Economic Growth and Development

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Lecture – 18
Measuring Human Development-I

Hello and welcome to week 7 and lecture 18 of the NPTEL MOOCS course on Economic Growth and Development. In the last week we were introduced to the very basic concepts of human development. We saw how to define successful development, and we now have a very clear understanding of the fact that development need not necessarily be equated to growth of incomes. And to be able to define what is successful development; we need to enter into various other domains of human development primarily among them being domain such as education and health.

In the last week, we were also introduced to various frameworks which are required to contextualize defining successful development. We looked at normative and positive and predictive frameworks. And with the help of a number of case studies we also saw how a development is approached or how human development is approached. And we focused on the capabilities approach as put forward by a Professor Amartya Sen. In the last lecture of week 6 we also saw the differences between various approaches to development such as the utilitarianism approach, which is the dominant framework which is used in economics. We also looked at the basic needs approach which are basically the competitive approaches to human development. And we also made a case for why the human development approach is a significant improvement over the other approaches to development.

In this week we will look at the issue of Measuring Human Development. And various indices have been worked out through the human development reports brought out by the United Nations development programme. Primarily among them being the human development index. There have been various indices that have been worked out for various purposes. However, the most quoted and the most one of the most significant one is the human development index. The significance of the human development index is such that it has been used by a various policy makers in various countries across the

world. It has become one of the most robust and one of the most widely used indices of development and for a policy making.

Now, when we are getting introduced to the human development index, the computation of human development index, we will also in this class look at the various dimensions and indicators of human development index. And what is the significance of looking at these indicators of human development.

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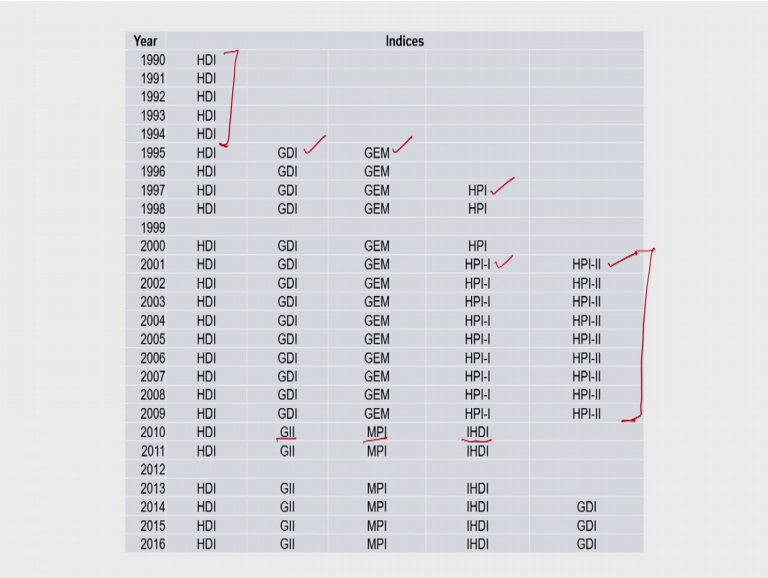

To before we get into the human development index. Let us first see; what are the different kinds of indices that have been computed by the human development report they are showing up on your slide now.

Between the period 1990 and 2016, 2016 is the latest year for which the un-human development report is available between 1990 and 1994, the HDR reports came up with only one summary index called the human development index. In 1995 along with HDI to be able to capture the differences in achievements of human development across gender; they also computed the gender development index. They also came up with a measure called the gender empowerment measure. So, you have GDI and GEM. Between 1990 and 1994 the only summary index that we saw was the human development index.

There was certain changes in indicators between these years which will presently see in this lecture. So, between 1995 and 2009; 3 indices HDI GDI and GEM a human development index gender development index and the gender empowerment measures came into being. So, these were basically improvements over the previous human development reports which could give a more comprehensive picture of achievements of human development across countries.

In the year 1997 the UNDP introduced what is called the human poverty index. And this was another novel addition to the list of indices that were computed through the HDRs. And, in 2001 the HPI or the human poverty index measure was there were the improvements made to this measure, and there were 2 variants of the HPI that was computed. So, they called it the human poverty index 1 and the human poverty index 2.

So, between 2001 and 2009 we had 4 5 measures of human development the HDI, GDI, GEM and the HPI. So, while the human development index were showing achievements based upon domains of longevity and knowledge and command over resources. The GDI was giving us an index based upon all of these domains, but calculated computed for males and females and then it was giving us the disparity between the male and females across countries the gender empowerment measure. And 2 variants of the human poverty index, which was basically in the form of a deprivation indicator index which showed the levels of shortfalls from the desirable levels of development or what we consider is desirable development.

In 2010 a very significant improvement came about in the HDRs. And this was captured through to a very important indices, the gender development index was also transformed into a gender inequality index in which the gender development index was inequality was accounted in the gender development index. And therefore, we came up the HDR came up with the gender inequality index. There was also an inequality adjusted human development index.

Now, in the last classes often we have discussed about the glaring levels of inequalities noticed across the world across developing as well as a developed countries in the 1990s. Particularly after the developed developing countries took up the project of structural adjustment program based upon the prescriptions of the World Bank and the international monetary fund. Now all of these while the UNDP was computing human development

indices for all of these countries which showed the levels of achievements made in different domains of human development inequality was not getting incorporated in these levels of achievement. Therefore, there was a need to calculate an HDI after incorporating the changes that may come about because of glaring inequality and therefore, there was the emergence of GII and the IHDI which adjusted for inequality.

So, which means that if HDI levels have gone up and inequality levels have also gone up then it need not necessarily mean that the country concerned has improved in different dimensions of development. So therefore, their needs there a lot needs to be done with regard to with respect to the vulnerable groups of population or people who are still facing different kinds of vulnerability and poverty. The 2010 HDR also came up with the multidimensional poverty index which accounts for a lot of other variables indicators apart from the ones that are seen in the HDI. And the MPI or the multidimensional poverty index has now become a very a highly competing indicator with respect to the HDI. Although it has not completely replaced it, but along with the HDI the multidimensional poverty index is also been increasingly computed for countries.

So, between 2010 and 2016; so there was at least 5 indices are being calculated the HDI, GII, MPI, IHDI, and GDI. Now as a part of this week class on measuring human development we will be looking at the computation of each of these indices. And in this class we will make a beginning with the human development index. Now before we go into the components of the human development index. Let us consider this that in any system of monitoring and evaluation the most ideal thing to do is to include as many variables or indicators as possible, such that because to give such that it can give a more comprehensive picture of human development.

Now, there are practical limitations of being able to include a multiple variables or indicators for 2 reasons. One is of course, the state of current availability of data. For example: if we are trying to compute the HDI for 2016 across different countries of the world, then a lot depends upon how much data is actually available at that point of time such that cross country comparisons can be made. So, data availability statistical data availability is one of the major limitations of being able to include different multiple indicators or multiple dimensions.

The second limitation is that inclusion of a large number of variables or indicators though desirable may not be entirely required, because when we are including a lot of dimensions or indicators, it may provide a very perplexing picture and that picture may mislead the policy makers into being unable to understand the trends that we see with respect to human development. There for a lot of variables including a multiple multiplicity of variables is not entirely desirable. So, the crucial issue here is that of emphasis which are the dimensions which are the indicators which will sufficiently be able to give us a sense of the levels of development; and therefore, the importance of the human development index or the dimensions of the human development index.

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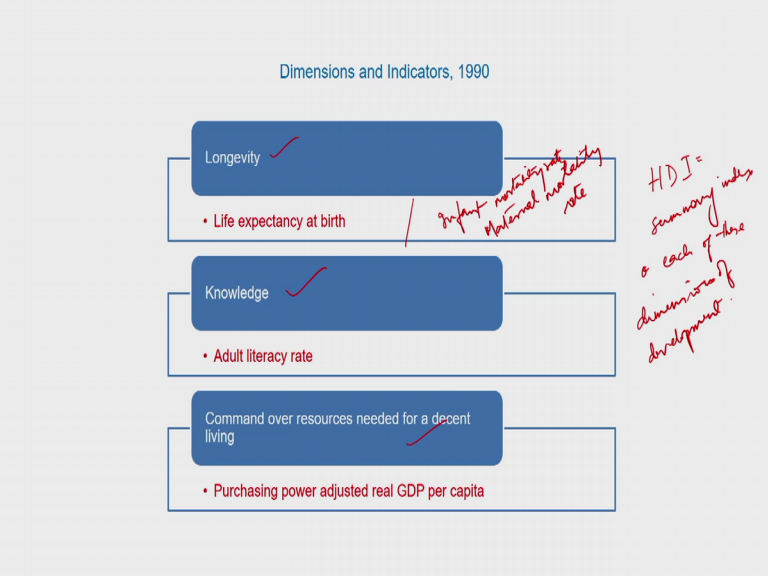

Now, the 1990 HDR came up with 3 dimensions of human development. Longevity knowledge and command over resources needed for a decent living. These were the 3 dimensions which were chosen to be able to come up with the summary index of human development. Now, one of the questions that we ask with regard to longevity and the indicators corresponding each of these dimensions were as follows to be able to capture the longevity dimension in the form of a summary index. You can you can call the HDI as a summary index summary index of each of these dimensions of, it is a summary index of each of these dimensions of development.

So, these are the dimensions longevity knowledge command over resources needed for a decent living and these are the indicators.

And there is a dist there is a distinction between dimensions and indicators. So, these are the indicators life expectancy at birth is the indicator for longevity. Adult literacy rate was the indicator for knowledge, and purchasing power adjusted real GDP per capita was the indicator for command over resources needed for a decent living. Now there is a clear cut difference between dimensions and indicators. Dimension generally refers to a domain of development. So, when we are saying longevity would include a lot of other indicators apart from life expectancy at birth.

For example, the levels of nutrition among different groups of population and in an economy will contribute to the numbers of years that an individual or groups of individual may live. Therefore, different levels of nutrition or different indicators of nutrition and morbidity and mortality indicators can also form a part of longevity. Because, that helps us determine how much people are living for how long people are living the duration of living.

However, in that sense there is a difference between dimension is a more broader concept whereas, indicator is a most specific concept which will help us measure the levels of achievements or the levels of deprivation. So, under the longevity dimension, if we include an indicator let us say the infant mortality rate or the maternal mortality rate, when these 2 may also qualifies indicators which are measuring specific levels of deprivation within a country. So, they can be different indicators which are which are trying to measure certain specific features or certain specific characteristics of a country or a region. Whereas, the dimension is a more broader term which may include various indicators.

Now one of the reasons is to why longevity is considered to be a significant indicator of or life expectancy at birth is considered to be a significant indicator is that, life expect the number of years that an individual can live depends a lot upon a what has been the level of nutrition of that individual over a over his or her life time. So, longevity has an intrinsic value. It has direct benefits because in term. So, that it let us just know how what is the level of nourishment or what is the level of living conditions of an individual. And, it has also indirect benefits because the longer an individual lives the more he or she will be able to devote her life to various pursuits which will otherwise not be possible in a very short span of time.

Now, various countries across the world that have very high life expectancy at birth may also face problems of providing social security to the old age persons, they may face various problems of providing social security, because of infirmity conditions because of deteriorating health conditions and so on. However, the vulnerability is considered to be much more higher when people are not able to meet the basic standards of living and therefore, not able to escape morbidity and mortality. So, in that sense longevity has an important significance and life expectancy at birth as an important significance. Only if you are able to live a sufficiently long duration of life will you be able to devote your time and energy to other pursuits in life.

The second dimension of knowledge has the 1990 HDR provides adult literacy rate as the only indicator of the knowledge dimension here. And, it may be mentioned here that the adult literacy rate is a very crude indicator of how knowledgeable a society is. Because, to be able to be able to gauge the knowledge the levels of knowledge of a particular country of a or of a particular society along with the levels of adult literacy rate. We should also be able to see; what are the rates of enrolment of students in primary schooling in secondary schooling in higher education scientific advancements investments made in science and technology and so on.

So, in that sense adult literacy rate is a very crude indicator of human development, but it is a significant indicator because the adult literacy rate has a direct effect on or has a direct correlation with the levels of productivity labour productivity within a country. So, the more literate the labour force is the adult labour force is the more productivity there is. And therefore, the levels of capital formation also has a direct correlation with the highly labour highly, labour highly productive labour force.

So, in that sense an adult literacy rate is also a very significant indicator of the knowledge dimension. And we know that to be able to gauge there were the most basic human development of a country is also highly dependent upon the levels of literacy rate. Therefore, there is always this discussion with regard to what is the levels of literacy rate in a different countries across the world.

The third dimension which the 1990 HDR considered was the command over resources needed for a decent living. And the HDR 1990 report itself commented and discussed that this is one of the most difficult to measure that there is no representative indicator

which can tell us which is the which provides that which can tell us what is it that provides us command over resources needed for a decent living, because this may be dependent upon the levels of that the distribution of land ownership or operational holdings of land. It may be dependent upon the level of asset inequality within a country and so on.

However, in the absence of comparable land data or asset data the most representative is of course, the GDP per capita and the purchasing power adjusted real GDP per capita. So, which is basically tells us that given the level of income. How much can the individuals within country households within a country be able to purchase goods and services for their own consumption?

So, the presence of non-one of the limitations of using GDP real, GDP per capita in terms of purchasing power parity is the presence of non tradable goods and services within an economy. And there are distortions from exchange rate anomalies the tariffs and taxes that make per capita income data a nominal prices not very useful of international comparisons. However, in the absence of any other comparable data GDP real GDP per capita becomes one of the most significant indicators of the dimension command over resources needed for a decent living.

Now, based upon this introduction to dimensions and indicators; let us look at what are the components of the 1990 human development index to remind you the human development index can be considered as a summary index for measuring achievements or levels of human development in different domains of human development.

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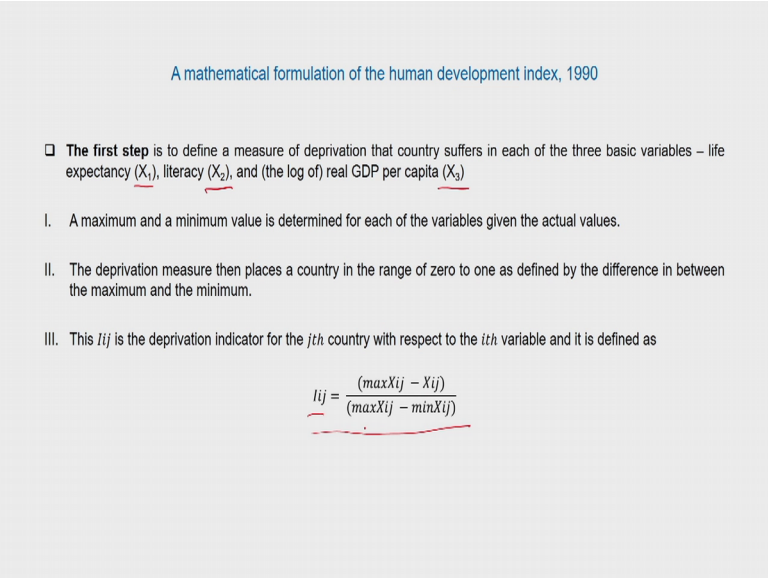

Let us look at the mathematical formulation of the human development index. And this is the mathematical formulation as was done in the 1990 HDR. There have been improvements to the 1990 HDI in the subsequent reports. And I will be dealing with only one such in today's class the 1991 HDR made substantial improvements over the 1990 HDI that was calculated.

Now, the first step the HDR 1990 focuses on being able to come up with a measure of deprivation first. What is the shortfall in achievements in various dimensions of human development and then comes up with the human development index or the achievement index. So, the first step in the 1990 HDI is to define a measure of deprivation that country suffers in each of the 3 basic variables.

So, x 1 is life expectancy x 2 is literacy which is adult literacy, and x 3 is the real GDP per capita and the log of real GDP per capita is taken to be able to come up with an indicator. One of the reasons of giving of providing a logarithm of real GDP per capita is that there it is the is based upon the assumption that the increased incomes have diminishing marginal utility, which means higher the income lesser they will be able to the marginal utility of being able to derive basic necessity is out of very high levels of income will keep on declining; so which is why the GDP per capita is shown as a log of real GDP per capita.

So, there are 3 indicators x 1 x 2 and x 3 life expectancy, adult literacy and the log of real GDP per capita. Within in the first step first we are coming up with a deprivation index for that a maximum and a minimum value is determined for each of the variables given the actual values. So, which means for the indicator life expectancy a maximum and the minimum value is determined the maximum and the minimum value is determined based upon the actual levels of levels of life expectancy at birth for each of the countries that have been considered for computation of indices.

So, in that sense it is it the HDI computed in each of the HDRs gives the relative ranking of countries. So, first a maximum and a minimum value is determined for each of the variables given the actual values. Then the deprivation measure then places a country in the range of 0 to 1 as defined by the difference in between the maximum and the minimum. And this i j is the deprivation indicator for the j-th country with respect to i-th variable. And it is defined as the maximum of x i j let us say maximum life expectancy at birth for the j-th country minus the actual value for the country that we are considering divided by the maximum minus minimum.

So, the first step is to define a country's measure of deprivation for each of the 3 variables life expectancy literacy and the log of per capita GDP. A maximum, and minimum values identified for the actual values of each of the 3 variables and a deprivation measure then places the country in the 0 to 1 range defined by the difference between the maximum and the minimum.

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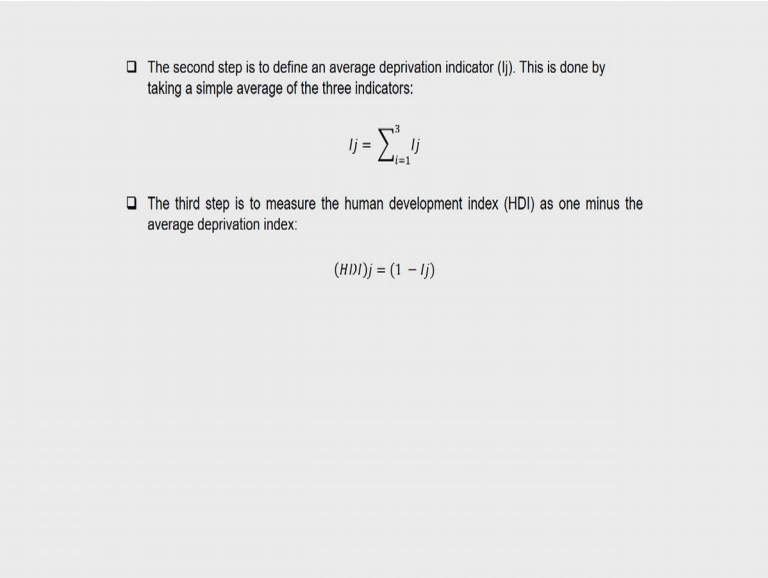

The second step is to define an average deprivation indicator. So, based upon these deprivation indices that have been calculated an average deprivation indicator is computed. This is done by taking a simple average of the 3 indicators that we just saw life expectancy literacy and log of real GDP per capita. And the final step is to measure the human development index as 1 minus the average deprivation index. So, to be able to come up with an HDI; first deprivation index is computed after which the achievement HDI becomes an achievement index in terms of what are the levels of human development that have been achieved.

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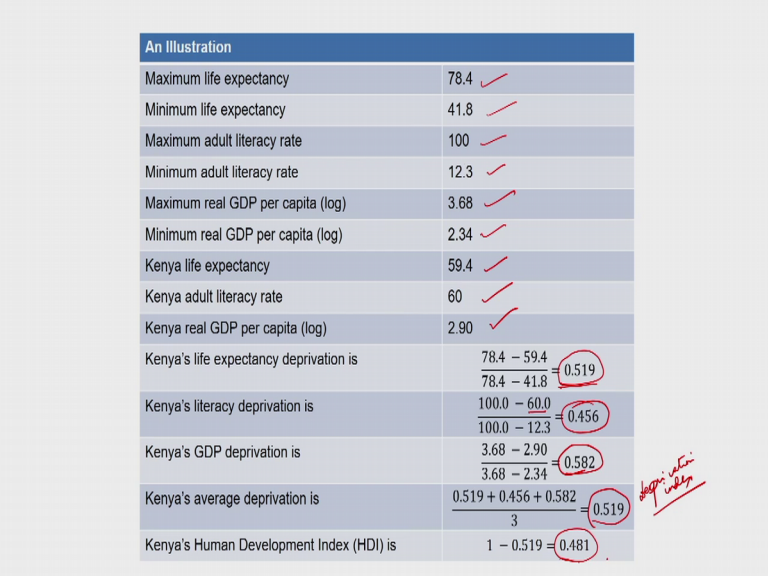

Now, let us look at an illustration in this I have taken the example of Kenya based upon the 1990 human development data set that exists in the human development report of 1990. The maximum life expectancy was observed for Japan and it was 70 8 point 4 the minimum life expectancy was 41.8. The maximum adult literacy rate was 100 percent. Minimum adult literacy rate was 12.3 percent. The maximum real GDP per capita in logarithmic terms was 3.68 and the minimum real GDP per capita in log terms was 2.34.

Now, we are computing the HDI for Kenya the actual value of Kenya the life expectancy is 59.4. Kenya's adult literacy rate is 60 and Kenya's real GDP per capita in log terms is 2.9. So, first we need to calculate the deprivation indicator for life expectancy which is maximum life expectancy this is for Japan 78.4 minus the actual life expectancy of Kenya divided by the maximum minus minimum that gives us the value of 0.519 which is the deprivation value of the life expectancy indicator for Kenya.

Similarly, we compute the deprivation value for Kenya's literacy rate, which is the maximum is 100 minus Kenya's actual literacy rate which is 60. So, 100 minus 60 divided by the maximum minus the minimum which here is 12.3 and that gives us a deprivation value of 0.456. So, Kenya's literacy deprivation the literacy indicator deprivation value is computed as 0.456. Similarly, we calculate Kenya's GDP deprivation value which is 3.68 which is the maximum minus Kenya's actual 2.90 divided by maximum minus minimum which gives us a deprivation value of 0.582.

And then we do a simple arithmetic average of each of these deprivation indicators which gives us the value of 0.59. So, this is the deprivation index. This is the deprivation index of Kenya. And based upon this deprivation index we compute Kenya's human development index which is 1 minus 0.519. So, the human development index of Kenya for the year 1990 is computed as 0.481. Similar method of calculation computing of the human development index is followed for each of the countries. So, we get a deprivation index and an achievement index deprivation index is based upon all of these this calculation index calculation of maximum minus the actual divided by maximum minus minimum. And then the achievement index is constructed. And then the countries are ranked based upon both the deprivation index and the human development index.

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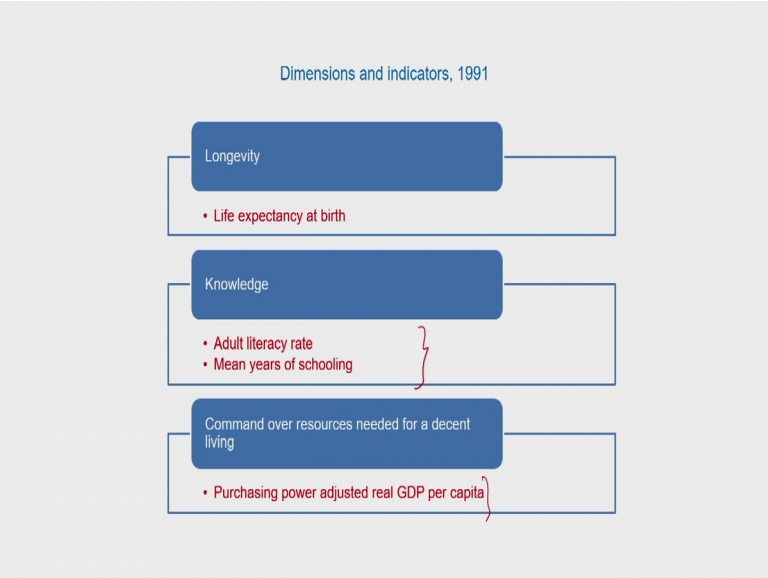

Now, there was slight changes to the dimensions and indicators in 1991 and since the 1990 HDR made a beginning with regard to calculations in the human development index. And the data available for there were there were problems of data availability for various countries, a limited number of countries were taken for calculating the human development for computing the human development index.

And with time numbers of improvements were made to the methodology of calculating the human development index based in 1991. And certain refinements and improvements were brought about in the indicators used for computing the human development index as well as well. As a longevity dimension is considered the indicator continue to be life expectancy at birth. For the knowledge dimension along with adult literacy rate the mean years of schooling was introduced as the second indicator and the world unequal rates given to adult literacy rate and mean years of schooling.

For the third dimension of command over resources needed for a decent living purchasing power adjusted real GDP per capita continue to be the indicator. So, the changes made were in the knowledge dimension and additional change was made improvement was made with regard to the way the real GDP per capita was computed for individual countries. Now, let us spend some time on what were the changes that were brought about in the second human development report the 1991 human development report.

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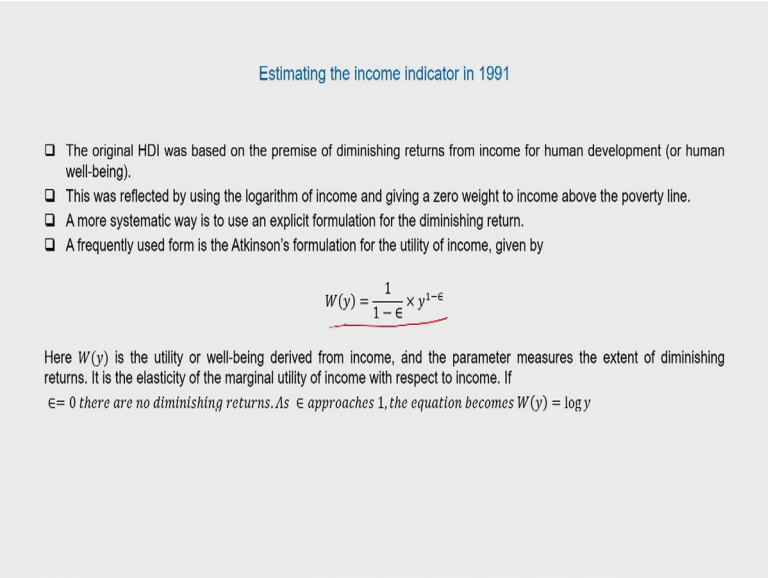

Now the original HDI was based on the premise of diminishing returns from income for human development or a well being. So, what it basically means is that as incomes of individuals rise as incomes of households rise, they will be spending less and less on the basic requirements and they will be spending more on other items of that are required by the households. So, that they will be spending less on basic education on basic health, but more on achieving higher education or achieving various tertiary levels of health achievements and so on.

So, the original HDI was based on the promises of diminishing returns from income or human development. And as I just mentioned that this was reflected by using the logarithm of income and giving a 0 weight to income above the poverty line. So, there were 2 divisions of incomes below the poverty line and those above the poverty line. And there was a weight of 0 which was given to income above the poverty line, which definitely showed diminishing marginal returns from income.

But a more systematic way was to use an explicit formulation for the diminishing returns, because in real world we see that there are different classifications different income classifications and not all every individual every household above the threshold above a threshold income or above a poverty line income is necessarily as well of. So therefore, a more systematic way is to use an explicit formulation for the diminishing return. And frequently Atkinson's formulation for utility of income is used which is

basically given by this function here. Where W y is the utility of wellbeing derived from income and this parameter measures the extent of diminishing returns it is the elasticity of marginal utility of income with respect to income.

So, here it is given by 1 by 1 minus e into y to the power 1 minus epsilon. Here if epsilon is 0 there are no diminishing returns, but as epsilon approaches one the equation W of y becomes log y. So, the utility or wellbeing derived from income is basically equal to the log of y.

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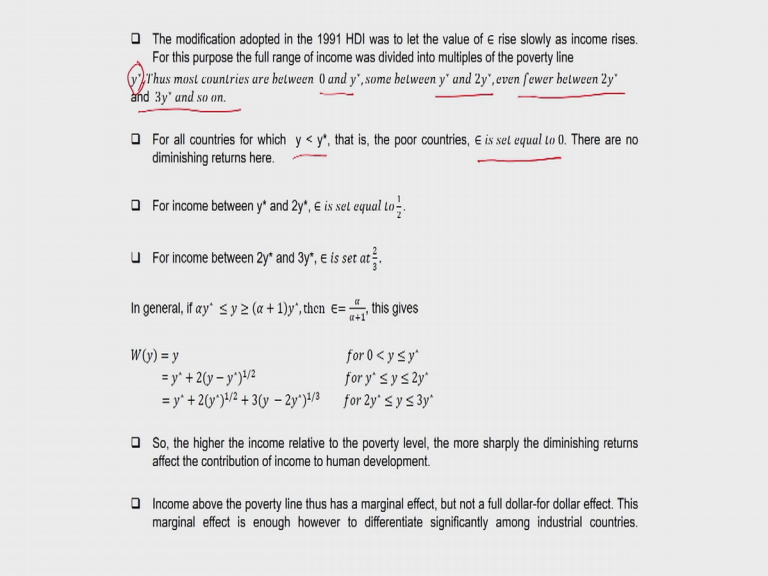

So, the modification adopted in the 1991 HDI was to let the value of epsilon rise slowly as income rises. So, for this purpose the full range of income was divided into multiples of poverty line.

So, as I was seeing there are different categories of people in different income slabs. Therefore, it was necessary to come up with a more realistic representation of different income groups based upon multiples of the poverty line. If the poverty line is given by a threshold income y star; here let us say which means that anybody above the threshold y star or the income level may be considered above the poverty line. And anybody below the threshold of y star may be considered below the poverty line. So, let us say there is a threshold of y start some income y star. So, most countries are between 0 and y star. So, which is basically below the poverty line some are between y y star and twice y star.

So, let us say just above the poverty line and even fewer maybe between 2 y star and 3 y start and so on. And it will of course, vary across countries depending upon the levels of development of each of these countries. Now this introducing this classification was extremely important, because when we are ranking countries based upon the human development indices. We understand that the industrialized countries have very high levels of income compared to the less developed countries or the industrially less advanced countries. Even within the industrialist industrialized countries the levels of incomes vary there are extreme variations in income and therefore, this classification was important.

So, for all countries for which y is less than y star, in other words the poor countries epsilon is set equal to 0, which means that there are no diminishing returns here the more the levels of income achieve the better. Because any household below the threshold the increased incomes increasing incomes are most desirable because in terms of being able to take care of the basic standards of living in being able to provide the basic dimensions of development.

So, for all countries in which for which y is less than y star epsilon is set equal to 0 and there are no diminishing returns here. For incomes between y star and 2 y star epsilon is set equal to 1 by 2. And for incomes between 2 y star and 3 y star epsilon is set at 2 by 3. Now this is the formula this is the change in this is the improvement in a formula that was brought about in 1991.

So, in general if income y is greater than alpha y star, and is less than equal to alpha y star, but greater than equal to alpha plus 1 y y star then epsilon is given by alpha by alpha plus 1, which gives the income utility function. So, W of y or utility derived out of income is equal to y for income greater than 0, but less than equal to y star. This function will take the form y star plus 2 into y minus y star to the power half, if y is greater than equal to y star, but less than equal to 2 twice y star. And this function will take the form y star plus 2 y star to the power 1 by 2 plus 3 y minus 2 2 y star to the power 1 by 3 for all y greater than equal to 2 y star less than equal to 3 y star.

So, the higher the income related to the poverty level the more sharply the diminishing returns affect the contribution of income to human development. And income above the poverty line has a marginal effect, but not a full dollar for dollar effect. So, there is a

marginal decline in utility been derived out of income as incomes rise above the poverty threshold. So, there is no there is no full dollar for dollar effect, but there is a marginal effect as incomes rise above the poverty line. And this marginal effect is enough to differentiate significantly amongst industrial countries.

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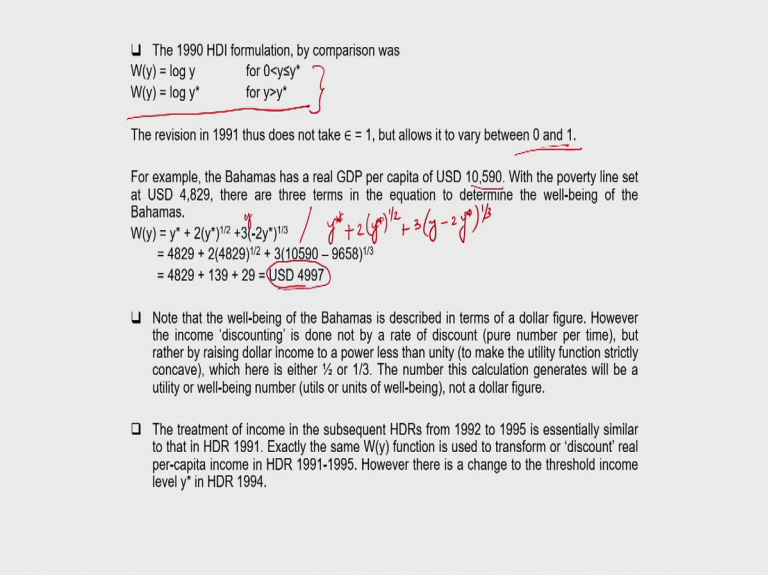

So, the 1990 HDI formulation by comparison was can be summarised as follows. Where the utility derived out of income given by W y is equal to log y for all y greater than 0, but less than equal to the poverty threshold y star. And the in utility derived out of income W y is equal to log y star for all income that is greater than y star. So, this was a simple formulation that was incorporated in 1990, but the revision in 1991 does not take epsilon is equal to 1, but it allows to allows epsilon to vary between 0 and 1 depending upon which income group the countries belong to.

So, if we have to illustrate this case here. For example, Bahamas has a real GDP per capita of USD 1590 dollars with the poverty line set at 4000 the poverty line for 1999 91 was set at USD 4829. So, there are 3 terms in the equation to determine the wellbeing of the Bahamas. Utility derived out of income is equal to going by the previous formula that we just saw here. So, going by this y star plus twice y star to the power half plus 3 minus 2 y star y minus 2 y this should be y minus 2 y star to the power 1 by 3.

So, this should be y star plus 2 y star to the power half, plus 3 y minus 2 y star 1 by 3. So, replacing the values set by the poverty line as 4829 that will be for 8 2 9 plus 2 into 4

8 2 9 to the power half plus 3 into the rest 1590 minus 9658 adding up that which is twice 4829 and that comes to USD 4 9 9 7.

So, you have to note here that the wellbeing of Bahamas is described in terms of a dollar figure; however, the income discounting is done not by a rate of discount, but rather by raising dollar income to a power less than unity, which here is either 1 by 2 or 1 by 3. And the number this calculation generates will be a utility or wellbeing number which is measured in terms of utils or units of wellbeing and not a dollar figure.

So, the treatment of income in the subsequent HDRs from 1990 2 to 1995 is essentially similar to that in HDR 1991. And exactly the same utility function or income utility function is used to transform or discount real per capita income in HDR 1991 to 1995; however, there is a change to the threshold income level y star in HDR 1994. Now for those being introduced to the human development index it is not necessary that we keep in that we and that we keep in mind the changes in methodology to the income computations for in each year. However, it make sense to understand that the income indicator in the dimension command over resources is one of the most complex to be calculated the. And an adequate amount of waiting needs to be done to this indicator; so as to be able to come up with the more suit most suitable human development index.

However, what will suffice to keep in mind is that the HDI over a period of time continuous. Although, there have been methodological changes in each of the in computation of each of the dimensions or each of the indicators, the dimensions have more or less continue to be the same as longevity knowledge and command over resources to be able to have a certain standard of living.

Now, the HDI calculations between 1990 and 1995 more or less remain to be the same apart from a few changes in the inclusion of some indicators along with the adult literacy rate in the knowledge dimension, and some changes in methodology made to the to the to the computation of income for each of the countries. In the 1994 HDR the minimum and a maximum values were fixed and they were referred to as goalposts. Instead of being observed from the list of countries followed in terms of the range equalization method index calculation that we saw in the beginning. In the next class we will look at some of these thresholds that were worked out in the HDR 1994.

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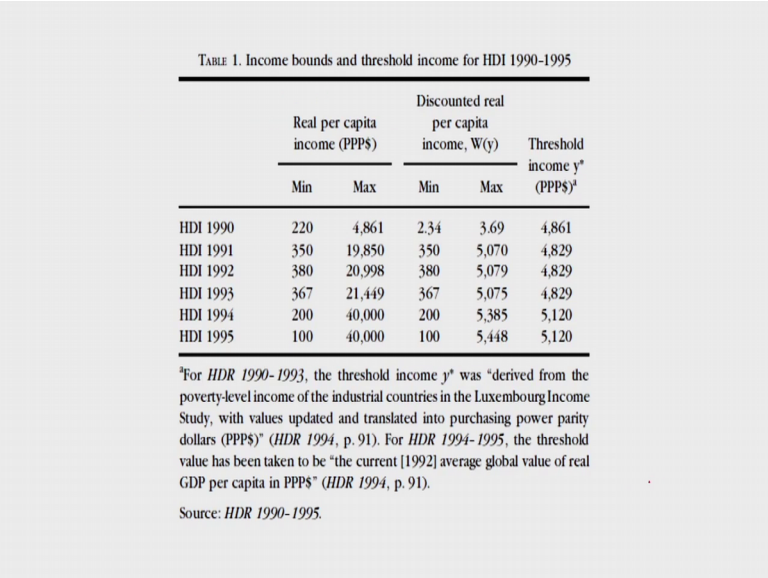

TABLE 1. Income bounds and threshold income for HDI 1990-1995

	Real per capita income (PPP$)		Discounted real per capita income, W(y)		Threshold income y* (PPP$)[a]
	Min	Max	Min	Max	
HDI 1990	220	4,861	2.34	3.69	4,861
HDI 1991	350	19,850	350	5,070	4,829
HDI 1992	380	20,998	380	5,079	4,829
HDI 1993	367	21,449	367	5,075	4,829
HDI 1994	200	40,000	200	5,385	5,120
HDI 1995	100	40,000	100	5,448	5,120

[a]For *HDR 1990-1993*, the threshold income y* was "derived from the poverty-level income of the industrial countries in the Luxembourg Income Study, with values updated and translated into purchasing power parity dollars (PPP$)" (*HDR 1994*, p. 91). For *HDR 1994-1995*, the threshold value has been taken to be "the current [1992] average global value of real GDP per capita in PPP$" (*HDR 1994*, p. 91).

Source: *HDR 1990-1995*.

However, this is a summary of the income bounds and threshold income for HDI calculation between 1990 and 1995. The first 2 columns here shows the minimum and maximum values of real per capita incomes the third and 4th column shows the discounted real per capita income in terms of the utility derived out of income. And the fifth column shows the threshold income or the y star which is basically the poverty line income levels

So, for HDRs 1990 to 1993 the threshold income y star was derived from the poverty level income of the industrial countries in the Luxembourg income study with values updated and translated into purchasing power parity dollars. For HDR 1994 to 1995 the threshold value has been taken to be the current average global value of real GDP per capita in purchasing power parity terms in US dollars.

So, to be able to summarise today's discussion the first human development index was calculated through the first human development report of 1990. And the report of 1990 focused on 3 dimensions longevity knowledge and command over resources. The indicator used for a knowledge for longevity was life expectancy at birth the indicator used for knowledge was adult literacy. And the indicator used for command over resources was a real GDP per capita in purchasing power parity terms the 1991 formula refined the 1990 formula by including a new indicator under the dimension of knowledge. So, apart from adult literacy rate the indicator which was introduced was

mean years of schooling. And different weights were given to adult literacy rate and mean years of schooling to be able to come up with a combined educational attainment index which we will do in the next class.

And certain refinements were made in the methodology of computing incomes for each of the countries under the income dimension and the HDI calculation was based upon a simple averaging of each of the indices. In the 1990 HDI calculation the first step resulted in a deprivation indicator based upon a range equalization method which give us the this deprivation index was calculated based upon this range equalization method maximum minus actual divided by the maximum minus minimum.

And then in the second step the deprivation indicators were all averaged there was a simple average of 3 indicators to come up with a deprivation index. And in the third step the achievement index of HDI was calculated by subtracting the deprivation index from one. And this illustration showed us the deprivation index calculation for Kenya and then the achievement index calculation for Kenya and then we also. So, how the improvements based upon the income indicator was made in 1991 by incorporating Atkinson's formulation for utility of income where epsilon was given different or range of values between 0 and one.

And the revision in 1991 allowed epsilon to take values between 0 and 1. And then we also saw this in the form of an illustration for the Bahamas. In the next class we will look at we will we will continue with measurement of human development. And we will see all the dimensions and indicators of human development index that have been worked out since 1995. There have been certain methodological variations with regard to how the human development index has been calculated.

We have moved from a simple averaging of each of the indicators to a geometric mean averaging of the indicators. And we will see what is what was the justification of moving from a simple average of indicator is to be able to come up with the index to a geometric mean calculation. So, we will look at each of the dimensions and indicators we will also go a little more deeper into the relevance of these dimensions and how these dimensions are a significant improvement over the per capita GDP indicator which was used by the growth literature in the earlier times.

In the lesson 3 of this week we will look at the associated indices of the human development index such as the gender development index the gender empowerment measure. And the multidimensional poverty index along with the inequality adjusted human development indices, then we will see what was the justification or what is the significance, and what is the relevance of looking at an inequality adjusted human development index.

I will see you in the next class.

Thank you.