The international community, academics, and policymakers have in recent years devoted considerable resources to evaluating well-being both across countries and over time. Here we introduce the major types of indicators discussed in the academic literature, along with briefly discussing strengths and weaknesses of the proposed measures.

Introduction
Until recent years a country’s aggregate output, or gross domestic product (GDP), was used almost exclusively as the primary measure of economic development. Both comparative (i.e. between countries) and over time, growth in GDP per capita was commonly used to describe changes in well-being. Recognizing the inadequacy of this measure of well-being, the United Nations began to devise and collect other macro-level quantitative measures of health, education, employment and housing in addition to real income data in the mid-1950’s. More explicit attempts at capturing human level well-being were made by M.D. Morris (1979) and more recently in the UN’s Human Development Index (DasGupta, 1993).

Mainstream use of GDP per capita as the primary measure of economic progress began to noticeably change around the time of the Bruntland commission. The UN Commission on Environment and Development, chaired by the Norwegian Prime Minister Gro Bruntland, released a report in 1987, *Our Common Future*, in which the committee defined “sustainable development” as “to meet the needs of the present without compromising the ability of future generations to meet their own needs.” The definition articulated in that report continues to be an important factor in shaping development objectives for many international organizations.

Given the influence of the Bruntland commission, contemporary indicators of well-being often reflect both current well-being and future capacities. GDP as an exclusive index cannot satisfy this definition of development. First, GDP measures current aggregate output, and growth refers to changes in the current period relative to the past. Current output may or may not reflect future productive capacity: a high current level of GDP may be achieved through consumption goods at the expense of capital goods. Second, changes in GDP do not account for changes in all of an economy’s assets: most notably, it does not account for changes in the stocks of human and natural capital. An economy may increase current consumption by depleting non-renewable resources. This change in natural capital should be included in analysis of future growth potential. Finally, measuring changes in GDP alone does not provide much insight into changes in determinants of well-being such as life expectancy and infant mortality (Sen and Anand,

---

* This paper appeared as Chapter 3 in ISER’s report to the Denali Commission “Economic Development Performance Indicators,” (2004)
1994). While GDP per capita is correlated with such things as health care, education and clean drinking water, the linkages are often indirect.\(^1\)

As carefully articulated in DasGupta (1993, 2001), there are essentially two methods of capturing individual well-being. One may measure either the “determinants”—i.e. the inputs of well-being—or the very “constituents” of well-being—i.e. the ends themselves. For example, if life expectancy is a component of well-being then inputs include sufficient water, natural resources and GDP per capita. Some constituents of well-being are also determinants, for example education. In any case, when properly measured, analyses based either on constituents or determinants of well-being should, theoretically, produce similar results. But in practice, because of data constraints measures of well-being under the different methods are sometimes quite different.

In what follows we briefly discuss indicators relevant to each approach, along with an overview of strengths and weaknesses of each. To begin, we discuss measures focusing on constituents of well-being, of which the most important measure is the UN’s Human Development Index. Second, we look at changes in wealth, along with a corollary discussion on project evaluation.

**Specific Measures**

*Constituents of Well-being Methodology*

Under the constituents of well-being approach, indicators that comprise well-being\(^2\) are aggregated in some fashion to produce standardized indices across countries or regions. The most widely used international measure is the UN’s Human Development Index.

As discussed above, the impetus behind this approach was an effort to move away from measuring “opulence” and toward measuring “the quality of human lives” (Anand and Sen, 1994). In particular, while GDP and constituents of well-being are certainly correlated, the channel by which GDP influences well-being is typically indirect. For instance, Anand and Ravallion (1993) show that variations in life expectancy are robustly explained by public health spending and an index of poverty, but that including GDP does not increase the explanatory power. Proponents of this approach maintain that measuring constituents of well-being captures more concrete outcomes than measuring inputs or determinants of well-being. They argue that determinants of well-being, while necessary for improvements in well-being, may not be sufficient causes.

The United Nations human development indicators are the most comprehensive and widely cited of such indicators. The five indicators provided in the current *Human Development Report* are presented in Table 1. below. The most widely cited measure

\(^1\) Also, as noted by Ravallion (2001), increases in aggregate wealth are dispersed differently across regions and households in a country. Macro measures of well-being are made more effective by micro-level empirical studies that highlight regional differences in development.

\(^2\) Choosing which indicators to include as constituents of well-being is also an important part of the process.
<table>
<thead>
<tr>
<th>Categories of Well-Being</th>
<th>Long and Healthy Life</th>
<th>Knowledge</th>
<th>Standard of living</th>
<th>Social Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Development Index</td>
<td>life expectancy at birth</td>
<td>adult literacy rate</td>
<td>gross enrollment ratio</td>
<td>GDP per capita</td>
</tr>
<tr>
<td>Human poverty index I</td>
<td>probability of not surviving to age 40</td>
<td>adult literacy rate</td>
<td>population without access to improved water source</td>
<td>percent of underweight children</td>
</tr>
<tr>
<td>Human poverty index II</td>
<td>prob. of not surviving to age 60</td>
<td>adults lacking functional literacy</td>
<td>percent below poverty</td>
<td>long-term unemployment rate</td>
</tr>
<tr>
<td>Gender-related development index</td>
<td>female and male life expectancy</td>
<td>female and male adult literacy rate</td>
<td>female and male gross enrollment rate</td>
<td>female earned income</td>
</tr>
<tr>
<td>Gender empowerment measure</td>
<td>Political Participation and Decision-making</td>
<td>Economic Participation and Decision-making</td>
<td>Power Over Economic Resources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>female and male shares of parliamentary seats</td>
<td>female and male shares of positions as legislators, senior officials and managers</td>
<td>female and male shares of professional and technical positions</td>
<td>female earned income</td>
</tr>
</tbody>
</table>

Box 1. Calculating the Human Development Index

Calculating the HDI

This illustration of the calculation of the HDI uses data for Albania.

1. Calculating the life expectancy index

The life expectancy index measures the relative achievement of a country in life expectancy at birth. For Albania, with a life expectancy of 73.4 years in 2001, the life expectancy index is 0.807.

\[
\text{Life expectancy index} = \frac{73.4 - 25}{85 - 25} = 0.807
\]

2. Calculating the education index

The education index measures a country’s relative achievement in both adult literacy and combined primary, secondary and tertiary gross enrolment. First, an index for adult literacy and one for combined gross enrolment are calculated. Then these two indices are combined to create the education index, with two-thirds weight given to adult literacy and one-third weight to combined gross enrolment. For Albania, with an adult literacy rate of 85.3% in 2001 and a combined gross enrolment ratio of 69% in the school year 2000/01, the education index is 0.798.

\[
\begin{align*}
\text{Adult literacy index} &= \frac{85.3 - 0}{100 - 0} = 0.853 \\
\text{Gross enrolment index} &= \frac{69 - 0}{100 - 0} = 0.690 \\
\text{Education index} &= \frac{2}{3} (\text{adult literacy index}) + \frac{1}{3} (\text{gross enrolment index}) \\
&= \frac{2}{3} (0.853) + \frac{1}{3} (0.690) = 0.798
\end{align*}
\]

3. Calculating the GDP index

The GDP index is calculated using adjusted GDP per capita (PPP US$). In the HDI income serves as a surrogate for all the dimensions of human development not reflected in a long and healthy life and in knowledge. Income is adjusted because achieving a respectable level of human development does not require unlimited income. Accordingly, the logarithm of income is used. For Albania, with a GDP per capita of $3,680 (PPP US$) in 2001, the GDP index is 0.602.

\[
\text{GDP index} = \frac{\log(3,680) - \log(100)}{\log(40,000) - \log(100)} = 0.602
\]

4. Calculating the HDI

Once the dimension indices have been calculated, determining the HDI is straightforward. It is a simple average of the three dimension indices.

\[
\text{HDI} = \frac{1}{3} (\text{life expectancy index}) + \frac{1}{3} (\text{education index}) + \frac{1}{3} (\text{GDP index}) \\
= \frac{1}{3} (0.807) + \frac{1}{3} (0.798) + \frac{1}{3} (0.602) = 0.735
\]

Source: UN Human Development Report, 2003
used in international comparisons is the Human Development Index (HDI) which is shown in row one. The HDI measures longevity, education and GDP per capita. To calculate the index, a country’s indicators are compared to international benchmarks, and the relative performance gaps are measured on a standardized scale of 0 to 1. A simple average of the three dimensions determines a country’s HDI, with 1.0 representing the highest state of well-being. Box 1 explains the calculation of the index in detail.

The UN Division for sustainable development provides a separate set of 58 sustainable development indicators. And the World Bank’s World Development Indicators provide 800 indicators for more than 200 countries. Similar to the Human Development Index these separate indicators may be combined in various ways to form simple aggregate indices useful for policymakers in evaluating well-being across countries.

However, as forcefully argued by DasGupta (2001), the primary drawback with using the constituents of well-being approach, exclusively, is that such a measure does not provide information about the state of future well-being. In particular, he argues that the same criticism made of GDP can also be made of the human development indicators. Hidden behind a high indicator today may be a reduction in the stock of capital necessary to maintain the level of well-being into the future. He argues that properly valuing and evaluating the determinants of well-being avoids this problem as we discuss in the next section.

**Determinants of Well-Being Methodology**

**Changes in Wealth and Changes in Well-Being**

Assessing changes in well-being through measuring changes in total assets is one way to calculate changes in determinants of well-being. While the precise relation between well-being and wealth may not always be immediately clear it is generally true that most measures of well-being are increasing in wealth, given how wealth is defined in this approach. Wealth in this context is the sum of an economy’s physical capital, human capital, natural capital, and to some extent, social capital. Typically, such a measure is in terms of the macro or national economy, but as we will discuss, measures of wealth are also feasible on a regional or even project level.

Key to the determination of total wealth is estimating changes in natural capital. In valuing natural capital, a price should be used that reflects the total social cost or benefit of an additional unit increase or decrease in a particular good. Typically, economists use the term accounting prices to refer to a price that reflects total social costs or benefits and market prices of environmental capital are sometimes equal to accounting prices but not always. For instance, consider a water and sewer project. The accounting price would

---


5 The approach described in this section is, for the most part, based on discussions in Dasgupta (2001; 1993).
include the flow of profits over the life of the project, in addition to benefits from improvements in health, property values, and possibly fisheries (if, for instance, runoff is harming the local fishery).  

Market prices may also be used to estimate a lower bound value for certain types of natural and human capital. For instance, as described in DasGupta (2001), in a paper calculating the optimal harvest rate of blue whales, Spence (1974) bases the value of the blue whale simply on the market price of whale meat. Even when using this lower bound price (that doesn’t capture the total social benefits of blue whales), he showed that it was in the interest of the whaling industry to declare a moratorium on blue whale harvesting until the sustainable whale population was reached. Placing a higher price on the value of the whale (an accounting price) would have resulted in the same general conclusion.

While changes in net wealth as an index of well-being has not received as much attention as the HDI and other indicators, since 1999 the World Bank has published such a measure in its annual World Development Indicators. This measure is called “adjusted net savings” and includes an estimate of physical capital (net national savings), human capital (education expenditures), and natural capital (four indicators). Changes in natural capital include net forest depletion, mineral depletion, energy depletion, and CO2 damage.

In Table 2, we present this measure of wealth from the World Bank and other measures of well-being for various countries as discussed in DasGupta (2001). Select countries are compared in light of changes in GNP per capita, wealth per capita, and the Human Development Index. Although the measure of “wealth,” is incomplete it clearly captures different information relative to the Human Development Index and other measures of well-being.

A very different portrait of well-being is painted by the respective measures. According to data in the table, well-being dramatically increased for all regions based on the Human Development Index and changes in GNP per capita also show modest improvements. However, changes in real wealth per capita (where wealth is defined above) were decreasing over time, indicating a decline in well-being. Interestingly, places where positive changes in the HDI were greatest corresponded to places where negative changes in wealth per capita were greatest. In Nepal average annual change in wealth per capita was -2.60 while average change in the HDI was around 11.4. The situation is nearly parallel in the case for Bangladesh.

---


Table 2. Average Annual Changes in Well-being, 1970-1993*

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>2.3</td>
<td>-2.40</td>
<td>1.0</td>
<td>+ (8.0)</td>
</tr>
<tr>
<td>India</td>
<td>2.1</td>
<td>-0.50</td>
<td>2.3</td>
<td>+ (7.7)</td>
</tr>
<tr>
<td>Nepal</td>
<td>2.4</td>
<td>-2.60</td>
<td>1.0</td>
<td>+ (11.4)</td>
</tr>
<tr>
<td>Pakistan</td>
<td>2.9</td>
<td>-1.70</td>
<td>2.7</td>
<td>+ (8.5)</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>2.7</td>
<td>-2.00</td>
<td>-0.2</td>
<td>+</td>
</tr>
<tr>
<td>China</td>
<td>1.7</td>
<td>1.09</td>
<td>6.7</td>
<td>+ (7.0)</td>
</tr>
</tbody>
</table>

*Table from Partha DasGupta (2001)
** this is based on the World Bank’s estimate of wealth described above – it includes an estimate physical capital, human capital, and natural capital.
*** this data from UN Human development report 2003, based on 5 year average changes in the HDI

This evidence underscores the point that the choice of an intertemporal (across time) versus a static mechanism significantly influences the determination of well-being. Based on the HDI (a static measure), China has made the least progress (7.0), relative to other countries in the table, whereas based on wealth per capita, China has made the greatest progress (1.09) (which gives a better picture of wealth available for future well-being).

Finally, the table illustrates differences when looking only at growth in GNP per capita. Relative to the Human Development Index, we see that growth in GNP per capita is relatively lower for the countries in the sample. Countries that scored highest in terms of improvements in GNP did not necessarily score highest in terms of increases in the HDI (i.e. China and India). Similarly, countries scoring highest in improvements in the HDI did not score highest in terms of increases in GNP per capita (i.e. Nepal and Pakistan). Relative to wealth per capita, GNP also presents a relatively brighter picture for most countries.

The primary benefit associated with measuring determinants of well-being is the ability to simultaneously present a picture of current well-being and projected future well-being. That is, changes in total wealth (including human capital, physical capital, and natural capital) provide insight not only into current living conditions but also into future capacities for well-being. This “macro-economic” measure of wealth, as we have discussed it thus far, can also be generalized to smaller regions and indeed to project evaluation, as we discuss below.

Changes in Net Benefits: Project Evaluation

The corollary to measuring changes in wealth is social cost benefit analysis and this methodology is particularly useful in project evaluation. Put another way, changes in determinants in well-being due to a policy program are equal to the sum of changes in
wealth resulting from specific projects. Social cost-benefit analysis may be used as a tool to measure the change in wealth accruing from a specific project.8

Social cost benefit analysis is a methodology where the projected net benefits of a particular project (the benefits minus the costs for each period) are evaluated over the life of the project prior to implementation of the project. It is particularly important to value all relevant benefits and costs including those which are economic, environmental, and human capital related. Using cost-benefit analysis to evaluate the feasibility of a project is a common requirement for many projects funded by the World Bank and other international organizations and there are numerous case specific publications by these organizations detailing their methodology for projects ranging from water and sewer to large infrastructure such as a dam.

The accepted practice is to calculate the discounted net-present value (summing the discounted costs and benefits over the life of the project) where accounting prices are used in valuing non-market goods.9 Projects with a positive net-present value are accepted (they add positively to total wealth over the life of the project). Similarly, project A may be compared directly to project B, such that the project with the greatest calculated net-present value is the project expected to offer the greatest increase to well-being.

When comparing projects between regions, the net present value approach also provides for straightforward comparisons. For instance, without accounting for natural capital it may be that in region Y project A would offer the same net present value as project A in region X. But suppose that there is a unique type of environmental degradation in region X that project A would address as an indirect benefit whereas in region Y this indirect benefit to the environment would not be realized. All other things being equal, the discounted net present value of project A would be higher in region X relative to region Y when accounting for the environmental benefits.

### Conclusion

Effective indicators of well-being share important characteristics: they have policy relevance; they are analytically sound and measurable, and they provide a sense of future well-being (Hamilton, 2003; DasGupta, 2001). In the discussion above we presented an overview of indicators used in the development literature to evaluate country-level well-being.

Apart from straightforward measures of GDP per capita there are essentially two mainstream approaches in the literature. First, simple aggregates of social indicators of development can be constructed which provide insights into particular elements of well-

---

8 This point is skillfully articulated in Chapter 10 of DasGupta (2001).

9 Future benefits and costs are given less weight relative to current values. Sensitivity analysis is the procedure of valuing the project under a range of discount rates. It may be that the positive present value calculated for a particular project is highly sensitive to the discount rate selected. In such case, this information should be made clear to policymakers deciding between projects.
being. We described this approach as measuring the **constituents** of well-being and the most important example of this approach is the UN’s Human Development Index. The UN Human Development Report emphasis on shifting policymaker focus toward measuring changes in human well-being rather than simple changes in national incomes has had an important impact on the types of development projects pursued by international organizations.

Second, we discussed measuring the determinants of well-being, (i.e. the inputs to well-being such as national wealth) as an alternate approach. While the “constituents of well-being” approach provides important information to policymakers, it is not sufficient to provide an accurate picture of well-being, particularly future well-being. Changes in national wealth—when wealth includes natural capital, physical capital, and human capital—provides a clearer picture, particularly when considering future well-being. On a more micro-level we described how social cost-benefit analysis used in project evaluation, when it accounts for changes in physical capital, natural capital, and human capital, can similarly provide important information about changes in present well-being and expectations for the future.
References


