toxic waste into the air and water does positively contribute to GDP; in fact, we even an added boost to output because the costs of cleaning up the waste and the additional expenditures on healthcare that result from these activities also contribute positively to GDP.

Last week you read about the millennium development goals. On the next slide you will have the opportunity to read about the sustainable development goals.

Sustainability seems to require a critical observation, pollution arises from poverty as well as affluence. How can we balance the need for continued economic growth, a more egalitarian distribution of income, and the urgency of protecting the natural environment?

Let me briefly summarize two polarized views: the first is virulently antigrowth and values all of nature and all species and all natural habit equally. Humans do not have any privilege in this view, which calls for a simple life with limited material wants. The other extreme views economic growth as the primary means for human development. The environment is simply an input, it is the means to increasing average incomes.

The concept of sustainability needs to extend beyond the environment to also include social structures like, distribution, gender issues, and racial tensions amongst many others.

Purchasing power parity

We attempted to find measures of development and well-being using income; we adjusted for both population and prices. Does \$420 of income provide the same standard of living in the United States as it does in Mexico or Kenya? Some tradeable goods may end costing about the same in different countries, but non-tradeable goods and services like housing or a visit to the Dr's office will diverge much more and tend to vary positively with a country's income.

The tables we saw previously were all measured in US dollars by simply multiplying the respective country's GDP, as measured in their own currency, by the official exchange rate.

Another way to compare income between countries is to use purchasing power parity.

Calculating GNI per capita using PPP values is similar to how we calculated real GDP per capita. Rather than use base prices from a certain year, we use base prices from a certain country. The equation presents the PPP GNI per capita of country M: $Q_{i,M}$ represents all the newly produced goods and services and $P_{i,US\$}$ are the US prices for those goods and services. This measure provides us the available goods and services available in country M valued at prices prevailing in the US.

If you were to compare GNI per capita at the official exchange rate to that calculated using PPP, the exchange rate measure understates, particularly for the less-developed nations, the purchasing power of incomes. This is compounded by the fact that less-developed nations have significantly greater household production which is not counted in official income measures.

Indicators Criterion of Development

Many have long argued that income is not a sufficient measure for a broader conception of development and its full range of objectives. Moreover, the link between income and these broad development objectives becomes more tenuous the poorer the nation.

Dating back to 1990 a composite index known as the Human Development Index or HDI has been gaining credibility and is published annually by the United Nations Development Program or UNDP. This composite index uses longevity, knowledge, and a decent of standard of living as representative indicators of development.

According to the UNDP: "Human development is about much more than the rise and fall of national incomes. It is about creating an environment in which people can develop their full potential and lead productive, creative lives in accord with their needs and interests. People are the real wealth of nations."

How income is spent affects well-being. I am referring to income spent by both individual and the government. The UNDP found that while 25% of income spent in less-developed nations came from the government, less than 10% was spent in categories which contribute to human development like education and healthcare; rather, a disproportionate share was spent on military which contributes very little to human development.

(animation of images now)

This table shows the value of the HDI and rankings for a variety of countries in 1990 and 2012. The HDI value of Mexico in 2012 is 0.775. The interpretation of this result follows: in 2012, Mexico had attained 77.5% of the maximum values possible on the individual components of the HDI- life expectancy, school enrollments, adult literacy, and PPP GDP per capita.

In the fifth column, you can see the difference between rankings of PPP GDP per capita and HDI. If this value is positive, then the income ranking understates the country's level of development. For example, the Philippines did better on the HDI measure than the income per capita measure. The converse is true of China.

You can also find in this table the Gender inequality index or GII which calibrates for different attainment levels between men and women on the indicators of the HDI. The greater the value of the GII, the greater the gender inequality is in that nation.

The HDI was criticized for not accounting for accessibility of the included indicators across socio-economic classes. In response, the UNDP introduced the Inequality-Adjusted HDI or IHDI which is included in the final columns. This measure attempts to account for unequal access to the components of the HDI and is expressed as a percentage.

Multidimensional poverty index

The HDI, while considering a much broader notion of development, does not directly account for the plight of the poorest members of society. The Multidimensional Poverty Index seeks to understand how people experience poverty by identifying how they are being left behind across the key dimensions of health, education, and standard of living which includes access to clean drinking water and sanitation. The lower the value of the MPI, the better the nation is doing at addressing poverty.

We have been introduced to several different indicators, all of which provide information which is relevant and important for evaluating development. However, like all measures, they are imperfect.

Awareness of the weaknesses of whatever measure you are presented with is critical as an economist who desires to make policy recommendations for progressive change.

The clash of economic growth and equity???

Would targeting components of development like education and health care or actively targeting poverty reduction adversely affect economic growth? Are growth and development at odds or complementary?

Many decades ago, the Nobel prize winning economist Simon Kuznets considered a broad indicator of equity: the relationship between income per capita and distribution. Trends in distribution can reflect the progress a nation is making towards broader goals of development. The logic of this inquiry is that if income inequality is deteriorating it is likely reflecting a structural problem.

Kuznet's research led him to conclude that there is a minimum level of income that a country must achieve before greater equity and higher levels of development can be obtained.

The image here shows the inverted u hypothesis known as the Kuznets curve. Using the GINI coefficient as the measure of inequality, it is presented on the vertical axis while income per capita is plotted on the horizontal axis. As a country poor country grows, the higher income will initially lead to greater inequality. However, once the threshold has been passed income inequality will begin to fall. Increasing inequality is the price to pay of rising per capita incomes. And, if this hypothesis is correct, growth and development are not rivals.

Statistical relationships do not infer causality. One explanation for this relationship is that as countries become richer, they increase expenditures on things like health, education, and social security which tend to reduce inequality. Even though we may observe changing expenditures, it is not given; rather, these changes are the result of social and economic movement and struggle to build institutions which protect the most vulnerable.

As we will discuss later this semester, many east Asian countries were able to simultaneously achieve higher levels of development and greater equality. But for now, that's a wrap on this lecture.