



PROMOTING LEADERSHIP OF THOUGHT
THAT LEADS TO ACTION

THE WEALTH OF NATIONS REVISITED

CADMUS

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The CADMUS Journal

The acronym of the South-East European Division of The World Academy of Art and Science – SEED – prompted us to initiate a journal devoted to seed ideas - to leadership in thought that leads to action. We put this sentence as a motto, but we realize that we need a name for the journal. For our website it was easy to decide on www.seed-ideas.org, but name of a journal is more demanding. Several suggestions were made: Mercator (Gerard Mercator born as Gerard de Cremer in 1512 in Rupelmondanus - a Dutch mathematician, astronomer, and best known as a cartographer, professor at University of Leuven, He signed his work with Gerardus Mercator Rupelmondanus. Indeed, we are trying to provide maps) and, following the example of Daedalus, used by the American Academy of Arts and Sciences for its journal, Cadmus. Cadmus (or Kadmos in Greek and Phoenician mythology) was a son of King Agenor and Queen Telephassa of Tyre, and brother of Cilix, Phoenix and Europa. Cadmus is credited with introducing the original alphabet – the Phoenician alphabet, with “the invention” of agriculture, and with founding the city of Thebes. His marriage with Harmonia represents the symbolic coupling of Eastern learning and Western love of beauty. The youngest son of Cadmus and Harmonia is Illyrius. The city of Zagreb, which is the formal seat of SEED, was once a part of Illyria, a region including what is today referred to as the Western Balkans and even more.

Cadmus will be a journal for fresh thinking and new perspectives that integrate knowledge from all fields of science, art and humanities to address real-life issues, inform policy and decision-making, and enhance our collective response to the challenges and opportunities facing the world today.

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Indicators of Economics Progress: The Power of Measurement and Human Welfare

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1. Introduction

Right measurement is a powerful instrument for social progress; wrong or imprecise measurement a source of hazard and even havoc. The essential purpose of economic activity is the promotion of human development, welfare and well-being in a sustainable manner, and not growth for growth's sake, yet we lack effective measures to monitor progress toward these objectives. Advances in understanding, theory and measurement must necessarily proceed hand in hand. A companion article in this publication sets forth the urgent need for new theory in economics. This article sets forth the complementary need for new measures. The stakes are high and the choice is ours. On one side, rising social tensions, recurring financial crises and ecological disaster; on the other, the progressive unfolding and development of human capacity in harmony with Nature. The deficiencies of GDP as a measure are well-documented by leading economists Kuznets, Tobin, Tinbergen and many others; but, unfortunately, decision-making still remains largely based on GDP, valid during 1930-70 perhaps, but certainly inappropriate today. The challenge is to derive more appropriate indicators to reflect real, sustainable economic welfare, social development and human well-being. The attributes that have made GDP so successful are often overlooked — it provides clear objectives for policy and decision-making. We propose new composite indicator, HEWI, which can be used to guide decision-making, which retains the strengths associated with GDP, while substantially enhancing its value as a measure of human economic development. HEWI monitors progress on factors that contribute prominently to present economic welfare — household consumption, government welfare-related expenditure, income inequality and unemployment — as well as factors that have the potential to significantly enhance long term sustainability — education, fossil fuel energy efficiency and net household savings. The index is applied to assess the economic performance of select countries from 1985-2005.

2. Tools and Measures

Human beings are distinguished from other life forms by their unique ability to fashion tools which extend our powers of consciousness beyond the reach of our senses and our powers of execution beyond the limits of strength, endurance, space and time imposed by our physical bodies. Tools are an instrument for social evolution. Language is a tool which enables us to formulate original ideas, communicate our inmost thoughts and feelings, record

events for posterity, transmit knowledge down through the ages, and exchange ideas over vast expanses of time and space. The efficiency of our tools is an index of our social development.

Measurement is another remarkable human ability. Many tools acquire power through their use in or capacity for measurement, such as the calendar, weighing scale, measuring rod, astrolabe, surveyor's theodolite, carbon dating, and DNA fingerprinting. The mariner's compass and chronometer enabled ships to navigate safely far from land. Modern medicine could not exist without the thermometer, stethoscope, sphygmomanometer and glucometer, along with measures for blood cell count, hemoglobin, cholesterol, and countless other metrics. Today every food ingredient is carefully measured for its exact nutritional content.

Money is one of humanity's greatest inventions. It is both a tool and a measure. But unlike other measures that are confined to measuring a single dimension or quality, money has the capacity of assigning value to almost anything material or immaterial — physical objects, human labor, social status, information, obedience, loyalty and sometimes even love. Coinage enabled ancient kingdoms to become military and economic powers, because it facilitated standardized valuation of products and services for the financing and maintenance of huge armies. The concept of zero was unknown to the Greeks and Romans. Developed independently in India and Mexico, it reached Europe via Arabia only in the 10th century. One need only try adding and multiplying Roman numerals to realize how greatly the introduction of Hindu-Arabic numerals, the zero, and the decimal place enhanced the capacity for accounting and the growth of trade. Combined with double-entry bookkeeping, they spurred the commercial revolution in 13th century Italy, facilitating the precise calculation of capital and profit.¹

The development of modern economy has been made possible by continuous development and refinement of tools and measures. The Domesday Book is a record of the first known numerical census conducted by William I of England in 1085 to identify arable lands, livestock, fisheries and other sources of national wealth as a basis for improved tax collection. The first US census was conducted in 1790. Today economics employs a wide range of indispensable measuring tools, including GDP, the consumer price index, interest rate, money supply, exchange rate and the unemployment rate. While the general public may regard these tools as accurate measures of economic reality, economists recognize that they are in fact only rough, approximate indicators designed to reflect economic reality rather than accurately measure it.

Right measurement is a powerful instrument for social progress, which is why efforts are constantly being made to improve their power and precision. The atomic clock has replaced the sundial, hourglass and pendulum. DNA fingerprinting has largely replaced hand fingerprinting as a precise means for identifying human beings. Global satellite navigation has made the chronometer obsolete. The 20th century has been aptly described as *The First Measured Century* in recognition of the enormous recent strides in harnessing the power of measurement.² Phenomenal scientific and social progress since the end of World War II has opened up previously unimagined opportunities and ignited soaring aspirations the world over. Today humanity pursues a common quest for higher standards of living, greater economic security, sustainable development, higher levels of welfare and well-being. For decades, the very intensity of the pursuit for a better life obscured the inadequacy of our

¹ Sombart, Werner. "Medieval and Modern Commercial Enterprise", *Enterprise and Secular Change*, edited by Frederic C. Lane., and Riemersma, Jelle. Homewood. 1953. 25-40.

² Caplow, Theodore., Ben J. Wattenberg., and Louis Hicks. *The First Measured Century: An Illustrated Guide to Trends in America 1900-2000*. New York: American Enterprise Institute Press, 2000.

conceptions and our instruments for achieving it. But in recent decades we are compelled by social, economic and environmental challenges to seek more precise definitions of what we mean by these terms and more exact tools for measuring our progress toward achieving them. Social and economic measures are inseparable from political objectives and public policy. It is not merely scientific precision that we are after, but more powerful instruments for achieving human objectives.

Wrong or imprecise measures are a source of hazard and even havoc. They can result in wrong policy with disastrous consequences. As John Kenneth Galbraith observed in his book *The Great Crash 1929*, the lack of reliable measures combined with faulty theoretical knowledge led to actions that worsened rather than mitigated the crisis. Galbraith cites poor economic intelligence among five principal causes for the Great Depression. From 1929 to 1932, “policy was almost entirely on the side of making things worse.”³ Had the real risks associated with US mortgage-backed securities been more accurately assessed a few years ago, the entire sub-prime mortgage crisis and resultant international financial debacle might have been avoided. Wrong measures can undermine good theory and practice. Right measures can dramatically enhance the rate of social progress.

It’s not just the economists and policy-makers who need new and better measures of economics and social progress. We all do. In democratic societies where ordinary citizens are bombarded by information and asked to support the best policies, the absence of clear, reliable measures of economic welfare and social progress lead to endless debate, confusion, obfuscation, recriminations and even despair. As we have recently witnessed, wrong measures can lead to a false sense of security or euphoria at the very moment crisis is preparing to strike.

3. Measures of National Income

Adam Smith, David Ricardo and the other great founders of modern economics made remarkable contributions to our understanding of the wealth of nations, yet they lacked effective measurements to apply their concepts with precision. This changed dramatically with the development of quantitative economic measures after World War I. Among all the tools evolved to measure economic progress, none has attracted more attention and controversy than GDP and related indicators used to measure national and per capita income over time and in different countries. With the onset of the Industrial Revolution, the conception of economic power and national wealth shifted from agriculture to industrial production. Then early in the 20th century it was further broadened to encompass a wide range of tangible and intangible services.

The idea of valuing such a diverse range of economic activities in terms of a single common denominator, price, was itself an ingenious invention, but one that has since given rise to serious misconceptions and policy distortions. As money is one of the most powerful instruments of social progress, price is one of the most powerful tools of measurement. But the temptation to measure all value in terms of price plays havoc with commonsense, reason and human values. Can we really equate the value of an antique vase, collector’s baseball card or music memorabilia with the cost of food and medicine to save the lives of thousands of children? Is a billion dollars spent on military armaments really equivalent to a comparable

³ Galbraith, Kenneth, John, *The Great Crash 1929*, New York: Mariner Books, 1954. 171, 182-3.

investment in education or public health? Is an extra dollar of income for the richest of the rich really equivalent in value to the individual concerned and society in general as an extra dollar earned by the poorest of the poor? Is a \$100 of renewable energy equal in value to \$100 of non-renewable fossil fuel? Is an hour of paid services for cooking or cleaning at home more valuable than an hour of unpaid work by family members? According to GDP, the answer to all these questions is 'yes'.

GDP was developed as an indicator of market activity during the Great Depression and a war-planning tool during the Second World War, when the primary objective of government was to stimulate industrial production.⁴ Based on its utility during the war, it became an official instrument of US economic policy in 1946. Originally intended as an index of industrial growth, growth of GDP came to be regarded as synonymous with an improvement in a nation's economic health and the welfare of its people. Its creator, Simon Kuznets, warned the US Congress about its limitations as early as 1934, "The welfare of the nation can scarcely be inferred from a measurement of national income as defined above."⁵ Three decades later he asserted the need for distinguishing between quantity and quality of growth, costs and return, short and long run.⁶ In the early 1970s William Nordhaus and James Tobin again reminded us that GDP was never intended as a measure of welfare or well-being.⁷ In one of his last speeches Senator Robert F. Kennedy summed up the limitations of GDP. "We cannot measure national achievements by GDP, since GDP includes air pollution, cigarette advertisement and ambulances to clear our highways after carnage. It counts special locks for our doors and jails for people who break them. GDP includes destruction of redwoods and of Lake Superior. GDP grows with the production of napalm and nuclear warheads. It does not include the health of our families, the quality of their education, it is indifferent to the safety of our streets... In short, GDP measures everything except what makes life worthwhile."⁸ Yet these concerns went largely unheeded and even now we are told daily to measure our present and future welfare in terms of a number that conceals and distorts more than it reveals and clarifies.

GDP is simply a measure of the total of finished goods and services produced in the monetized segment of the economy valued on the basis of cost, regardless of its relative importance or benefit to human well-being, and without making any distinction between productive and destructive, essential and trivial, sustainable and unsustainable activities. Thus, earthquakes, hurricanes, rising crime and divorce rates, increasing levels and costs of litigation, proliferation of hand guns, increasing incidence of epidemic diseases, increasing consumption of sedatives and saturated fats, subprime mortgages and unsustainable credit card debt, chemical pollution, depletion of non-renewable resources, military spending and all-out war are indistinguishable by this measure from rising levels of employment, education, public health and safety, cleaner air and water, better housing and nutrition and retirement security. GDP is simply a gross measure of total output, market activity, money changing hands.

⁴ Cobb, Clifford, Ted Halstead and Rowe, Jonathan. "If the GDP is Up, Why is America Down?", *Atlantic Monthly*, October 1995, accessed August 2, 2010, <http://www.theatlantic.com/past/politics/ecbig/gdp.htm>.

⁵ Kuznets, Simon. "National Income, 1929-1932". 73rd US Congress, 2d Session, Senate Document No. 124, 7, accessed August 2, 2010, <http://library.bea.gov/u/?SOD,888>.

⁶ Kuznets, Simon. "How to Judge Quality," *New Republic*, October 20, 1962, 29.

⁷ Nordhaus, William D., and James Tobin. "Is Growth Obsolete?", *The Measurement of Economic and Social Performance, Studies in Income and Wealth*, Vol. 38, NBER, 1973. Cowles Foundation Discussion Papers 319, Cowles Foundation, Yale University. Accessed August 10, 2010, <http://cowles.econ.yale.edu/P/cp/p03b/p0398ab.pdf>.

⁸ Kennedy, Robert F. Speech at University of Kansas, March 18, 1968. Accessed August 6, 2010, <http://www.jfklibrary.org/Historical+Resources/Archives/Reference+Desk/Speeches/RFK/RFKSpeech68Mar18UKansas.htm>.

Long considered a technical issue of concern only to economics, it is now evident that bad measures can lead to bad and even catastrophic policy, just as wrongful treatment arising from an erroneous medical diagnosis can convert a mild disorder into a fatal illness.⁹ Major determinants of human welfare and well-being are too important to be regarded as mere technical issues. It is both unfortunate and ironic that even the general public has come to place so much faith in this inadequate and misleading index of national progress, that people celebrate each increase in GDP even when their own personal living standards have declined markedly in real terms. Aspirations for a better life have become so universal that people everywhere readily take pride and satisfaction in the real or false sense of national achievement reflected in the numbers.

The recent history of the debate regarding GDP is too voluminous and frequently cited to warrant inclusion here. Before examining other options, we can simply summarize the most salient concerns that need to be addressed in the search for more adequate alternative measures.

1. GDP makes no distinction between factors that contribute to social progress and those that may actually impair it or reflect its decline. GDP treats natural disasters, divorce, crime and war as economic benefits, e.g. the massive expenditure to redress the human crisis and damaged infrastructure consequent to Hurricane Katrina or the rising crime rates which spur increasing public expenditure on security measures, law enforcement and prisons. It treats on par investments in human capital, such as those that raise the level of education and training, with expenditures that reflect a decline in human welfare, such as increasing need for psychiatric services or divorce-related legal fees.
2. GDP, a measure of activity, flow, is wrongly interpreted as a measure of wealth, stock. Higher levels of GDP growth can be and are often accompanied by increasing levels of financial debt or depletion of natural assets, as during times of war, excessive government spending or household borrowing.
3. GDP includes some forms of economic activity that consume more capital than they generate. Consumption of non-renewable resources generates a flow by consuming an irreplaceable asset. War increases output and flow for an activity which actually destroys the products produced along with other natural and social forms of capital. Like a company without a balance sheet to distinguish between investment and expenditure, asset creation and asset destruction, GDP is virtually blind to these distinctions.
4. GDP does not distinguish between sustainable and unsustainable activities. It treats the depletion of natural capital and the costs associated with compensating for it as income. Rising levels of consumption do not necessarily result in higher levels of economic welfare or well-being, as in the case when the declining quality of the public water supply spurs demand for more costly bottled water or increasing crime necessitates rising expenditure on personal and commercial security.
5. GDP/capita is a measure of national productivity, not of personal consumption or the economic welfare of households. It takes into account the value of all financial transactions at market prices, including categories of expenditure such as military spending and general administration that are not directly related to household income and expenditure.
6. GDP ignores the impact of unemployment on human security and welfare.

⁹ Diagnosis is based on a set of direct and indirect measurements summarized in a medically-formulated statement of a person's health. GDP as currently utilized in politics and economics is a diagnosis of a nation's economic health, but an incorrect one.

7. GDP takes no account of the distribution of income. Therefore, average per capita GDP figures can disguise the fact that growth may be flat or even negative for a substantial part of the society while it rises exponentially for a small proportion of the population in the highest income bracket.
8. GDP fails to distinguish between speculative gains in financial markets during a bubble economy and real gains from increasing employment, production and personal consumption.
9. GDP ignores the non-market household and community economy, assigning zero value to household work and voluntary services, while attributing positive value to the very same activities when they are performed for pay. One of the reasons that GDP is so unsuitable as a quality of life index is its inability to take into account the value of parenting, home care and home schooling, household work, volunteerism and other forms of non-monetized activities that are invaluable to individuals and society-at-large.
10. GDP and other price-based indices grossly understate real improvements in living standards and quality of life, because they measure only the cost of goods and services, while ignoring real and often substantial improvements in product quality and quality of life. These gains accrue from real advances in social development, including advances in science and technology, improvements in social organization, e.g. the Internet, and globalization.

4. Need for New Theory

As significant as it is, the debate regarding GDP and other measures masks a deeper and far more important issue. For in trying to arrive at a more appropriate measure for real human progress, it calls into question the fundamental purpose of economic activity and the fundamental premises on which modern economic theory is based. Theory and measurement go hand in hand. Without sound theory, measures can result in misleading conclusions. Even great minds can fail in matching theory and measurement. Aristotle, possibly the greatest philosopher and scientist that ever lived, failed to properly measure motion. Although an excellent experimentalist and keen observer, his incorrect procedure for measuring motion stopped the development of physical sciences for over a thousand years, prompting Russell to castigate Aristotle as the greatest hindrance in the history of science. Would Aristotle have understood motion better, if he had had access to more or better information regarding the shape, color and composition of falling objects? Some of this data would have been useful, but the real problem was that Aristotle was missing a necessary abstraction that would lead him to the understanding of motion. He lacked the foundation for the underlying conceptual theory. Success of physical and life sciences today are rooted in precise and adequate measurements married with sound theory. Measurements often generate paradigmatic changes in our understanding of Nature and in turn these changes influence the meaning and process of measurements.

As the authors have elaborated in a separate article in this issue, in striving to attain to the rigor of the physical sciences, economics has sought for impersonal universal principles governing economic systems. Not only in its assumptions, but in its stated goals as well, economics too often equates all market activity with human welfare and well-being. Thus, both economic theory and measurement are subject to the same limitations. This approach must inevitably be supplanted by the evolution of a more human-centered approach to economic science.

In an effort to attain the value-free objectivity associated with physical science, latter day social scientists have overlooked the fact that GDP itself is founded upon inherently subjective judgments, equating crime and war with more food and better housing, pollution-prone fossil fuels with clean, renewable energy. At the same time, GDP assigns zero value to non-monetized activities that enhance welfare, such as caring for children and the elderly, or leisure time and family relationships that enhance well-being. All human activities are goal-oriented and value-based and therefore, the only meaningful measure must be one that consciously acknowledges those goals and values and assesses the extent to which economic activity achieves them.

True advance in measurement must be predicated on commensurate advance in the underlying theory. Thus, we are compelled to ask at the outset the most apparently naïve of questions, namely, what is the purpose of economy and economic activity? What role does it play in human existence, social development and evolution? The most obvious answer is certainly the most reasonable and acceptable. The aim of economic activity is to enhance human welfare and well-being. If Kuznets and others are correct in stating that economic policy based on GDP too often pursues other goals that are different and even incompatible with human welfare and well-being, then there is full justification for urgently striving to evolve both new theory and new measures to reorient economics toward its true purpose. The companion article *Wealth of Nations Revisited* examines the need for new theory.¹⁰ The remainder of this article focuses on the need for new measures.

5. Measures and Indicators

A distinction needs to be made between measures and indicators. In the physical sciences, we are accustomed to measuring tangible physical parameters such as distance, mass, speed, frequency and wavelength. But in the social sciences, many of the parameters we seek to measure do not lend themselves to simple quantification. While most physical events can be accurately described in terms of a few parameters, human activities are far too complex for complete categorization. Human events are far more complex because they are influenced not only by physical parameters in time and space, but also by social, cultural, political and psychological factors that are often difficult to perceive and impossible to measure directly, such as the decision whether to buy a genuine Prada leather bag from the shop or a passable imitation from a street vendor at one-third the price. Therefore, in the social sciences, we must often seek for more effective ways to measure the complexity of social reality.

Thirty years ago, India struggled with the task of measuring the progress of 600 million population living in 575,000 villages and more than 10,000 cities and towns. In spite of making huge public investments and borrowing extensively from overseas, according to traditional measures based on per capita GDP in constant dollars, the country had raised its per capita living standards by only 27% between 1960 and 1980. By comparison, France increased its per capita GDP by 109%, Korea by 190% and Japan by 237% during the same period. Given the very low base and rising expectations post-Independence, India's performance looked far from satisfactory. India's leadership was perplexed and discouraged by the relatively slow pace of progress. Intuitively many felt that the actions they had taken were essential for national progress, yet according to available economic measures they had been a dismal failure.

¹⁰ Giarini, Orio., Jacobs, Garry., Lietaer, Bernard., and Šlaus, Ivo. "Introductory Paper for a Programme on The Wealth of Nations Revisited", *European Papers on the New Welfare*, No. 15, 2010.

Then a study in 1980 documented huge gains that were not reflected by GDP. It pointed out that more than 80 million lives, a population equivalent in size to that of reunited Germany, had been saved since Independence as a result of improved public health. If saving 80 million human lives is not progress, then what is? Yet the first result of this remarkable accomplishment was to dilute per capita GDP growth, thereby creating the impression that the country was going nowhere or even backwards. The study also found that life expectancy had risen by 60%, infant mortality was down by a third, and literacy had more than doubled since 1950. The total number of schools and colleges had almost tripled. Primary school enrollment had quadrupled. The number of hospital beds had tripled. Incidence of malaria had declined from 75 million cases to 100,000 and deaths attributable to the disease from 800,000 to only one. Electricity had been made available for the first time to hundreds of millions of people. A country which lost three million people to famine in 1943 and required 10 million tons of imported foodgrains to avoid another massive famine in the late 1960s had increased its food production by two and half times and become self-sufficient in foodgrains. Per capita food consumption had risen 25%.

The Indian example highlights the crucial need for additional and alternative methods. It also brings into focus a fundamental difference between economic growth and social development. Recognizing the urgent need for more accurate ways to assess national progress, the country began a search for alternatives. To obtain a more reliable basis for policy-making and assessment, the Government of India identified 107 indicators of development for regular monitoring at the local and national level.^{11, 12, 13} Frequent physical surveys of the entire territory and population to measure actual living standards were prohibitively expensive. Rather than relying solely on direct measures such as literacy, life expectancy and infant mortality, the study proposed searching for parameters that were correlated with rising living standards. For example, international comparisons revealed that rising income levels were closely correlated with rising levels of sugar consumption. In India too, increasing consumption of sweetened foods and beverages was among the very first observable changes associated with increasing prosperity. On this basis, researchers postulated that rising sugar consumption might form one component of an easily measurable index of rising living standards among the poor in rural areas in India. The sugar index was never adopted, but it is illustrative of the distinction between direct measures, which tell us about performance on a specific variable, and indicators, which can be taken as reflections of social development. A measurement is a precise means of evaluating a phenomenon on a fixed scale of values, whereas an indicator is an indirect and imprecise means of assessment by observation or measurement of changes in one or a group of related variables that are found to accurately reflect changes in a wider field of phenomenon. An increased heart rate is an indicator rather than a measure of health. It can vary widely with increasing levels of physical activity and stress as well as with the onset of heart disease. By itself it tells us very little, but when correlated with other observations, it can serve as a useful index of cardiac health.

¹¹ Jacobs, Garry. "Growth: The Real Symptoms," *The Hindu*, April 23, 1981.

¹² Jacobs, Garry. "Common Indicators of Development," *The Hindu*, April 24, 1981.

¹³ Jacobs, Garry. "New Indicators of Development," *The Hindu*, May 5, 1981.

6. Characteristics of a Successful Indicator

In our eagerness to find a more acceptable measure of human progress, let us not lose sight of the remarkable features that have made GDP so successful and adaptable. The genius of GDP is that it expresses all economic activity in terms of a common denominator, price or currency value. When adjusted for changes in price levels due to inflation, this permits comparisons over time. When adjusted for differences in costs of living in different countries, it permits comparisons between countries. Based on data that is easily gathered at the national level, it facilitates frequent measurement in a timely manner. Simplicity, universality, ease of application and timeliness are great strengths that should not be lightly discarded. GDP has also derived a symbolic capacity to precisely indicate changes in the underlying fields that it measures, such as consumer spending, housing, electronics, transportation and communication.

In fairness, we must also recognize that the indicator cannot be faulted for its widespread misapplication and misinterpretation. That is the error of those who wrongly apply and interpret it. GDP has a role to play as an indicator of short term changes in economic activity. Our challenge is to derive more appropriate indicators to reflect real and sustainable economic welfare, social development and human well-being — tasks GDP was never intended to perform. In doing so, we should avoid the error of those who currently regard GDP as an effective composite measure. Trying to accomplish all things with a single measure, either simple or complex, is more likely to confuse than to clarify. The success of GDP over more than half a century is a compelling argument for simplicity and universality. Its greatest weakness has been the attempt to do too much with too little — to impute reliability and significance far beyond what the number really tells us, a source of bad policy and great harm to society.

The most rational approach is to start with a clear conception of the goals we want to achieve and a valid theoretical framework describing the underlying processes that contribute to that result, then devise measures capable of monitoring our progress toward achieving these goals. Clarity of conception is the only sound basis for precise measurement. As long as economic growth per se was the main social objective, as it was during the Industrial Revolution, Great Depression and Second World War, GDP did a reasonable job as a monitoring instrument. But the aims of 1930s are not our present aims, since we now realize that unfettered growth would lead us to ecological disaster.

At the same time we must be sufficiently objective to concede that much of what we would like to measure may be for the time being beyond our capabilities, either because the required data is not available, is not sufficiently accurate or is simply too subjective to rely on. As we have seen, even defining measures for the relatively straightforward conception of economic growth is fraught with difficulties, resulting in measures that include activities that are the very opposite of the goal we desire. When it comes to measures of social development, sustainability, human welfare and well-being, the challenge is even greater. Humility is always a virtue, but never more so than in purporting to measure the fulfillment of human aspirations. It is wiser to attempt less to begin with and do it well than to attempt all and do it so inadequately that it serves little utility. In either case, it is important to recognize both what is included and what is excluded in each formulated measure.

7. The Problem of Value

Before examining alternative approaches to the measurement of social progress, it may be useful to consider some of the factors that pose serious obstacles to the quantification of economic growth, sustainable development, welfare and well-being.

7.1 Uncertainty & Risk

The importance of the linkage between theory and measurement is most powerfully illustrated by Orio Giarini's challenge to traditional measures as set forth in *Dialogue on Wealth and Welfare* (1980) and *Limits to Certainty* (1993).^{14, 15} There he highlights fundamental differences between the industrial model of economy that emerged with the Industrial Revolution and the modern service economy which has emerged post 1970. His central thesis is that methods for measuring the value of manufactured goods are inappropriate for measuring the value of many types of services, emphasizing that even in the manufacturing sector 80% of what we regard as production cost now also consists of service activities. In this way he challenges the adequacy of GDP as a measure of economic growth, when applied to the valuation of basic services such as health care, insurance, education, R&D, etc. Can the value of longer life expectancy and better health, higher levels of education, greater social security be adequately evaluated in terms of the cost of production and delivery?

In *Limits to Certainty*, Giarini argues that value in the new economy is probabilistic, rather than deterministic, because it involves new types of risk and far greater degrees of complexity, vulnerability and uncertainty. Cost in manufacturing is measured at the stage up to the point of final sale. Whereas in regard to services the actual cost of full delivery may not be known until long after the sale. This is most obviously the case with regard to various forms of insurance, but it applies also to the cost of fulfilling on-going product and service obligations. Toyota's worldwide recall of more than nine million vehicles in 2009-10 — equal in quantity to 90% of total light vehicle sales in the USA in 2009 — cost the company and its dealers upwards of \$4 billion. Hurricane Katrina is estimated to have cost upwards of \$200 billion. This includes \$120 billion in insured catastrophic losses, but does not include the significant increase in the cost of home insurance that affected all US homeowners in the years following the disaster.¹⁶ Human error has recently proven far more costly than the most violent acts of nature. The losses associated with Katrina are dwarfed by the costs associated with the collapse in value of mortgaged-back securities following the subprime crisis, an instance in which the linkage between the theory of value and its measurement is transparent and direct. Between July 2007 and June 2008, rating agencies lowered the credit ratings on these securities by \$1.9 trillion. Indeed, many regard wrong valuation as the principal cause of the crisis. Valuation errors led to bad policy and bad business decisions on an inconceivable scale. Residential properties in the US declined in value by more than \$5 trillion or 32% in the following year. The value of retirement assets and other investment assets dropped by more than \$8 trillion.¹⁷ Of course, both the potential costs and inherent uncertainty associated with the consequences of current economic activities on climate change are considerably greater.

¹⁴ Giarini, Orio, *Dialogue on Wealth and Welfare*, Club of Rome, 1980.

¹⁵ Giarini, Orio, and Stahel, Walter. *The Limits to Certainty*, preface by Prigogine, Ilya. Dordrecht /Boston: Kluwer Academic Publishers, 1993.

¹⁶ Stahel, Walter R. "Global Change, Acts of God, Acts of Man, Acts of Nature and Systemic Risks," Geneva Association Information Newsletter, May 2010, 3. Accessed August 5, 2010, http://www.genevaassociation.org/Portals/0/Geneva_Association_Systemic_Risk_in_Insurance_Report_March2010.pdf.

¹⁷ Altman, Roger C., "The Great Crash 2008", *Foreign Affairs*, 88, (2009): 5. Accessed August 20, 2010, <http://www.foreignaffairs.com/articles/63714/roger-c-altman/the-great-crash-2008>.

These examples illustrate the magnitude of uncertainty and systemic risk inherent in the modern service-based economy in which contractual obligations of the seller as well as the uncertainties of the buyer may extend long after the date of sale, throughout the entire life cycle of utilization and even disposal. This view challenges the fundamental notion of price based on the equilibrium between supply and demand as an adequate measure of value. And it goes to the heart of the question, 'What do we really mean by value?' The ingenious device of equating price with value has served as the basis for the entire development of modern mathematical economics as a science, yet all the major objections to GDP as an indicator of human welfare and well-being point to the inadequacies, gross distortions, disastrous policy measures and catastrophic consequences that can arise from implicit faith in this equation. This perspective, which highlights the linkage between theory and measurement, reinforces the need for more fundamental reassessment of economic theory as proposed in the companion article "Wealth of Nations Revisited".

Evolving measures to adequately reflect risk and uncertainty is a formidable challenge for the future of economics. In section 10.4 below we illustrate one approach to this challenge in formulating an index for sustainable energy efficiency.

7.2 Price and Quality

GDP measures social progress in terms of an increase in the total transaction value of goods and services at market prices. Price is a powerful tool for measurement, but it can also introduce gross distortions for the simple reason that price is an inadequate measure of value. Can we really place a dollar value on an extra hour of leisure? A college education? A cataract operation that restores eyesight to the elderly? An extra year of human life? GDP and other price-based indices grossly understate real improvements in living standards and quality of life, because they measure only the cost of goods and services, while ignoring real and often substantial improvements in product quality and quality of life. These gains accrue from real advances in social development, including advances in science and technology, improvements in social organization, e.g. the Internet, and globalization. Differences in product quality can cause gross distortions in the measurement of inflation and the price deflators used to compare GDP growth over time. The price of a man's shirt in USA is about the same as it was fifty years ago in current dollars as a result of world trade, which represents a decline in price of 80% in constant dollars.

Efforts to measure social progress over time are also impeded by radical changes in the quality of goods, services, jobs and life in general. A 1920 Model-T Ford and 2010 Mercedes or Lexus are both cars, but in other ways they are far from equivalent. Traveling across the USA on horseback in five months or by car or train in five days or plane in five hours are all forms of transportation, but the difference between them cannot be reduced simply to measures of speed and cost. Because of technological advances, a long distance telephone call from USA to India, which cost \$1.50 minute in 1975, equivalent to \$4.50 today, is now virtually free over Skype and other VOIP services. Similarly, the price of personal computers has declined 90% in real terms since 1990, while their speed has increased 1000 fold and storage capacity 10,000 fold.

Advance in social development leads to enhancements in the quality of life which are very difficult to quantify or reduce to monetary terms. These qualitative dimensions are linked to rising levels of education, greater social security provided by private and government-funded insurance programs, improved medical treatment and public health, new forms of

entertainment, machines that reduce physical labour, and many other types of comfort and convenience. It is impossible to value in terms of price the impact on quality of life resulting from antibiotics, year-round access to a full range of fruits and vegetables from all over the world, email, the Internet, on-line education and training, social networking, global access to a free encyclopedia like Wikipedia, e-books, i-Pods, cell phones, ATMs, improvements in the quality of automobiles, and countless other social and technological innovations of the past few decades.

The nature and quality of employment required to achieve economic security has also changed dramatically. Manual labor on farms and in factories has been largely replaced by white collar categories of employment which are less physically demanding. In the USA, for example, professional, technical, managerial and other categories of white collar employment rose from 24% to 75% of total employment between 1910 and 2010, while employment in crafts, manual labor, farming, mining and household services declined from 76% to 25%. Workers engaged in farm labour fell from 18% to under 1%. Nearly 25% of all workers in the USA are now engaged in professional, technical and related activities. These qualitative changes continue. In addition, the qualitative value of employment cannot be assessed strictly in terms of physical working conditions, type of labour or compensation. Types of employment differ widely in terms of the social status and self-esteem they carry, a major reason why the more highly educated shun even undemanding, well-paying jobs that they deem beneath their social status. In our effort to scrupulously account for hidden costs such as environmental degradation and social problems, we should not err in the opposite direction by overlooking the enormous hidden gains that have accrued to the entire society.

8. What Are we Trying to Measure?

GDP and similar measures may be very useful tools for monitoring short term changes in industrial activity over the course of a few years, but they are grossly inadequate to reflect the complex structural changes that occur during the process of social development and the longer term implications and sustainability of the present mode of economic activity. As Giarini reminds us, like other man-made powerful tools, financial information can be either positive or negative, depending on the values it is used to express. "The production of powerful tools is one thing, but the definition of their goals and their positive utilization is a matter of human choice and responsibility."¹⁸ Thus, before evaluating the utility of any specific measure, we must be as clear as possible about what those objectives actually are. This naturally raises the question, what are we trying to measure?

A very wide range of individual indicators are now being monitored which purport to reflect economic and social progress. The OECD regularly monitors indices relating to fertility rates, migration, marriage and divorce, education, unemployment, income inequality, gender wage gaps, social spending, old age replacement rates, poverty, life expectancy, health expenditure, birth weight, infant mortality, health risks, life satisfaction, use of alcohol, drugs and tobacco, strikes, voting, public policies, work accidents, prisoners and many others. In addition there have been numerous attempts in recent decades to formulate composite indices of progress to supplement or supplant GDP, including UNDP's Human Development Index (HDI), the Index of Sustainable Economic Welfare (ISEW), the Genuine Progress Indicator (GPI), Environmentally Sustainable National Income (eSNI), Sustainable Development

¹⁸ Giarini. *Dialogue on Wealth and Welfare*, pag. 186.

Indicators (SDI), National Accounts of Well-being (NAW), Calvert-Henderson Index, and others.

Before examining the utility of these alternatives, it is necessary first to examine more closely the theoretical conceptions and definitions on which they are based. All of these measures attempt to address one or more of the following aspects of progress.

- Economic growth
- Economic welfare
- Development
- Sustainable development
- Human welfare
- Well-being

These terms are so commonly used today that it is natural to assume that they have standardized meanings, but this is far from the case.

8.1 Economic Growth

The term economic growth is widely used with reference to increasing output by an economy as measured by total national income or expenditure, i.e. GNP or GDP. Although most criticism of GDP focuses on what are considered its wrongful inclusions and exclusions, Orio Giarini raises a more fundamental challenge regarding the basic methodology for measuring value and risk in a modern service economy, an issue already discussed in Section 7.1 above.

8.2 Economic Welfare

The concept of economic welfare is employed to focus on the impact of economic growth on the material living standards of households and individual citizens, rather than on production. It includes in-kind services provided by government such as subsidized health care and educational services, while excluding defense spending and general government expenses which do not directly contribute to household consumption.¹⁹ It also emphasizes the importance of the distribution of income and wealth in society. Economic welfare is commonly measured in terms of per capita GDP or per capita household consumption expenditure at constant currency value. International comparisons are made in purchasing power parity equivalent. We argue later in this paper that improvements in the measurement of economic welfare can and should be rapidly adopted, which will significantly enhance our understanding of the impact of economic activity on human beings. Sections 10-12 of this paper present a tentative model and supporting data for a new index of human economic welfare (HEWI).

¹⁹ Stiglitz, Joseph E., Sen, Amartya and Fitoussi, Jean-Paul. *Report by the Commission on the Measurement of Economic Performance and Social Progress*, 2009, 8, Accessed August 23, 2010, http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf.

8.3 Social Development

The term development is commonly used as a catch-all phrase for something that includes, but extends beyond considerations of economic growth. Socio-economic development is frequently used as a proxy for per capita economic growth measured in real terms. Sometimes it is used with reference to the economic welfare of citizens; sometimes more broadly to include non-economic factors such as health, education, life expectancy, social inclusion, gender equity, social cohesion, freedom, democratic participation and good governance; and at others with reference to national investments in infrastructure, education, science and technology, energy and other fields deemed essential for national progress.

In contrast to this vague general usage, we would argue for making a clear and emphatic distinction between growth and development. Growth represents a horizontal quantitative expansion of existing capacities and activities in society; whereas development involves a qualitative enhancement in the structural capabilities of society, an increasing capacity for organization, coordination, and complexity. Growth may be regarded primarily as an economic concept, but development in any field belongs to the wider realm of society as a whole. Growth generates more of the same on a larger scale. Development generates something new and better that was not possible earlier. Development relates to enhancement of social productivity through strategies such as investments in human capital by education and training, enhancement of social capital and organizational capabilities — with regard to governance, production, commerce, research, social welfare, etc. — technological advancement, greater access to information, and networking between individuals and institutions. India's dilemma in 1980 discussed earlier highlights the distinction. Improvements in food security, life expectancy, education, and the like represent not only real tangible benefits, but also investments in future generations that cannot be quantified in terms of present income. Although growth of per capita GDP was relatively modest, the overall improvements in quality of life and national capacity were many times greater; but they were not reflected by existing measures, because none of these parameters adequately lend themselves to either precise definition or quantification. They can only be assessed on a combination of quantitative and qualitative dimensions, both tangible and intangible.

But the problem of defining and measuring development lies even deeper, for it is rooted in underlying, invisible social processes that may be apparent on the surface only long afterwards. A notable instance is a phenomenon which Harlan Cleveland, former US diplomat, educator and World Academy President, observed in East Asia 60 years ago and termed the revolution of rising expectations. There he witnessed a rapid change in social attitudes expressing as higher aspirations, greater dynamism and individual initiative, sweeping aside the sense of resignation, complacency, submission to the status quo which had characterized earlier periods of relative social stagnation. He rightly perceived that this underlying wave of surging human aspirations would dramatically alter the future of East Asia in the decades to come and eventually spread its influence to other parts of the world. His insight reminds us that all economic processes occur on a bedrock social foundation and are ultimately determined by more basic social and cultural attitudes and values. The sudden explosive transformation of Eastern Europe following the fall of the Berlin Wall appears abrupt and unpredictable when viewed in terms of measurable events, but the undercurrents of revolutionary transformation were active long before they manifested on the surface in public life. The relatively recent recognition of the economic power and potential of China, India, and Brazil has a similar character.

Measurement of this social process lies beyond the scope of the present study, but we

note here that the future evolution of economics and other social sciences will compel us to inquire more deeply into the common principles underlying all social change and to evolve effective measures or indicators that may be very different than those currently in use to measure growth and development.²⁰

8.4 Sustainable Development and De-Growth

The Brundtland Commission popularized the term sustainable development as development that meets the needs of the present generation without compromising the ability of the future generations to meet their needs.²¹ While most commonly used with reference to the ecological carrying capacity of the natural environment, it is also applied with reference to economic, political, technological and social issues, including energy, water, mineral resources, climate, urban congestion, population, pollution, industrialization, technological development, public policy, health, education, and employment. The underlying concept is that both economy and society are constrained by environmental limits. Sustainable development is subject to the same vagaries as the other terms discussed above. Often, it is applied in a context that might more aptly be referred to as sustainable growth.

The justification for focusing on sustainability is too obvious to require elucidation. Traditional economics made no distinction between consumption of renewable and non-renewable resources, between productive activities that enhance the environment and those that pollute or destroy it, between those that ensure the security of future generations and those that place human and other forms of life at dire risk. Although most measures of sustainability focus on ecological issues, we would argue that the term applies equally to the development of human capital, where issues such as assured access to education, vocational training, health care and employment opportunities as well as income distribution are also crucial.

Views on sustainability differ with regard to future generations. Advocates of “strong sustainability” argue that the aim must be to ensure that individual stocks of critical natural capital, such as biological diversity, ozone layer, and carbon cycle do not decrease over time as the result of global warming, ozone layer depletion, and land degradation, i.e. each individual critical natural capital has to be maintained. “Weak sustainability” defines the concept more broadly to encompass economic and social as well as environmental sustainability to ensure that the overall wealth of a society, i.e. the sum of human-capital, knowledge-capital and natural-capital do not decline over time.

In recent decades the concept of zero growth or de-growth has gained ground, as a stronger rejection of traditional economic growth. Degrowth challenges the necessity of current modes of consumption and advocates a return to voluntary simplicity of life style, relocalization of economic activities, and decreased energy and other resource consumption. It seeks to reverse national and global production and consumption trends to reduce the overall ecological footprint of human activity.

²⁰ Calculus and most mathematical models treat continuously varying phenomena. The catastrophe approach of French mathematician Rene Thom and his followers treats various sudden, catastrophic changes. The real behavior of economic development is not smooth. It is accentuated by dramatic sudden changes. Calculus was developed to treat classical mechanics, where from the saying that nature does not make jumps followed. Quantum physics does make jumps. So do markets, economies and societies.

²¹ Brundtland, G.H. *et al.*, *Our Common Future*, Oxford University Press, 1987, 383.

8.5 *Quality of Life, Welfare and Well-being*

These three terms are sometimes used in combination or interchangeably to reflect the need for a major reorientation of public policy based on the view that economic growth is not an end in itself but a means to a greater end that encompasses social, political, cultural and even psychological needs, aspirations and values of individuals and the social collective. Actions that contribute to higher rates of economic growth and higher living standards may or may not enhance human welfare, well-being, and overall quality of life. The loss of leisure time and sense of community, breakdown of the family and social cohesion, rising incidents of divorce, crime and mental illness, deterioration of social and cultural values are common concerns. This concept emphasizes the value of non-market human activities that do not fall within the monetized economy, such as household and personal services provided by members of the family, home schooling, care for children and the elderly. This broader conception recognizes the value of intangible but vitally important elements of human life, including the sense of security, belonging, social acceptance, self-esteem, and personal fulfillment.

9. Alternative Indices

The debate regarding GDP has served a meaningful purpose by helping to shape broader, more sustainable, human-centered conceptions. It has also given birth to a wide variety of alternative indices, each intended to address one or more of the deficiencies inherent in GDP. For example, Eurostat monitors 11 major categories of sustainable development indicators related to socio-economic development, sustainable consumption and production, social inclusion, demographic changes, public health, climate change and energy, sustainable transport, natural resources, global partnership and good governance, but it considers each of them separately, rather than as a composite index.²² Apart from this there have been numerous attempts to construct composite indices for economic welfare, sustainable development, quality of life and well-being. We examine a few of the most salient in this section.

9.1 *Human Development Index (HDI)*

UNDP's HDI is a composite statistic widely used by international organizations to evaluate and rank countries in terms of three main indicators of economic and social welfare — income, health and education attainments — utilizing readily available data. The income component adjusts per capita GDP as measured in constant international dollars at purchasing power parity (PPP) for inequality by discounting the income of countries that exceed the world average. Life expectancy at birth is used as an index of health. Educational attainments are measured by a weighted sum of literacy and gross enrollment rates at the primary, secondary and tertiary level, assigning two-thirds weight to the literacy subcomponent.

HDI is a relatively simple composite index with a transparent structure that readily lends itself to comprehension and analysis. It is primarily suitable as a normative tool for inter-country comparisons, especially those at the lower end of the scale, rather than as an aid to policy-formation and evaluation. It consists of three main sub-indices designed to measure per capita income, education and life expectancy, each on a scale from 0 to 1.0. Scores on

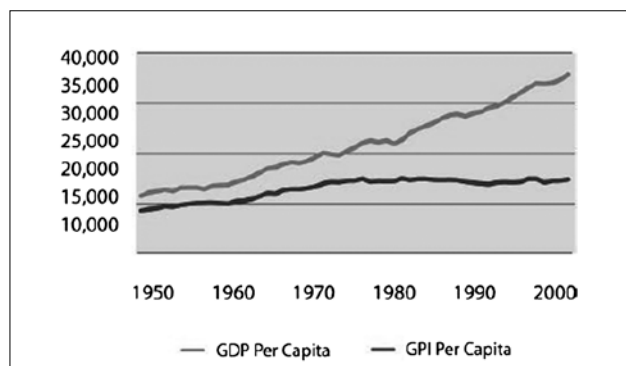
²² European Commission, "The Sustainable Development Indicators". Accessed September 2, 2010, <http://epp.eurostat.ec.europa.eu/portal/page/portal/sdi/indicators>.

the three sub-indices are averaged to arrive at an overall score for HDI.²³ Since it is based on GDP data, HDI is subject to the same limitations as GDP. The use of an abstract, arbitrary rating scale (0-100) makes it very difficult for the general public to relate to HDI's scores as a measure of welfare. The substantial weightage given to literacy (22.2%) seems inordinate considering that literacy is determined in many countries by the ability to read and write one's own name, while 11.1% is given to primary, secondary and tertiary school enrollment rates. HDI does not take into account income inequality or ecological factors.

9.2 Genuine Progress Indicator (GPI)

GPI is a complex, composite measure consisting of 51 indicators of economic welfare, sustainable development, social welfare and well-being, including consumption income, income inequality, consumer debt, underemployment, environmental degradation, breakdown of families, crime, and the value of non-monetized household and voluntary work. It is based on the personal consumption expenditure component of GDP. It measures changes in inequality rather than absolute levels of inequality based on the Gini coefficient and Income Distribution Index. It also takes into account the costs associated with pollution, resource depletion, crime, car accidents and other defensive expenditures, including loss of leisure time. GPI assigns and incorporates a dollar value for every year of higher education, household work, parenting, volunteering. While GDP data is widely interpreted to show a near tripling of per capita income in the USA during second half of the 20th Century, GPI shows 63% rise from 1950 to 1970, then a gradual leveling followed by flat or negative growth from 1980 to 2000 as shown in Figure 1. The difference between the measures is largely the result of rising marginal costs associated with income inequality, natural capital depletion, consumer durable expenditures, defensive expenditures, undesirable side effects of growth, and net foreign borrowing since 1980 as reflected in GPI.²⁴ Comparison between GDP and GPI serves as an argument that policy-making and decision-making based on the use of GDP may have been appropriate during 1950-1970, but have since become inadequate and counterproductive.

Figure 1: GDP per capita & GPI per capita 1950-2004 in \$2000



²³ UNDP, "Human Development Index: Methodology and Measurement", 1994. Accessed August 20, 2010, http://hdr.undp.org/en/media/HDI_methodology.pdf.

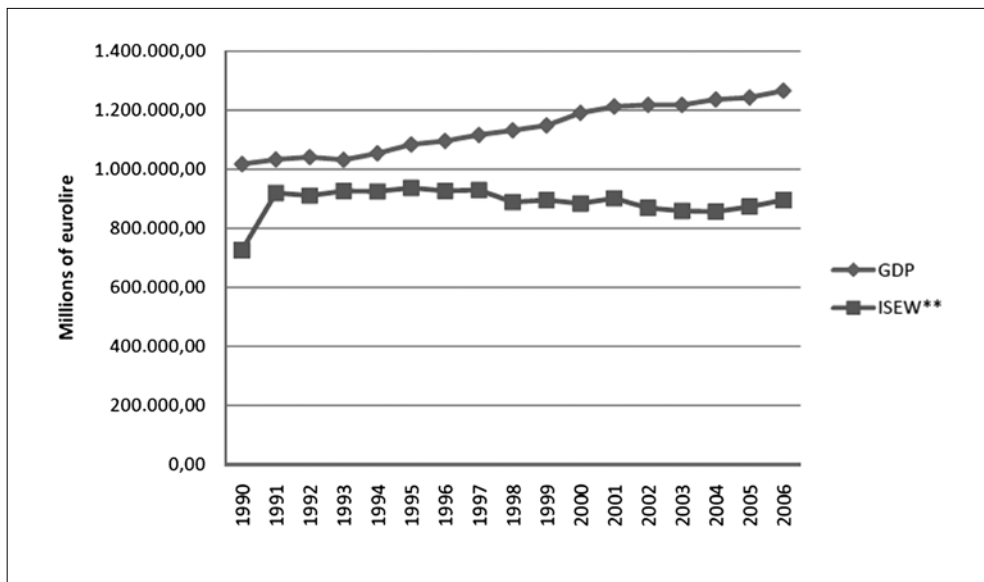
²⁴ Talberth, John., Cobb, Clifford., and Slattery, Noah. "The Genuine Progress Indicator 2006," *Redefining Progress*, February 2007. Accessed August 4, 2010, http://www.lanec.edu/sustainability/documents/Talberth_Cobb_Slattery.pdf.

GPI is an admirable attempt to assess progress on a wide range of indicators related to human welfare and quality of life. Its main advantage is that, like GDP, it is a currency denominated index and bases itself on GDP consumption data. However, the necessity of combining indicators of economic, social and ecological indicators and of assigning arbitrary monetary value to a wide spectrum of immeasurable and intangible components diminishes its credibility as a real reflection of living standards. Thus far GPI calculations are available for only a handful of OECD countries and a few cities and regions within countries. The difficulty in obtaining reliable data and evolving internationally valid standards for interpretation on a very wide spectrum of economic and social variables, e.g. time spent volunteering, obesity, drug use and mental health make it unlikely that it will gain acceptance as an alternative measure of real economic performance.

9.3 Index of Sustainable Economic Welfare (ISEW)

ISEW is a variant of GPI and is also based on GDP personal consumption data. It makes modifications to take into account services that directly influence human welfare, e.g. public non-defensive expenditures, capital formation, domestic services, the cost of environmental degradation and depreciation of natural capital. It applies the Atkinson Index to correct for income inequality. ISEW calculations have been made for Austria, Chile, Germany, Italy, Netherlands, Sweden, Australia, Belgium, Italy and USA for the period 1950 to 2000. Figure 2 compares the performance of Italy from 1990 to 2006 as measured by GDP and ISEW.²⁵

Figure 2: Performance of Italy 1990 to 2006 as measured by GDP & ISEW



²⁵ Carta, Valentina and Porcu, Mariano, "Measures of Wealth and Well-Being: A comparison between GDP and ISEW", *Working Papers 2010/06*, Centro Ricerche Economiche Nord Sud, Università di Cagliari, April 2010, 19.

9.4 Weighted Index of Social Indicators (WISP)

WISP is a composite index consisting of 40 economic and social indicators of development, welfare and well-being in 10 dimensions — economics, welfare, demography, education, health, environment, women's status, cultural diversity, social chaos, and defense. The economic sub-index includes GDP/capita, GDP growth rate, unemployment rate, external debt and Gini index as a measure of inequality. The index has been applied to rank the progress of 16 OECD and developing countries over the period 1970 to 2000. WISP arrives at scores for each of the sub-indices, which are statistically weighted by factor analysis based on an assessment of their relative contribution to social progress.

The utility of each of these and many other indices depends precisely on the intended application. GPI and ISEW require data on a wide range of factors that is only available in OECD countries. Data for HDI and WISP are available for all countries. GPI and ISEW can provide useful insights into changes over time within specific OECD countries, regions and urban areas, but are not suitable for cross-country comparisons on a global scale. GPI and ISEW both retain currency value as the unit of measure and GDP consumption related expenditure as the base. HDI and WISP utilize numerical scales unrelated to currency value. HDI is a narrow, partial measure of social development, while WISP is very broad, but lacks depth or precision in the dimensions it encompasses.

This brief summary of concepts and composite indices is intended to emphasize the complexity of the challenge we face in striving to evolve more effective measures and the inherent ambiguity of the terms used to describe various conceptions. Each of the composite indices reviewed above incorporates a range of variables that span multiple dimensions of social progress — economic welfare, development, sustainability, social welfare and well-being. The remainder of this article focuses on a narrower range of issues more strictly confined to measurement of economic welfare and proposes an alternative composite index somewhat narrower in scope but more proximate in its utility to GDP per capita.

10. Components of Economic Welfare

Much of the criticism of GDP as a measure centers around the way it accounts or fails to account for important attributes of economic welfare. In this section we examine the most prominent of these attributes and discuss the desirability and feasibility of effectively incorporating them in a composite index suitable for both cross-country and historical comparisons.

10.1 Household Income and Consumption Expenditure

GDP per capita takes into account the value of all financial transactions at market prices, including categories of expenditure such as military spending and general administration that are not directly related to household income and expenditure. Human economic welfare can be more accurately assessed by focusing on that portion of national income which relates directly to households, namely disposable income, consumption expenditure and net savings plus that portion of government expenditure related to health, education, housing, environment and social welfare.

For cross-country comparisons, the most widely available and reliable data concerns

household consumption expenditure (HCE) and human welfare-related government expenditure (HWGE), which includes government expenditure on education (Ed), health (He), housing and community amenities (HC), social protection (SP), environmental protection (EP), recreation, culture and religion (RCR). This omits expenditure on general public services, defense, public order and safety, and economic affairs. The sum of the above two components is divided by the total population to derive per capita human welfare consumption expenditure (HWE/c), which is converted to PPP constant international dollars to facilitate cross-country and historical comparisons.²⁶

$$HWE = \frac{HCE + HWGE (Ed + He + HC + SP + EP + RCR)}{(I)}$$

When applied to a cross-section of OECD and developing countries, we find that the value of HWE ranges from a low of 41% of GDP in China to a high of 88% in Russia, but for most of the sample countries it falls between 60 and 80%. HCE omits information regarding NHS, net household savings after deducting the total of all debt by households in the country, a crucial piece of information needed to assess overall human welfare and progress. Net household savings reflects the amount of financial capital available for investment by households in their future economic welfare. Combining household expenditure and household savings, we derive personal disposable income per capita (PDI): $PDI = HCE + NHS$.

Table 1 compares total GDP per capita in 2005 international dollars with human welfare-related household consumption expenditure (HCE/c), welfare-related government expenditure (HWGE/c), net household savings (NHS/c) and personal disposable income (PDI). India has the lowest GDP per capita, 45% less than China's, but India's PDI is only 10% lower. This dramatic change in relative welfare results because Chinese households receive only 50% of national income as PDI whereas Indian households receive 82%. This is consistent with the frequent assertion that growth of real wages is being suppressed by undervaluation of China's currency.²⁷ China's low HCE is offset by a high rate of capital formation (40%), which is twice the USA level and nearly three times the level in Russia, reflecting a strong political commitment to investment in GDP growth. China's low level of household consumption expenditure and relatively high household savings rate (24%) is fueled by uncertainty over provision of pensions, and the rising costs of healthcare and education.²⁸ Government welfare-related expenditure (HWGE) is nearly the same in both countries as a percentage of GDP and India's net household savings rate (30%) is 6% higher. These facts indicate that human economic welfare in India and China is much more similar than the wide gap that GDP figures reflects, but they do not invalidate China's remarkable economic gains. They only suggest that a larger proportion of those gains have thus far gone for investment in public goods than for the personal consumption and welfare. It may be justifiable as a temporary expediency, but as a long term strategy it can be used to subordinate human welfare to national economic and political power.

²⁶ The analysis done in this paper is focused on per capita human economic welfare. Therefore all the major terms are per capita terms (whether or not it is specifically stated) except where aggregate figures are necessary for purposes of comparison or calculation.

²⁷ Krugman, Paul. "Japan, China and America," New York Times, September 13, 2010.

²⁸ Aziz, Jahangir., and Cui, Li. "Explaining China's Low Consumption: The Neglected Role of Household Income," IMF Working Paper, Asia and Pacific Department, WP/07/181, 2007, 4.

Table 1: Values for GDP per capita (GDP) vs. household consumption expenditure per capita (HCE), welfare-related government expenditure per capita (HWGE), net household savings per capita (NHS) and personal disposable income per capita (PDI) in 2005 international dollars PPP. Values are for the year 2005.

A	B	C	D	E	F	G	H	I	J	K
Country	GDP	HCE	HCE as % of GDP	HWGE	HWGE as % of GDP	Total Govt Exp as % of GDP	NHS as % of PDI	NHS	PDI	PDI as % of GDP
India	2,234	1,284	57%	71	3%	10%	0.30	537	1,821	82%
China	4,076	1,535	38%	151	4%	14%	0.24	485	2,019	50%
Brazil	8,505	5,077	60%	416	5%	15%	0.07	382	5,459	64%
So. Africa	8,504	5,776	68%	773	9%	19%	0.00	6	5,782	68%
Turkey	10,977	7,462	68%	322	3%	9%	0.10	829	8,291	76%
Russia	11,861	9,233	78%	1,252	11%	19%	0.13	1,331	10,564	89%
Mexico	12,563	8,827	70%	519	4%	6%	0.07	664	9,492	76%
Croatia	14,271	8,658	61%	1,822	13%	19%	0.00	9	8,667	61%
Korea,Rep	22,783	10,568	46%	1,095	5%	10%	0.11	1,306	11,875	52%
Spain	27,377	16,467	60%	3,469	13%	19%	0.11	2,102	18,569	68%
Italy	28,144	16,165	57%	3,326	12%	19%	0.16	3,040	19,205	68%
Japan	30,310	16,331	54%	3,405	11%	17%	0.01	240	16,571	55%
Germany	31,378	17,955	57%	4,288	14%	19%	0.16	3,494	21,449	68%
Sweden	32,319	14,834	46%	5,252	16%	22%	0.08	1,350	16,183	50%
UK	32,690	21,481	66%	3,917	12%	18%	0.04	883	22,364	68%
US	41,833	29,398	70%	2,305	6%	14%	0.00	118	29,516	71%

At the upper end of the income spectrum, the GDP of first ranked USA is 28% higher than second ranked UK, while its household consumption expenditure (HCE), which constitutes 70% of GDP, is 37% larger than UK's, which constitutes 66% of GDP. However, when government welfare-related expenditures (HWGE) are taken into account, the gap declines, since HWGE in the UK is 12% of GDP compared to only 6% in USA. UK savings rate was 4% compared with a zero net household savings rate in the USA throughout the first half of the decade due to a rising level of household debt. Overall, UK spends 78% of GDP on human economic welfare (HWE) compared to 76% in USA. Thus, even though PDI is 32% higher in USA, its actual HWE is only 25% higher than UK. As we shall see, the gap in welfare between these countries shrinks even further when other aspects of human welfare are taken into account. In contrast, the GDP of third ranked Germany is 33% lower than USA, while its HWE is 43% less, in spite of the fact that HWGE in Germany (14%) is more than twice the USA level. This is explained by the fact that Germans receive a 13% lower share in national income but save a very high portion of what they receive (16%).

Among OECD countries, PDI ranges from a low of 50% of GDP in Sweden to a high of 76% in Mexico and Turkey. As expected, Sweden has the highest rate of HWGE at 16% as well as the highest proportion of overall government expenditure, 50% higher than in the USA, offset by smaller share of household consumption in GDP.²⁹ Russia's high HCE, HWGE and PDI as a percentage of GDP result from 10 percent growth rate in incomes, a doubling of real incomes and halving of the poverty rate since 2000, a 10% decline in the proportion of income spends on food from 1993-2003, an 18% compounded increase in consumer spending since 2004 reflective of a growing middle class, combined with a low flat rate 13% income tax, subsidized for housing and utilities equivalent of 20% of household

²⁹ Mukkai, Saraswathi, "Human Welfare, Consumption & Income Inequality", *MSS Research Working Papers*, The Mother's Service Society, September 2010. Accessed August 5, 2010, http://mssresearch.org/?q=Human_Welfare_Consumption_Income_Inequality.

income, a 13% savings rate, rising oil prices during that period and rising levels of direct foreign investment.^{30,31} A recent study attributes the very high level of household consumption as a percentage of income to large-scale under-reporting of income data by households.³² This analysis is intended to bring out the variety of factors that determine the relationship between GDP and human economic welfare and the fallacy of trying to deduce welfare based solely on per capita GDP.

These differences point to the need for economic theory and measurement to openly adopt a position on the purpose of economic growth and development. Like any human activity that loses sight of its central purpose and place in the wider scheme of social existence, economic growth for its own sake is subject to diminishing returns and potentially disastrous consequences. Here we are not dealing with impersonal values that are the creation of physical nature, but rather personal values which are wholly the creation of human beings and need to reflect universal human aspirations. We have both the capacity and a responsibility to redefine our concepts to reflect human values. After suffering from scarcity for millennium, it was natural of people to assume that more is always good. Today we are faced with the fallacy in the facile assumption. Everywhere we confront the consequences of unconscious and unconscionable excess that depletes the abundant riches of our natural environment, while concentrating destabilizing accumulations of wealth among the few, an essential cause for the Great Crashes of 1929 and 2008.

10.2 Income Inequality

One of the serious criticisms of GDP is its blatant disregard of income distribution. In recent decades income inequality has risen — in many cases sharply — in most countries in the world. From the 1960s to the 1990s, inequality declined in only 9 out of 73 countries for which data is available.³³ The significance of disregarding the impact of income distribution on economic welfare can be illustrated with reference to the USA, where income inequalities are at their highest levels since 1929.³⁴ In 1979, the richest 1% of American families took in about 9% of the nation's total income; by 2007, the top 1% took in 23.5% of total income. During this period, the after-tax income of this group rose by 281%, whereas the growth of the middle fifth of households averaged only 25% and the bottom fifth only 16% as shown in Figure 3.³⁵ At the very least this figure shows the illusory effect of regarding growth of GDP as synonymous with increasing general welfare. In simple terms, this means that the good news about economic progress over the past three decades applied almost exclusively to a small portion of the entire population. Krugman estimates that perhaps as much as 70% of all of the income growth in the United States during the 1980s went to the richest 1% of all families.³⁶

³⁰ "Russia: Shoppers Gone Wild", Bloomberg Business Week, Feb 20, 2006. Accessed September 1, 2010. http://www.businessweek.com/magazine/content/06_08/b3972071.htm.

³¹ Notten, Gerander, and Denis de Crombrughe, "Poverty and Consumption Smoothing in Russia", Maastricht Graduate School of Management, *Working Paper*, MGSOG/2006/WP004, 2006. Accessed September 12, 2010, <http://www.governance.unimaas.nl/home/publications/2006WP004.pdf>.

³² Gorodnichenko, Yuriy., Klara Sabirianova Peter and Stolyarov, Dmitriy, "Inequality and Volatility Moderation in Russia: Evidence from Micro-Level Panel Data on Consumption and Income", *Discussion Paper*, No. 4233, Institute for the Study of Labor (IZA), Germany, June 2009, 14. <http://ftp.iza.org/dp4233.pdf>.

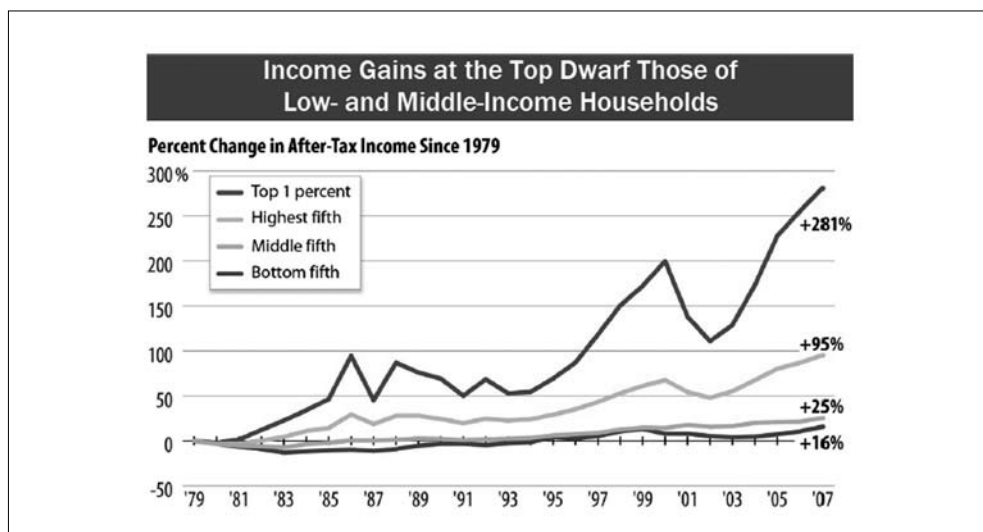
³³ Cornia, Giovanni Andrea and Court, Julius "Inequality, Growth and Poverty in the Era of Liberalization and Globalization", *WIDER Policy Brief*, No. 4, Helsinki: United Nations University World Institute for Development Economics Research, 2001, 12. Accessed June 14, 2010, http://www.wider.unu.edu/publications/policy-briefs/en_GB/pb4/_files/78807311723331954/default/pb4.pdf

³⁴ Piketty, Thomas and Saez, Emmanuel, "Income Inequality in the United States, 1913 to 1978", National Bureau of Economic Research *Working Paper* 8467, USA, 2001. Accessed August 22, 2010, <http://www.nber.org/papers/w8467.pdf>.

³⁵ Sherman, Aloc., and Stone, Chad, "Income gaps between very rich and everyone else more than tripled in last three decades", Center on Budget & Policy Priorities, USA, June 25, 2010. Accessed August 4, 2010, <http://www.cbpp.org/files/6-25-10inc.pdf>.

³⁶ Krugman, Paul. "The Rich, the Right, and the Facts," *The American Prospect*, 11 (1992): 19-31.

Figure 3: Percent Change in After-Tax Income since 1979 in USA



Thus, it is evident that income distribution is an important determinant of the impact of economic growth on economic welfare. As Stiglitz, Sen and Fitoussi observe in the report of the Commission on the Measurement of Economic Performance and Social Progress, “When there are large changes in inequality (more generally a change in income distribution), gross domestic product (GDP) or any other aggregate computed per capita may not provide an accurate assessment of the situation in which most people find themselves. If inequality increases enough relative to the increase in average per capita GDP, most people can be worse off even though average income is increasing.”³⁷

10.2.1 Impact of Inequality on Economic Welfare

High levels of inequality are associated with a wide range of social ills. Studies in the USA show that states with greater inequality in the distribution of income also had higher rates of unemployment, higher rates of incarceration, a higher percentage of people receiving income assistance and food stamps, and a greater percentage of people without medical insurance. The gap between rich and poor was the best predictor of these problems, not the average income in the state. In addition, states with greater inequality of income distribution also spent less per person on education and had lower school completion rates, poorer educational performance, a greater proportion of babies born with low birth weight, higher rates of homicide, higher rates of violent crime, a greater proportion of disabled workers, and a higher proportion of the population being inactive.^{38, 39}

³⁷ Stiglitz, Joseph E., Sen, Amartya and Fitoussi, Jean-Paul, *Report by the Commission on the Measurement of Economic Performance and Social Progress*, 2009, 8, Accessed August 4, 2010, http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf.

³⁸ Yates, Michael, “Poverty and Inequality in the Global Economy”, *Monthly Review*, 55 (2004):9. Accessed February 14, 2010, <http://monthlyreview.org/0204yates.htm>.

³⁹ Yates, Michael, *Naming the System: Inequality and Work in the Global Economy*, New York: Monthly Review Press, 2003, 58-60, quote from Peter Montague, “Economic Inequality and Health.”

While income inequality is considerably lower in countries such as Germany and Japan than it is in USA, it is even higher in Argentina, Brazil, Malaysia, Mexico, and South Africa and only marginally lower in China and Russia. Indeed, the same distorting impact of income inequality on the validity of per capita GDP is universal. Internationally, high levels of inequality are also associated with lower levels of economic growth, decreasing life expectancy, poorer educational performance, increasing crime rates, higher levels of corruption, and increased macro-economic instability, as well as low levels of development of human capital.⁴⁰ Wilkinson and Pickett found that the incidence of health and social problems is higher in countries with higher levels of inequality.⁴¹ Countries at the same level of per capita income vary widely in health and social problems due to differences in income distribution. Income inequality is a more accurate predictor of problems than actual level of income.⁴²

More equitable distribution is linked to higher levels of economic growth. IMF research confirms the “growing recognition that an excessively unequal income distribution may itself be detrimental to sustainable growth.”⁴³ High inequality reduces economic development by slowing poverty eradication, retarding investments in education, and inhibiting entrepreneurship.⁴⁴ World Bank and others have drawn attention to health as a factor in economic development.⁴⁵ Health is an important determinant of the productivity of human capital. Fogel found that one third or more of the economic growth in England over the past two centuries was attributable to improvements in nutrition.⁴⁶ As we have shown above, inequality has detrimental effect on health and life expectancy, thereby decreasing economic growth. Bloom and Canning found that an extra year of life expectancy is associated with a 4% rise in per capita GDP in the long run.⁴⁷ They argue that healthy individuals are more efficient at assimilating knowledge and, in consequence, attain higher productivity levels.⁴⁸ Employment and income distribution are also closely related. While employment rates and incomes levels tend to be high for educated and skilled workers, unemployment and underemployment are much higher for those with lower levels of educational attainment, especially among youth, the poor and the unskilled in many countries.

High levels of inequality are also associated with economic instability. Rising levels of income inequality result in the increasing concentration of wealth, a major source of international currency flows and speculative investments and a contributor to traumatic economic events. Since the rich spend a much smaller proportion of their incomes than other income groups, a rise in income at the top creates fewer jobs and slower growth. In addition much of their earnings are invested in commodities, stocks and real estate, a stimulus to price bubbles.⁴⁹ The period 1910-1929 leading up to the Great Crash in the USA was characterized

⁴⁰ International Labour Organization. “World of Work Report 2008: Income Inequalities in the Age of Financial Globalization”, International Institute for Labour Studies: Geneva, Switzerland, 2008, 2, 23. Accessed July 28, 2010.

⁴¹ Wilkinson, R. and Pickett, K. *The Spirit Level: Why Equality is Better for Everyone*, Penguin: London, UK, 2009.

⁴² Aguayo-Rico, A., Guerra-Turrubiates, I.A., Montes, R. “Empirical Evidence of the Impact of Health on Economic Growth”, *Issues in Political Economy*, 14 (2005). Accessed June 4, 2010, <http://org.elon.edu/ipe/aguayorico%20final.pdf>.

⁴³ Camdessus, Michael. Opening Remarks, International Monetary Fund, June 1, 1995, Accessed July 7, 2010, <http://www.imf.org/external/np/sec/mds/1995/mds9509.htm>.

⁴⁴ Ramcharan and Rodney, “Inequality Is Untenable”, *Finance & Development*, 47 (2010), IMF, September 2010.

⁴⁵ Rivera, B. and Currais, L. “The Effect of Health Investment on Growth: A Causality Analysis”, *IAER*, 9 (2003): 312-324.

⁴⁶ Fogel, R.W. “Nutrition, Physiological Capital, and Economic Growth.” Presented at Senior Policy Seminar on Health, Human Capital and Economic Growth: Theory, Evidence and Policies of the Pan American Health Organization (PAHO) and Inter-American Development Bank (IADB), Washington, DC, USA, October 2002. Accessed June 3, 2010, <http://www.paho.org/English/HDP/HDD/fogel.pdf>.

⁴⁷ Bloom, D.E., Canning, D., Sevilla, J., “The Effect of Health on Economic Growth: A Production Function Approach”, *World Development*, 32 (2004): 32, 1-13.

⁴⁸ Bloom, D.E., Canning, D. “The Health and Wealth of Nations”, *Science*, 287 (2000): 1207-1209.

⁴⁹ Reich, Robert B. “How to End the Recession”, *The New York Times*, Sept. 2, 2010. Accessed August 4, 2010, <http://www.nytimes.com/2010/09/03/opinion/03reich.html>.

by a near doubling of the share of income going to the top 1% of the income distribution. In the 1920s, 5% of Americans earned a third of the total national income and the top 1% owned an all-time-high 36% of the nation's assets.⁵⁰ The same phenomenon repeated during the period 1989-2008 immediately preceding the current international financial crisis. Meanwhile, household debt in the USA as a share of GDP increased by 50%. While in 1987 the bottom half of American households' debt was roughly equivalent to its net wealth, in 2008 its debt was twice the value of its net wealth.⁵¹

Over the past decade, a similar imbalance has occurred internationally, leading to what has been aptly termed a global savings glut. It has been accompanied by weak investment and sluggish consumption.⁵² From 1980 to 2006, total international financial flows rose from \$12 trillion to \$167 trillion, a fourteen-fold increase in 26 years, equivalent to almost three times total world GDP. Since 2004, currency trading has soared 69% to over \$4 trillion per day.⁵³ In 2000, the financial assets held by the wealthiest 7.2 million individuals in the world, representing 0.1% of the world's population, were valued at US\$27 trillion, equivalent to almost half of the entire world's GDP (\$61 trillion). The assets of the top 200 richest people amount to more than the combined income of 41% of the world's population.⁵⁴ Of course, not all concentration of wealth is detrimental to social progress. It is also the source of huge philanthropic endowments in support of health, education, research and cultural activities by well-known foundations such as Carnegie, Rockefeller, Gates and many others. Charitable donations in the USA were over \$300 billion in 2009, equivalent to 2.2% of GDP or about 10% of the total PDI of the top 20% of US households.⁵⁵ Although 89% of American households give to charity, a large portion of this comes from the top income group.

The impact of income inequality on economic growth and human welfare consumption expenditure is complex and difficult to isolate from innumerable other factors. But the notion that high levels of inequality are necessary for high rates of economic growth is clearly not valid. During the period 1950 to 1973, a period of falling inequality within most countries, the world experienced the fastest rates of economic growth in recorded history, with the exception of subsequent achievements by the Asian Tigers. In contrast, the post-1973 has seen much slower rates of economic growth amid rising levels of income inequality.⁵⁶ It is equally evident that high levels of inequality can curtail human economic welfare, as when rural land assets are concentrated in the hands of a landlord class employing landless laborers at subsistence wages. High income inequality can also retard investments in human capital, which are essential for rising living standards.

The importance of measuring income inequality is heightened in an age of globalization. Even while inter-country inequalities have declined in some cases, studies by Cornia and

⁵⁰ For incisive analysis of inequality and its economic consequences: X. Sala-i-Martin "The World Distribution of Income - Falling Poverty and Convergence Period", *Quarterly Journal of Economics*, May 2006; B. Milanovic, "Worlds Apart: Measuring International and Global Inequality", Princeton Univ. Press, Princeton, 2005; "Where in the world are you", World Bank Working Paper, Dec 2007; and "An even higher global inequality than previously thought", Dec 2007.

⁵¹ Oman, William. "Does income inequality increase economic and financial instability?" *Global Policy Journal*, September 6, 2010. Accessed September 5, 2010, <http://www.globalpolicyjournal.com/blog/06/09/2010/does-income-inequality-increase-economic-and-financial-instability>.

⁵² Lipsky, John. "Financial Market Turbulence and Global Imbalances," Conference on European Economic Integration, IMF, November 19, 2007. Accessed July 5, 2010, <http://www.imf.org/external/np/speeches/2007/111907.htm>.

⁵³ Lauricella, Tom., and Dave Kansas. "Currency Trading Soars", *Wall Street Journal*, Sept 1, 2010. Accessed August 6, 2010, <http://online.wsj.com/article/SB10001424052748704421104575463901973510496.html>.

⁵⁴ International Development Economics Association. "Globalisation and Income Inequality: A Survey." Accessed August 14, 2010, http://www.networkideas.org/feathm/aug2002/ft19_Globalisation_Survey.htm.

⁵⁵ Giving USA Foundation, "U.S. Charitable Giving Estimated to Be \$307.65 Billion in 2008", Accessed August 10, 2010, http://www.philanthropy.iupui.edu/News/2009/docs/GivingReaches300billion_06102009.pdf.

⁵⁶ Lee, Marc. "The global Divide: Inequality in the World economy", *Behind the Numbers, Economic Facts Figures and Analysis*, 4 (2002).

Kiiski and others have found increased intra-country inequalities.⁵⁷ While the progress of China over the past 35 years is largely responsible for the reduction in cross-country inequality, intra-country income inequality within China as measured by the Gini coefficient rose 30% from 1980 to 2005.⁵⁸ Intra-country inequality is also increasing among the wealthiest countries. As UNDP has pointed out, in 1960 the top 20% of the world's people in the richest countries had 30 times the income (in terms of total GDP) of the poorest 20%. This grew to 32 times in 1970, 45 times in 1980, and 59 times in 1989. By 1997, the top 20% received 74 times the income of the bottom 20%. While economic growth in the 19th century was largely driven by increasing capital investment in industry, we now live in a world of excess production capacity where growth depends primarily on increasing levels of consumption expenditure, which means that the greatest benefit will accrue from raising the incomes of the 2.8 billion people living on less than \$2 per day, who have the highest marginal propensity to consume.⁵⁹

10.2.2 Theories of Income Inequality

Rising levels of inequality result from multiple causes, including a rising share of capital in total income as well as increases in earnings inequality, rural-urban and regional differences, technology change, trade and financial liberalization, privatization, taxation policies and change in labour market institutions.⁶⁰ It is evident that new economic theory is needed to explicate the relationships between these factors and that new empirical research is needed to measure its expressions in different countries and under different circumstances.

Barro cites four broad categories of economic theory that have been constructed to assess the macroeconomic relations between inequality and economic growth. These theories can be classed according to the main feature stressed: credit-market imperfections, political economy, social unrest, and saving rates. As he observes, each of these theories has offsetting effects that lead to ambiguous conclusions. Based on his empirical research, Barro concluded that income-equalizing policies might be justified on growth promotion grounds in poor countries, but not necessarily in more prosperous countries.⁶¹

A true perspective on the role of inequality can only emerge when this issue is viewed from the wider perspective of social development theory. Differences in levels of accomplishment can ignite aspirations and act as a powerful spur to growth and development, provided the distance and obstacles are not so great as to discourage effort and generate alienation. Much more theoretical and empirical work is needed regarding the impact of economic inequality on overall levels of economic welfare, sustainable social development, human welfare and well-being. Both theoretical and practical efforts to assess the real impact of economic activity on human welfare at the household level necessitate the inclusion of some measure of income distribution.

⁵⁷ Cornia, Giovanni Andrea and Kiiski, Sampsa, "Trends in Income Distribution in the Post-World War II Period: Evidence and Interpretation", *WIDER Discussion Paper*, No. 89, Helsinki: United Nations University World Institute for Development Economics Research, 2001.

⁵⁸ Wolf, Martin, "The Big Lie of Global Inequality," *Financial Times*, February 8, 2000.

⁵⁹ UNDP, "Human Development Report 1999", United Nations Development Programme. Accessed July 13, 2010, http://hdr.undp.org/en/media/HDR_1999_EN.pdf.

⁶⁰ Cornia and Court, *op.cit.*, p. 12-22.

⁶¹ Barro, Robert J. "Inequality and Growth in a Panel of Countries", *Journal of Economic Growth*, 5(2000): 5-32. Accessed August 10, 2010, http://www.economics.harvard.edu/faculty/barro/files/p_inequalitygrw.pdf.

10.2.3 Measuring Income Inequality

Many economists have long been arguing for inclusion of income distribution in measures of human welfare. The Gini coefficient is the most frequently-used index for assessing differences in inequality between countries and over time. But Gini is a stand-alone figure that is not based on any distributional model. Nor does it tell us where within a population the inequality occurs or the impact of that inequality on human economic welfare of the society. Based solely on net household income, Gini does not accurately reflect differences in wealth. Some countries with a relatively low coefficient of inequality for income have a much higher coefficient for inequality of wealth. Nor does it reflect differences in inequality of opportunity arising from social barriers to upward mobility. In addition, Gini does not take into account non-monetized goods and services, such as the consumption of home-grown food, which is very high among the rural poor in many countries, e.g. estimated at 25% in Russia.

Other measures of inequality are subject to similar constraints. The quintile or weighted average method, Atkinson method and max-min method apply alternative approaches which explicitly introduce distributional objectives into measures of inequality. Jorgenson showed how information about consumption expenditure and aversion towards inequality can be combined to yield a measure of living standards.⁶² Other measures of inequality include the Hoover Index and Theil Index, each with its own utility and limitations. Hoover measures the proportion of all income which would have to be redistributed to achieve a state of perfect equality on a scale of 0 (perfect equality) to 1 (maximum inequality). Theil is a measure of distributional entropy on a scale of 0 to 1. It takes an 18:82 ratio of income distribution as equal to 0 and a state of maximum entropy in which income earners cannot be distinguished by their resources as equal to 1. Theil has the added characteristic of being decomposable to distinguish between inequality in different sub-regions.⁶³ The Atkinson Index has the ability to gauge movements in different segments of the income distribution. It can be converted into a normative measure by imposing a coefficient to weight incomes. UNDP and Eurostat monitor inequality by the ratio of total disposable income received by the 20% of the population with the highest income (top quintile) to that received by the 20% of the population with the lowest income (lowest quintile).

Gini measures differences in income between a state in which all households in the population have the same income and the Lorenz curve which measures the actual distribution. Country scores on the Gini index range from a low of 23 in Sweden to a high of 60 or more in several African nations. The quintile dispersion method shows that the ratio of the lowest to highest income groups ranges from 3.4 in Japan, 4.3 in Germany, and 4.9 in India, to 8.4 in USA, 10.7 in China, 23.7 in Brazil and 57.6 times in Sierra Leone.⁶⁴

Most of these indices are based on complex statistical calculations and summarize inequality in the entire income range. Each provides some insight into the extent and distribution of inequality, but they are not strictly comparable because they have different levels of sensitivity to incomes in different parts of the distribution.⁶⁵ For example, Theil and Hoover give contrasting results depending on whether the income distribution is characterized

⁶² Jorgenson, D.W. "Consumer Behaviour and the Measurement of Social Welfare", *Econometrica*, 58(1990): 1007-1040.

⁶³ Chaudury, Sunil, *Global Encyclopaedia of Welfare Economics*, New Delhi: Global Vision Publishing House, 2009, 144-145.

⁶⁴ UNDP, "Human Development Report 2006", *United Nations Development Programme*, p. 335.

⁶⁵ Litchfield, Julie A., "Inequality: Methods and Tools", *World Bank*, 4. Accessed July 16, 2010, <http://siteresources.worldbank.org/INTPGI/Resources/Inequality/litchfie.pdf>.

by high or low levels of inequality. Atkinson's sensitivity varies according to the level of inequality and weight assigned to the normative coefficient. Ryscavage applied four of these indices to measure income inequality in the USA from 1967 to 2006 and found significant variations both in the extent of inequality recorded as well as the rate of change over time.⁶⁶

One limitation of these methods is that they generate a separate score for income inequality but do not correlate it with actual income level. To overcome this limitation, in 1976 Amartya Sen proposed the Social Welfare Function (SWF), which multiplies mean per capita GDP by one minus Gini to arrive at an adjusted per capita income. $SWF = GDP/c * (1-G)$. An advantage of this approach is that it is a real-valued function which enables monitoring of changes in per capita income in a manner that more closely approximates the actual impact on the majority of households. SWF is a measure of both equality and efficiency. It reflects both overall economic performance as well as income distribution. It can rise as a result either of higher economic performance or more equitable distribution. Mukhopadhaya has proposed an alternative SWF to eliminate its inherent bias toward higher income groups.⁶⁷

10.2.4 Maximizing Growth & Equality

Like other measures of inequality, Sen's SWF is primarily intended to measure income distribution, not overall economic welfare. There is no justification for concluding that such a perfect state of equality as measured by Gini would lead to the optimal level of economic welfare for the population as a whole. Rather it may lead to a state in which on average everyone is equally less well off. For these reasons, SWF cannot be regarded as an effective measure of human welfare, even if it is found to be an accurate index of income inequality. Moreover, different measures of inequality result in different SWF functions. To illustrate, we compared SWFG based on Gini with SWFT, a similar function using the Theil Index for several countries based on data for the year 2000. For Brazil, SWFT was more than twice as large as SWFG. For UK, it was 46% larger.

Promoting greater political, economic and social equality are valid goals in their own right. But our objective here is more limited. It is to measure overall economic welfare, rather than income inequality or social equity. Income inequality, like social status and other forms of social differential, plays both a positive and a negative role in development, as a stimulus to social aspirations and as an impediment to the full and effective utilization of national wealth for human welfare. As Raghuram Rajan, former IMF Chief Economist, observes in his recent book *Fault Lines*, "Not all forms of income inequality are economically harmful. Higher wages serve to reward the very talented and hardworking, identify the jobs in the economy that need the most skills, and signal to the young the benefits of investing in their own human capital. A forced equalization of wages that disregards the marginal contribution of different workers will deaden incentives and lead to a misallocation of resources and effort."⁶⁸

Although we know that not all income inequality can be considered detrimental to economic welfare, the precise relationship between equality and efficiency is complex and unknown. We cannot assume that a completely equal distribution of income would lead

⁶⁶ Ryscavage, Paul, *Rethinking the Income Gap*, New Jersey : Transaction Publishers, 2009, 31.

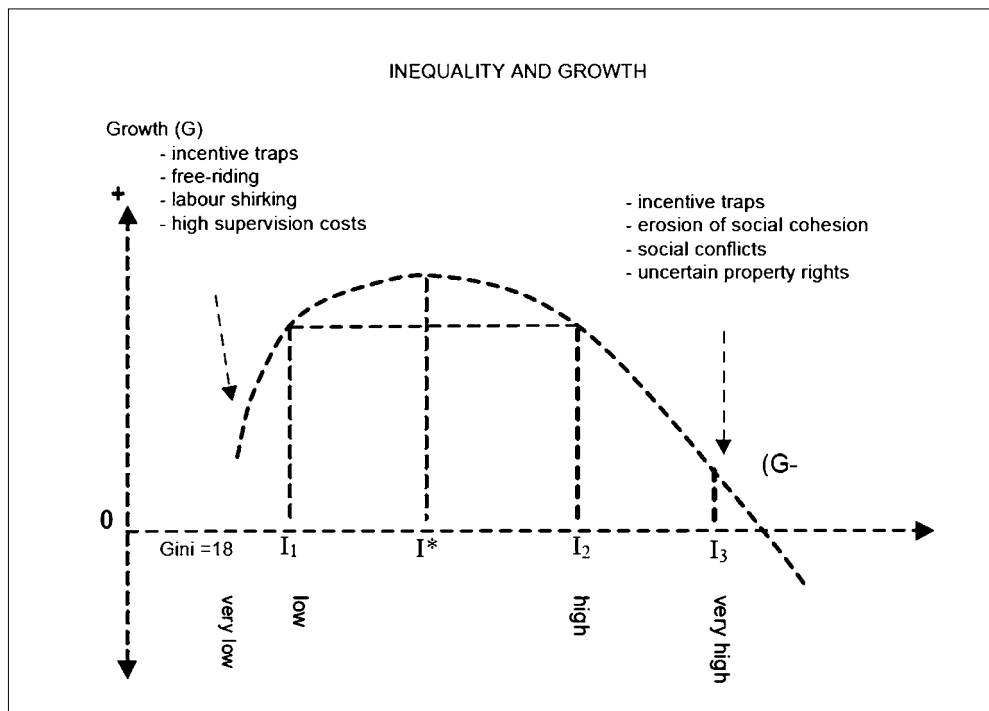
⁶⁷ Mukhopadhaya, Pundarik, "Efficiency Criteria and the Sen-type Social Welfare Function", *Working Paper*, No. 0114, Department of Economics, National University.

⁶⁸ Rajan, Raghuram, *Fault Lines*, Princeton University Press, 2010, 183.

to optimum social benefits, since beyond a certain level greater equality may discourage innovation, initiative and incentives for higher performance. Indeed, differences in level of attainment act as an essential stimulus to economic progress, as they do to progress in all fields of human activity. We may find, for instance, that the reductions in the income differences between the top and bottom income groups of a population result in higher levels of consumption and employment generation, whereas reduction of inequalities within each subset of total population reduce the motivation for higher performance. Thus, we need to take into account both the negative and positive effects on inequality on human economic welfare.

Cornia and Court address the complex relationship between inequality and growth. They define an 'efficient inequality range' as an inequality range that is most efficient for economic growth as depicted in Figure 4. They postulate that this range probably lies somewhere between a Gini value of 0.25 typical of Northern European countries and value of 0.40 in USA and Russia. "Any country that intends to maximize poverty reduction should choose the lowest level of inequality (I1) within the efficient inequality range (I1-I2). Aiming for the lower end of range is important because one obtains the same level of growth at lower levels of inequality, but it allows the reduction of poverty at a faster rate."⁶⁹

Figure 4: Inequality & Growth



⁶⁹ Cornia and Court, *op.cit.*, p. 27-28.

10.2.5 Economic Welfare Index

Note that both Sen's SWF as well as Cornia and Court's efficient inequality range focus on economic growth rather than economic welfare of individuals and households, which is the focus of this paper. For this reason, we support efforts to define a variant of the 'efficient inequality range' which is most conducive for human economic welfare, rather than growth per se. We recognize that this range may vary widely between different countries and conditions. Although the exact composition of the range is not known, we can readily conceive of a hypothetical balance between income distribution and incentives for income generation which might achieve the goal of optimizing human economic welfare for the society as a whole. Therefore, we need to adjust SWF for efficiency. We introduce a coefficient of efficiency e . The value of e ranges between 0 and 1. The lower the value of e , the higher the level of inequality required for optimal economic welfare. In addition, it is evident that countries which have already achieved low levels of inequality will have lower values of e than countries presently operating at high levels of inequality.

Our approach differs from Sen's SWF and others in one other important respect. The indices of inequality discussed above are typically applied to measure income inequality and take GDP as the base. Our objective here is to measure the impact of inequality on levels of welfare-related household consumption expenditure rather than income. Consumption inequality is typically lower than income inequality, because high income households consume a much lower percentage of their total income than low income households. For this reason, we cannot apply income inequality metrics to household consumption in their present form. We need to also adjust SWF by a coefficient c representing the difference between income inequality and consumption inequality in the population. In this paper we propose a new index, the Economic Welfare Index (EWI), which is a modification of Sen's SWF designed to reflect that portion of inequality which negatively impacts on economic welfare as measured by household consumption expenditure. EWI is derived by converting Gini into G_{ec} according to formula 2 below.⁷⁰ G_{ec} represents that proportion of the Gini coefficient which is compatible with optimal levels of economic welfare as measured by household consumption expenditure. Note that G_{ec} increases as Gini rises, reflecting the fact that high Gini countries have a greater potential for reducing inequality without dampening economic incentives that promote human welfare.

$$G_{ec} = 0.65 \text{ Gini} - 0.1$$

----- (2)

G_{ec} is intended to measure income inequality against a standard of 'optimal welfare inequality', which can be defined as that the lowest level of inequality compatible with the highest level of overall human economic welfare for the society as a whole.

EWI is personal disposable income (PDI) multiplied by G_{ec} plus government welfare-related expenditure on households (HWGE). Note that HWGE is not adjusted by G_{ec} since the distribution of government services is far more equitable than the distribution of income and consumption expenditure and is skewed in favor of lower income families.

$$EWI = PDI (1 - G_{ec}) + HWGE$$

$$EWI = PDI (1.1 - 0.65G) + HWGE$$

----- (3)

⁷⁰ Gini values have been developed to measure both pre-tax and after-tax inequality. As far as possible, the Gini values used in this study are the after-tax values, since the objective is to measure the impact of inequality after taking into account transfers to and from government.

This equation adjusts PDI to take into account the impact of inequality on optimal economic welfare. Further research is needed to more precisely determine the value of G_{ec} under different circumstances.

Table 2 shows that when adjusted for inequality (G_{ec}) per capita disposable income (col G - col D) declines by a minimum of 3% in Sweden and 5% in Korea to a maximum of 17% in Brazil and 23% in South Africa. The difference is reduced when we factor in the government human welfare-related expenditure, which is more equitably distributed among the population. In this case five countries actually register a rise in economic welfare as a percentage of GDP by (col I - col D) 3% in Italy and UK, 5% in Japan and Spain, 7% in Germany and 14% in Sweden. This illustrates the problem of viewing per capita GDP or even PDI without factoring in both inequality and welfare-related payments by government. When measured by EWI, the USA still remains the most prosperous nation followed by Germany. Surprisingly we find that while China's per capita GDP is 66% higher than India's, its EWI is only 5% more. This results from the fact that India's personal disposable income represents 82% of GDP whereas China's is only 51%. At the upper end, USA's GDP is 28% higher than second ranked UK, but its EWI is only 17% higher than UK and 16% higher than second ranked Germany.

Table 2: Values for GDP per capita (GDP), personal disposable income per capita (PDI) and Economic Welfare Index per capita (EWI) in 2005 international dollars PPP, Gini, Gini adjusted constant (G_{ec}). All values are for the year 2005

A	B	C	D	E	F	G	H	I	J	K	L
Country	GDP	PDI	PDI as % of GDP	Gini	G_{ec}	PDI- G_{ec} as % of GDP	EWI	EWI as % of GDP	Rank by GDP	Rank by PDI	Rank by EWI
India	2,234	1,821	82%	0.37	0.14	70%	1,638	73%	16	16	16
China	4076	2,019	50%	0.42	0.17	41%	1,827	45%	15	15	15
Brazil	8,505	5,459	64%	0.56	0.27	47%	4,420	52%	13	14	14
S. Africa	8504	5,782	68%	0.65	0.32	46%	4,690	55%	14	13	13
Turkey	10,977	8,291	76%	0.43	0.18	62%	7,112	65%	12	12	12
Mexico	12,563	9,492	76%	0.47	0.21	60%	8,060	64%	10	10	11
Croatia	14,271	8,667	61%	0.29	0.09	55%	9,720	68%	9	11	10
Russia	11,861	10,564	89%	0.38	0.14	76%	10,297	87%	11	9	9
Korea,Rep	22,783	11,875	52%	0.31	0.10	47%	11,764	52%	8	8	8
Italy	28,144	19,205	68%	0.35	0.13	60%	20,082	71%	6	4	5
Japan	30,310	16,571	55%	0.32	0.11	49%	18,186	60%	5	6	7
Spain	27,377	18,569	68%	0.32	0.11	61%	20,057	73%	7	5	6
Germany	31,378	21,449	68%	0.3	0.10	62%	23,700	76%	4	3	2
Sweden	32,319	16,183	50%	0.23	0.05	47%	20,592	64%	3	7	4
UK	32,690	22,364	68%	0.35	0.12	60%	23,488	72%	2	2	3
US	41,833	29,516	71%	0.38	0.15	60%	27,483	66%	1	1	1

10.3 Employment

In a market economy where employment is the principal means by which people acquire access to the income needed for goods, services and economic security, unemployment is the severest form of deprivation, akin to political disenfranchisement in a democracy. Policy-makers certainly recognize the potential political power of the unemployed, provided this disparate group could ever get organized. Government officials recognize the linkage between rising levels of unemployment and other social ills such as crime, violence, drug

use and social unrest. Wray observes that the direct social costs of unemployment in the USA are equal or greater in value to the financial cost of guaranteeing them employment.⁷¹ Unemployment and underemployment also represent severe forms of wastefulness, waste of human resources. Like other perishable goods, unutilized human capacities tend to degenerate over time, both from want of usage and because of the increasing social alienation and loss of self-esteem associated with unemployment. The remarkable decision of the Government of India to guarantee a minimum of 100 days per year of employment to the 45 million poorest households is testament to the growing recognition of the essential role of employment in human welfare.

Yet in spite of these facts, the plight of the unemployed is largely ignored by traditional income measures of human welfare and by many broader indices of social progress. Eurostat includes six individual measures of employment and unemployment in the list of Sustainable Development Indicators which it monitors. But of the composite indices discussed in Section 6, only WISP incorporates a direct measure of unemployment. The Calvert-Henderson Quality of Life indicators include 10 different measures of employment and unemployment, but it relies on data that is available in the USA and only a few other countries.

One obvious reason for the omission of unemployment in aggregate measures of human welfare is the difficulty that arises in assigning a market value to unemployment. Reliable measures of unemployment are themselves difficult to obtain. Even in OECD countries, the official figures mask the fact that large numbers of people have dropped out of the job market in discouragement and resignation. When underemployment is taken into account, actual levels may be considerably higher than official figures.⁷² A study in Australia in 2003 found that 25% of part-time workers sought an average of 37.5% longer working hours.⁷³ These studies cannot detect what ILO terms 'invisible underemployment', which refers to situations where workers were not fully using their skills in their current employment (because the job itself is low-skill and/or the worker is idle part of the time). In most developing countries where the informal sector predominates, official figures are even less reliable. In India, for example, the informal sector accounts for about 90% of total employment. Government is simply unable to monitor what is happening to huge numbers of new entrants to the workforce, although rising wage levels and increasing shortages of labor suggest that job growth equals or may even exceed growth of the labour force. To illustrate the magnitude of the problem, while ILO figures report an average unemployment rate in India of 2% during the period 2000, an Indian government expert task force concluded the actual figure was 7.3%.⁷⁴ For the purposes of this study, ILO data has been used for all countries.

It may be argued that the impact of unemployment on human welfare is already reflected in per capita GDP and measures of inequality, making inclusion of a separate index redundant. However, a recent ILO study confirms that this is not the case. "No clear link emerges between overall changes in employment and inequality. Some countries have created many jobs and at

⁷¹ Wray, Randall, "Full Employment Through Direct Job Creation", Webcast presentation to the World Academy of Art & Science, November 10, 2009. Accessed June 30, 2010, <http://www.worldacademy.org/files/Job%20Guarantee%20Wray%20presentation%20on%20Nov%2010%202009.pdf>.

⁷² ILO maintains a database of estimated underemployment in many countries, results ranged from a low of 1.1% of total employment time in USA to 13.9% in Argentina. Studies of specific groups and locales cannot accurately assess the larger problem. Even this data is not available for many countries.

⁷³ Mitchell, William and L. Randall Wray, "Full Employment through Job Guarantee: A Response to Critics", *CFEPS Working Paper 39*, Center for Full Employment & Equity, University of Newcastle, Australia, Jan 2005, 9. Accessed July 29, 2010, <http://e1.newcastle.edu.au/coffee/pubs/wp/2004/04-13.pdf>.

⁷⁴ Planning Commission, "Special Group on Targeting Ten Million Employment Opportunities per Year", Government of India, 2002, 134.

the same time income inequality increased significantly. Other good employment performers saw stable or even declining income inequality... to some extent, this reflects the diverse nature of the jobs created.”⁷⁵ Over the past two decades, relatively robust growth in employment has been accompanied by rising levels of inequality. The ILO report attributes this finding to changes in the structure of employment, including an increase in part-time, temporary and informal employment. Furthermore, in recent years there is a growing prevalence of jobless growth, a condition in which GDP rises but unemployment remains high. For these reasons, we argue that separate indices of employment and unemployment need to be incorporated in a composite index of economic welfare.

The task of accounting for the economic impact of unemployment is complicated by the fact that there are different types of unemployment and not all types have equal impact on economic welfare. Workers aged 15 to 24 represent about a quarter of the world’s labour force, ranging from 8 to 16% in Europe and North America to 18% in China, 23% in India and 28 to 30% in most parts of Africa. Youth employment is of crucial importance since it reflects on the capacity of the society to generate sufficient job opportunities for the next generation and to prepare them adequately to avail of the opportunities. In marked contrast to previous recessions, rising levels of long term unemployment is a striking characteristic of the current economic downturn in the USA and other OECD countries. In the USA, 46% of the unemployed have been out of work for more than six months and their jobs are unlikely to come back.⁷⁶ Measures of long term unemployment, as well as the average length of unemployment in that group, provide valuable information regarding economic welfare and security.

The problem of long term unemployment is compounded by high levels of unemployment among those 55 years of age or older, as a result of age discrimination when jobs are scarce, increasing obsolescence of skills as a by-product of rapid technological advancement, and the economic dislocation experienced by transition economies. Today 2.2 million American workers over 55 are unemployed, half of them long term, and the poverty rate among this group has risen significantly.⁷⁷ Increasing life expectancy magnifies the problem of those above 65 years of age who are compelled to retire but do not have adequate savings or pensions to ensure economic security during an extended period of retirement, as well among those who are still healthy and eager for gainful employment.

In addition to differences in levels of unemployment, countries also vary enormously in the overall employment-to-working-age-population-ratio (EPR). EPR is an important index of the utilization of human resources. From 1970 to 1990 the employment-to-population ratio (EPR) for those 65 years and above fell dramatically in OECD countries but it has since begun to rise again in many countries, with the exception of Europe. In an effort to raise 20 million people out of poverty, the European Union has committed to raising EPR for the age group 20-64 by 6% by 2020. Low EPR in OECD countries usually reflects a low level of participation by women in the workforce as the result of cultural tradition and gender discrimination. Low EPR for 15-64 age group can also results from high levels of tertiary education. EPR for many developing countries is higher than OECD rates, usually because of the large percentage of the workforce engaged in agricultural operations. Therefore measures of EPR for the age group 25+ may be considered more reliable. ILO is the only source of

⁷⁵ International Labour Organization, *op. cit.*, p.115.

⁷⁶ Semuals, Alana, “For Many Unemployed Workers, Jobs Aren’t Coming Back”, *Los Angeles Times*, Sept. 5, 2010. Accessed August 4, 2010, <http://articles.latimes.com/2010/sep/05/business/la-fi-america-unemployment-mainbar-2010090>.

⁷⁷ Rich, Motoko, “For the Unemployed Over 50, Fears of Never Working Again”, *New York Times*, Sept. 19, 2010.

EPR data for all countries and they use an open ended measure for population aged 15+ and 25+. One advantage is that it does not place an arbitrary limit on retirement age. Data for both employment and unemployment rates for most developing countries are based on rough estimates or sample surveys, which are inherently unreliable. Note that these problems are not confined to developing countries. They are universal. This month the Government of Japan reported that more than 230,000 Japanese centenarians listed on government records cannot be located. Many are believed to be dead, some for decades.⁷⁸ Significant changes over time in the reported employment and unemployment rates may be a more reliable index than the absolute numbers.

An adequate index of employment should also reflect the capacity of the economy to create new jobs. Net employment generation tells us whether the economy is creating more job opportunities and whether or not their number is sufficient to compensate for the increasing number of new entrants to the workforce. Two countries with the same unemployment rates may differ significantly in their capacity for job creation. For example, Argentina and Germany both reported unemployment rates of 11% in 2005, but the total number of new jobs in Argentina grew by 4.3% over the previous year compared with only 0.3% in Germany.

The present economic theory accords greater importance to production and efficiency than it does to the value of human beings and ignore employment. Is this value system essential or inevitable? Granted that there are real obstacles to effective measurement, efforts to take into account this crucial aspect of economic welfare are essential for the development of more reliable measures. Unemployment is both an economic and a social problem. Gender or racial discrimination in employment, rising rates of crime and violence, loss of self-esteem and alienation arising from absence of social status and identity are important social aspects of the issue. Obviously, there is a need to develop a new economic theory! Here we attempt to develop an index that focuses more narrowly on the impact of employment on the economic welfare of the population.

10.3.1 Full Employment Index

The interaction between employment, education, disposable income, government welfare-related expenditure and income inequality is complex and multi-directional. We know that rising levels of unemployment reduce disposable income, increase inequality and stimulate transfer payments to some extent. More difficult to measure is the impact of under-employment, which may be many times higher than the actual unemployment rate, and part-time work, which can be the result of either personal preference or lack of opportunities. Changes in demography, social attitudes and living standards also powerfully influence long term employment trends. An index that partially reflects the impact of unemployment on economic welfare can provide useful insights and guidance to policy-makers when viewed as a complement to monitoring of incomes, inequality and education. Taking into account the paucity of reliable data on some dimensions of the issue, we propose a composite index for Full Employment (FEI) which includes four sub-indices.

⁷⁸ McCurry, Justin, "Japan Launches Nationwide Search for Centenarians", *Guardian*, Aug 3, 2010. Accessed August 13, 2010, <http://www.guardian.co.uk/world/2010/aug/03/japan-centenarians-search>.

- *Employment-Population Index* — EPI is arrived at by taking the Employment-Population ratio for those aged 25+ and converting it into a scale from 0.01 to 1.0, assuming that 66% EPR represents full employment.⁷⁹ Note the cutoff level for full employment rises to 80%, if EPR is considered for aged 25-64 only.
- *Adult Employment Index* — AEI measures the rate of employment among members of the labour force aged 25+. The adult unemployment rate is derived by deducting from total employment and unemployment data, those under 25 years of age.⁸⁰ Adult underemployment is estimated by taking twice the level of adult unemployment. Our justification for doubling the unemployment rate is to take into account hidden underemployment and unemployment of discouraged workers who have dropped out of the labour market. Thus, $AEI = 1 - 2(AUR)$.
- *Youth Employment Index* — YEI measures the rate of employment among members of the labour force aged 15-24. It is derived by taking 1 minus the youth unemployment rate (YUR). In recognition of the great importance of providing employment opportunities to the young generation, we have assigned a weight to YEI equal to that of AEI, even in cases where the actual proportion of youth in the work force is far less than 50%. $YEI = 1 - YUR$.
- *Job Creation Index* — JCI measures the net rate of change in total employment year-to-year. JCR measures the net change in the total number of jobs from year to year, which serves as the basis for the index JCI. $JCI = (1 + JCR) = JCI = 1 + \frac{TE_2 - TE_1}{TE_1}$, where TE1 & TE2 are total employment in the previous and subsequent year. A value less than one for JCI signifies a decline in total employment from the previous year. A value of more than one signifies an increase in employment. Thus, a grow rate of employment of 10% would be indicated by a value of 1.10.
- *Full Employment Index* — FEI is equal to the average of the four sub-indices as shown below.

$$FEI = \frac{(EPI + AEI + YEI + JCI)}{4}$$

----- (4)

Table 3 presents several key indices of employment which are periodically monitored by almost all countries. The table is divided into two halves. The left side contains data for total unemployment rate (TUR), youth unemployment rate (YUR), employment to population ratio age 25+ (EPR), and net job creation rate (JCR) given as percentages. The right side contains

⁷⁹ The adoption of a 66% cut-off ratio is based on the assumption that not everyone needs to or wants to work, even if attractive opportunities for gainful employment are available. Some may prefer to stay at home with family, volunteer or pursue interests which do not lend themselves to monetary reward. What constitutes real full employment may vary over time and between countries and cultures. Until more adequate measures are available, a somewhat arbitrary cutoff is necessary to avoid exaggerating the value of this indicator. In 2005, Korea registered the highest EPR among OECD countries in our sample. Most OECD countries recorded a downward trend, e.g. Sweden's EPR 25+ declined from 68% in 1990 to 59% in 2005. Japan's fell from 67% to 58%. According to ILO 70 developing countries have an EPR of 66% or higher. Since in most of these cases very high EPR reflects a high level of casual, informal or seasonal labour, EPR may not be a useful measure for monitoring progress in these countries. Therefore, we have adopted the lower norm of OECD countries as more representative of full utilization of human capital.

⁸⁰ The ILO data does not have an upper age cut-off limit, so it includes all those who continue to work or seek employment upto and beyond the age of 65.

the derived indices for youth employment (YEI), adult employment (AEI), employment to population (EPI), job creation (JCI) and the composite Full Employment Index (FEI), which is the average of the four sub-indices. Note that a high FEI does not mean there is no further scope for improving the quality or number of employment opportunities. It only signifies that unemployment as measured by these parameters has relatively low impact on consumption expenditure and income inequality.⁸¹

Country FEI scores range from a high of 96% in Mexico, India and China to a low of 69% in South Africa. We realize that data for these calculations from developing countries is notably unreliable, but OECD countries are not exempt from reliability problems. To some extent the tendency to underestimate the magnitude of unemployment is offset by the fact that higher unemployment will also express as lower levels of PDI and higher levels of inequality, both of which result in lower overall rankings on the composite index, which includes EWI and employment. Between 2005 and 2009, the FEI for USA fell from 94% to 91%, as a result of a doubling of total unemployment in the country. This figure underestimates the total impact of the current economic downturn, but here too the impact would also be reflected in a lower EWI. The very low FEI of 69% for South Africa results from a high total unemployment rate of 27% combined with an even higher unemployment rate of 54% among youth, who constitute 33% of the labour force.

Table 3: Employment sub-indices and FEI for selected countries for the year 2005

A	B	C	D	E	F	G	H	I	J	K
Countries	TUR	YUR	AUR	EPR	JCR	YEI	AEI	EPI	JCI	FEI
Mexico	0.04	0.07	0.05	0.63	1.83	0.93	0.95	0.94	1.02	0.96
China	0.04	0.12	0.05	0.76	1.05	0.88	0.95	1.00	1.01	0.96
India	0.03	0.09	0.02	0.62	2.12	0.91	0.98	0.93	1.02	0.96
Korea	0.04	0.10	0.02	0.64	0.86	0.90	0.94	0.97	1.01	0.95
US	0.05	0.11	0.08	0.62	1.73	0.89	0.92	0.92	1.02	0.94
Japan	0.04	0.09	0.08	0.58	0.50	0.91	0.92	0.86	1.01	0.93
Brazil	0.09	0.19	0.12	0.66	1.64	0.81	0.88	0.99	1.02	0.92
Russia	0.07	0.16	0.12	0.61	1.49	0.84	0.88	0.92	1.01	0.92
UK	0.05	0.13	0.07	0.56	0.86	0.87	0.93	0.85	1.01	0.91
Indonesia	0.11	0.32	0.11	0.68	0.50	0.68	0.89	1.00	1.01	0.89
Sweden	0.08	0.23	0.12	0.59	1.68	0.77	0.88	0.89	1.02	0.89
Argentina	0.11	0.24	0.15	0.60	4.34	0.76	0.85	0.89	1.04	0.88
Spain	0.09	0.20	0.15	0.51	5.25	0.80	0.85	0.76	1.05	0.86
Algeria	0.15	0.31	0.21	0.55	9.26	0.69	0.79	0.83	1.09	0.85
Germany	0.11	0.15	0.21	0.51	0.35	0.85	0.79	0.76	1.00	0.85
Egypt	0.11	0.34	0.08	0.52	2.42	0.66	0.92	0.78	1.02	0.84
Turkey	0.10	0.19	0.16	0.47	1.29	0.81	0.84	0.71	1.01	0.84
Italy	0.08	0.24	0.12	0.45	0.20	0.76	0.88	0.67	1.00	0.83
Croatia	0.13	0.32	0.20	0.48	0.77	0.68	0.80	0.72	1.01	0.80
S Africa	0.27	0.54	0.44	0.49	0.86	0.46	0.56	0.74	1.01	0.69

⁸¹ Ravi, Ranjani. "Measuring Full Employment", *MSS Research Working Paper*, The Mother's Service Society, September 2010. Accessed July 28, 2010, http://mssresearch.org/?q=Measuring_Full_Employment.

Figure 5: Youth Employment Index 1985-2005

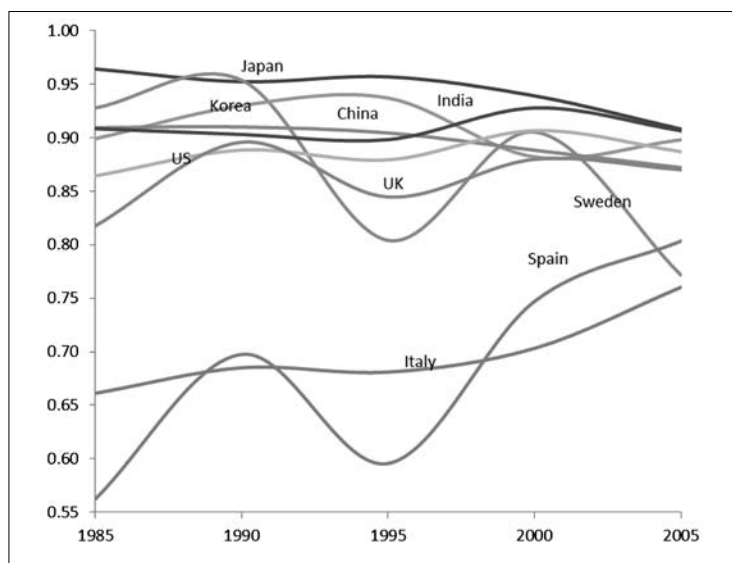


Figure 5 shows 20 year trends in youth unemployment for select countries as measured by YEI (1.00 = full employment). We find the sharpest drop in YEI for Sweden from 0.93 to 0.77. The oscillation in YEI for Sweden and Spain require further analysis. YEI is relatively constant over time in Korea and India, in spite of a huge surge in the under 25 population, and rising most dramatically in Spain from 0.56 to 0.80 and Italy from 0.66 to 0.76

Table 4 shows historical trends on FEI from 1985 to 2005 for select countries. This table will be referred to for the historical analysis of HEWI in Section 10 of this paper.

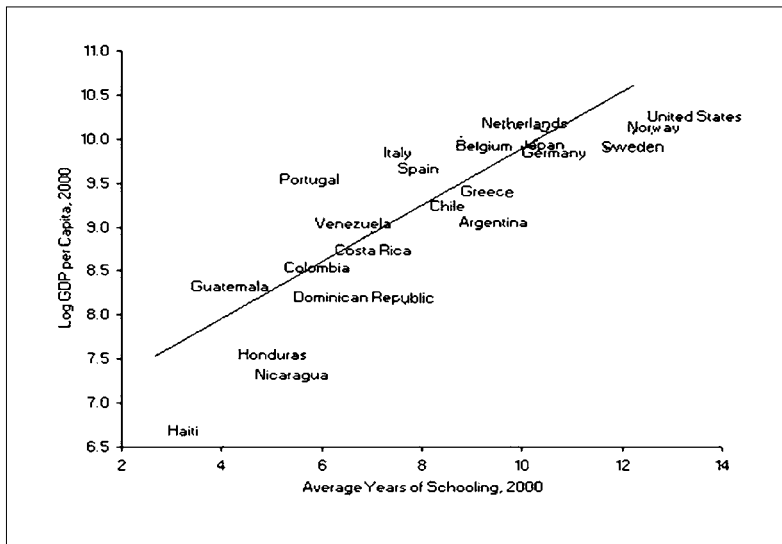
Table 4: Historical trends on FEI from 1985 to 2005 for select countries

FULL EMPLOYMENT INDEX (FEI)						
Countries	1985	1990	1995	2000	2005	FEI AVERAGE
India	0.97	0.97	0.96	0.97	0.96	0.97
Korea, Rep	0.95	0.98	0.99	0.95	0.95	0.96
China	0.97	0.96	0.96	0.95	0.96	0.96
Japan	0.98	0.98	0.96	0.93	0.93	0.96
US	0.92	0.94	0.93	0.95	0.93	0.94
Sweden	0.97	0.98	0.87	0.92	0.89	0.93
UK	0.86	0.91	0.87	0.91	0.91	0.89
Italy	0.82	0.82	0.78	0.80	0.83	0.81
Spain	0.72	0.79	0.70	0.81	0.86	0.78

10.4 Education

Education is rightly regarded as an essential component of overall human development and well-being. Our objective here is confined to measurement of human economic welfare, rather than human development per se. Here too, education needs to be included, since the relationship between education and incomes is well documented. Cross country studies indicate that an extra year of school is associated with a 30% increase in per capita income as shown in Figure 6.⁸² Throughout the world, higher levels of education are also associated with higher levels of employment and higher income. An extra year of schooling increases earnings from 6 to 14%.⁸³ Other studies reveal a very high correlation between education and per capita GDP in both developed and developing countries, as measured by UNDP's composite education index.⁸⁴

Figure 6: Years of Schooling & Country GDP



Rising levels of education are also associated with lower levels of unemployment. In the USA those with a high school diploma earn 42% more and had an unemployment rate 36% lower than those without a high school diploma.⁸⁵ In the Czech Republic, unemployment

⁸² Glaeser, "E.G. Education Last Century, and Economic Growth Today", *The New York Times*, October 2009. Accessed September 1, 2010, <http://economix.blogs.nytimes.com/2009/10/20/education-last-century-and-economic-growth-today>.

⁸³ Card, D., "The Causal Effect of Education on Earnings", Chapter 30. In *Handbook of Labor Economics*, Volume 3, Ashenfelter, Card, D. pp. 1801-1859. Accessed September 1, 2010, http://emlab.berkeley.edu/users/card/papers/causal_educ_earnings.pdf.

⁸⁴ "Overcoming Barriers: Human Mobility and Development", *Human Development Report 2009*, UNDP. Accessed September 1, 2010, http://hdr.undp.org/en/media/HDR_2009_Tables_rev.xls.

⁸⁵ "Education Pays", Bureau of Labor Statistics, United States Department of Labor. Accessed September 4, 2010, <http://www.bls.gov/emp/emptab7.htm>. (Data is based on weekly median earnings of full-time wage and salary workers in 2006.)

among university graduates is only 2% compared with 23% for those who did not finish secondary school.⁸⁶ University graduates in Norway and Hungary earn 26% and 117% more respectively than those who only finish secondary school.⁸⁷

All of the individual and composite measures referred to above incorporate indices for education, though the rationale and approach varies. HDI allocates one-third of its total weightage to measures of literacy and school enrollment, in the proportion literacy (2/3) and primary-secondary-tertiary school enrollment (1/3). The heavy weightage assigned to basic literacy in HDI appears disproportionate, especially considering the way literacy is defined and measured in many developing countries. GPI assigns a dollar value to each year of higher education. ISEW includes 50% of all public and private expenditure on higher education in its calculation of total consumption expenditure. While this may be suitable for an index applied solely to OECD countries, for global application and cross-country comparisons, the exclusive focus on higher education seems somewhat arbitrary, since many developing countries have yet to achieve universal enrollment at lower levels.⁸⁸

While educational enrollment rates have risen dramatically over the past five decades, there is still a significant proportion of the world's population that lacks this most fundamental asset for improving their economic welfare. Still more than 100 countries have not yet achieved 90% net enrollment rates for primary education and of these 44% are still below 80%. In Sub-Saharan Africa the average is under 70%. Only 12 countries in the world have achieved net secondary education enrollment rates of 90% or higher. Tertiary enrollment among those in the five year age group beyond secondary school ranges from less than 1% to a high of 92% in Korea. Only 24 countries have rates of 50% or higher, 86 countries have rates of less than 25%, and 53, rates of less than 10%.⁸⁹

Enrollment rates are at best a very crude measure of educational attainment, often concealing as much as they reveal of true progress toward universal education. Recent surveys report that the average reading ability of Indonesian school students is equivalent to that of the lowest 7% of French students, the average math ability of Brazilian school students is equal to the abilities of the bottom 2% of Danish students, 31% of Indian students who completed the lower primary cycle could not read a simple story and 29% could not do two-digit math problems. In Ghana, only 25% of 15-19 year olds score more than 50% on a test of one and two digit math questions. Despite the country's top rank in terms of total spending on education, U.S. students scored lower on science literacy than their peers in 16 of the other 29 OECD jurisdictions and 6 of the 27 non- OECD jurisdictions.⁹⁰

While any attempt to assign economic value to education must be subjective, abstract numerical scales such as HDI and cost-based measures such as GPI fail to take into account the direct contribution of education to economic performance and living standards. In constructing an index of economic welfare, we focus instead on the role of education as an

⁸⁶ "Unemployment Rates and Educational Attainment (2004)", Table A8.2b, Education at a Glance, OECD, 2006. Accessed September 6, 2010, <http://statlinks.oecdcode.org/962006061P1-A8.XLS>.

⁸⁷ "The Returns to Education: Education and Earnings (2004)", Table A9, Education at a glance, OECD, 2006. Accessed September 9, 2010, <http://statlinks.oecdcode.org/962006061P1-A9.XLS>.

⁸⁸ National Center for Educational Statistics, "PISA 2006: Performance of U.S. 15-Year-Old Students in Science and Mathematics Literacy in an International Context", 2007, p. Accessed September 13, 2010, <http://nces.ed.gov/pubs2008/2008016.pdf>.<http://nces.ed.gov/pubs2008/2008016.pdf>.

⁸⁹ UNESCO, Primary and Secondary Net Enrollment Data Tables. Accessed August 29, 2010, <http://stats.uis.unesco.org/unesco/TableViewer/tableView.aspx?ReportId=174>.

⁹⁰ Filmer, D., A. Hasan., and L. Pritchett, "A Millennium Learning Goal: Measuring Real Progress in Education", *Center for Global Development Working Paper 97*, 2006, 5-6.

investment in future economic performance. Rather than trying to assign arbitrary value to each year of education, we consider current economic performance as a result and reflection of the past educational attainments of the workforce. A rise in the average levels of education today represents an investment that will reflect in higher economic performance in the future. Since the essential purpose of an indicator is to promote effective policy-making and action, an indicator that factors in rising levels of investment in education assigns value to actions today that will contribute to future economic welfare.

10.4.1 Combined Education Index

The Combined Education Index (CEI) assesses the changes in school enrollment rates for primary, secondary and higher education over time as a measure of changes in the future capacity of society to generate human welfare. Regarding economic performance as a function of education, we adjust current level of economic welfare by an index that reflects the change in the enrollment rate at primary, secondary and tertiary levels over a period of time. Data on enrollment levels is notably unreliable in many countries compounded by over and under age students and home schooling. Even countries with advanced statistical systems such as USA are subject to major inaccuracies in the data.⁹¹ Calculations are based on the gross enrollment rates for primary (PER), secondary (SER) and tertiary (TER) as normalized by UNDP for the combined enrollment rates (CGER) used in the Human Development Index.^{92,93} In consideration of the increasing importance of higher education in economic development and welfare, the index assigns double weightage to changes in tertiary rates. We designate this modified CGER as CER_H.⁹⁴

$$\begin{aligned} \text{CER}_H &= \frac{3\text{CGER} + \text{TER}}{4} \\ \text{CER}_H &= 0.33 \text{ PER} + 0.23 \text{ SER} + 0.44 \text{ TER} \end{aligned}$$

----- (5)

In recognition of the time lag between acquisition of education and its impact on economic activity, we define the Combined Education Index (CEI) through CER_{Δn}.

$$\text{CEI}_n = 1 + [1.0 * \text{CER}_{\Delta(n-5)} + 0.9 * \text{CER}_{\Delta(n-6)} + 0.81 * \text{CER}_{\Delta(n-7)} + \dots 0.14 * \text{CER}_{\Delta(n-25)}]$$

----- (6)

Where

$$\text{CER}_{\Delta n} = \text{CER}_{Hn} - \text{CER}_{H(n-1)}$$

----- (6a)

⁹¹ Greene, Jay P. "High School Graduation Rates in the United States", Civic Report of the Manhattan Institute for Policy Research, Nov 2001. Accessed July 29, 2010, http://www.manhattan-institute.org/html/cr_baoe.htm.

⁹² UNDP, Combined Gross Enrollment rates Data Tables for HDI Education Index. Accessed August 4, 2010, <http://hdrstats.undp.org/en/indicators/90.html>.

⁹³ "Remeasuring the HDI by Data Envelopment Method", Interim Report of the International Institute of Applied System Analysis, Austria, 2001.8. Accessed on September 5, 2010, <http://www.iiasa.ac.at/Admin/PUB/Documents/IR-01-069.pdf>.

⁹⁴ UNDP's CGER apportions the following weightage in their CGER = (Gross Enrollment Ratio primary education * 7/17) + (Gross Enrollment Ratio secondary education * 5/17) + Gross Enrollment Ratio tertiary education * 5/17). For CEI, we increase the weightage of tertiary by an additional 21%.

$CER_{\Delta n}$ measures the absolute change in combined enrollment levels over time (equation 6a). CEI measures the cumulative impact of that change on human economic welfare at any point during 25 years in time subsequent to the change in CER_H . As the more educated youth enter the workforce and the impact of rising levels of education gradually impacts on actual GDP and HWE, the factor multiplying $CER_{\Delta n}$, i.e. 1, 0.9, 0.81 etc. for past educational achievements declines proportionately, because over time the impact of earlier education enrollment comes to be reflected in GDP and in our HWE. As an example, CEI (2005) for Sweden for year 2005 is given by:

$$CEI(2005) = 1 + [CER_{\Delta 2000} + 0.9 * CER_{\Delta 1999} + 0.81 * CER_{\Delta 1998} + ... 0.14 * CER_{\Delta 1980}]$$

Table 5: CEI of selected countries 2005

Country	CEI 2005
Sweden	1.16
Korea, Rep	1.16
Germany	1.11
UK	1.10
Spain	1.09
Egypt	1.09
Italy	1.08
Turkey	1.08
Argentina	1.07
China	1.06
South Africa	1.06
Japan	1.05
Algeria	1.05
Mexico	1.04
Croatia	1.03
India	1.02
Russia	1.02
Indonesia	1.02
US	1.01

Table 5 shows the CEI of selected countries for 2005. Korea achieved a CEI of 1.16 as a result of a 67% rise in CER from 1975-1995, including a 478% rise in tertiary enrollment from 9% in 1975 to 52% in 1995. Its CER rose by 28% from 1995 to 2005. Sweden also recorded a CEI2005 of 1.16 as a result of a 44% rise in CER for 1980-2005. The CEI2005 for UK was 1.10, primarily as the result of a 165% rise in tertiary enrollment during the 1975-1995 period from 19% to 50%. UK's TER rose by another 20% between 1995 and 2005, but the impact will reflect in CEI values only from 2006 onwards. Other countries still have enormous scope for raising CER at primary and secondary level. India's net secondary enrollment rate is 90%. Another 91 countries have net SER lower than India. It is noteworthy that of the countries studied, the five which recorded the highest growth rates in CEI were all OECD countries that had already attained high absolute levels of enrollment, signifying the scope for further progress on CEI even at the top of the scale. As a reflection of this potential, high school drop-out rates in US have declined by a third

since 1995.⁹⁵ Tertiary enrollment in USA (82%) now lags behind Korea (92%); Japan (55%) and Italy (64%) still have considerable scope for progress. The high quality of education is shown by several other indicators, e.g. the ranking of the best universities and through indicators assessing research and development productivity. According to these scores the USA, the UK, Japan and Germany are at the very top. Nevertheless, none of such indicators are useful for assessing economic progress toward achieving welfare and human well-being and therefore, they have not been included.

Table 6: Changes in CEI from 1985 to 2005 for select countries

Country	CER _H						CER _{H25} 1980-2005	CEI				
	1980	1985	1990	1995	2000	2005		1985	1990	1995	2000	2005
China	44	40	41	49	52	56	1.3	1.08	1.01	1.02	1.06	1.06
India	32	38	39	43	42	48	1.5	1.03	1.06	1.05	1.06	1.02
Italy	58	55	61	69	73	84	1.5	1.04	1.00	1.05	1.09	1.08
Japan	67	66	65	71	74	78	1.2	1.08	1.04	1.01	1.05	1.05
Korea, Rep	56	66	69	75	88	96	1.7	1.12	1.15	1.11	1.11	1.16
Spain	63	68	72	81	84	88	1.4	1.09	1.10	1.09	1.12	1.09
Sweden	64	63	64	85	92	92	1.4	1.05	1.03	1.02	1.18	1.16
UK	58	57	65	73	78	84	1.4	1.04	1.02	1.07	1.10	1.10
US	75	79	86	88	86	90	1.2	1.06	1.07	1.09	1.07	1.01

Table 6 presents changes in CEI from 1985 to 2005 for select countries. The left hand columns provide the actual CER_H enrollment figures for 1980 to 2005 and the total change over 25 years (CER_{H25}). The center column measures the overall 25 year index for CER_{H25} from 1980-2005 (e.g. a value of 1.50 indicates 50% rise in CER_H over 25 years, equivalent to 2% a year). The right hand section shows the average rate of enrollment growth as measured by CER from 1980 and 2005. Korea recorded the highest 25 year average (1.70) followed by Sweden (1.40). The USA and Japan recorded the lowest level of improvement over time (1.20), although its absolute levels of enrollment in 2005 rank only second to Korea.

CEI does not address the very important issue of quality of education, which varies very widely both within and between countries. Since 2000, PISA, Programme for International Student Assessment, has been measuring performance of 15 year olds on reading, mathematics and science literacy. Currently 30 OECD and 27 non-OECD countries are participating. China and India are not included. Future versions of CEI may be modified to incorporate the qualitative dimension of education based on PISA. Our approach does not diminish the inherent value of education as an endowment in its own right or its wider contribution to social development, human welfare and well-being. Our purpose here is only to recognize its role as an investment in future economic welfare.

10.5 Environment

The startling findings presented in the Club of Rome's report *Limits to Growth* alerted the world to the imminent danger inherent in the economic model prevalent at the time. Since then many things have changed, but the fundamental premise remains valid. Here, too, a

⁹⁵ National Center for Educational Statistics, US Dept of Education, Accessed August 15, 2010, <http://nces.ed.gov/fastfacts/display.asp?id=65>.

new theoretical framework is needed which recognizes environmental sustainability as an essential component of sustainable human welfare and identifies the principles by which these apparently disparate objectives can be most effectively reconciled. It is not sufficient to say that we cannot sustain current levels of resource consumption or call for a halt in economic growth. We must also take into account the changing composition of economic activity from products to services, the impact of technological advances that develop new energy sources and increase energy efficiency, the impact of education and culture on resource consumption, the rising aspirations of the developing world, and factors influencing changes in life style, as well as the political and social sustainability. New theory means new thought, new conception. Our view of the relationship between human activity and our natural environment must change radically.

M. Max-Neff pointed out that over time more and more economic activity is self-canceling from a welfare perspective. For every society there seems to be a period in which economic growth brings an improvement in the quality of life, but only up to the point — the threshold — beyond which, if there is more economic growth, quality of life may begin to deteriorate.⁹⁶ The abrupt differences between GDP and several other indicators, e.g. energy consumption, quality of life, and happiness, etc., are similar manifestations of the Max-Neff effect.⁹⁷ Historical analyses may show that GDP was a very good indicator to achieve political and economic objectives earlier in the last century; but today it leads to wrong conclusions and bad decisions resulting in destruction of the environment, missed opportunities and misuse of human capital. Nevertheless, many argue that GDP is correlated with several important socioeconomic indicators, e.g. there is a linear correlation between GDP/capita and personal well-being of EU member states.⁹⁸ Correlations do not and cannot prove that any indicator is reliable and that policies and decisions based on that indicator are not wrong. Rankings by GPI and ISEW as well as International Index of Social Progress (IISP) drastically differ from GDP, e.g. the USA is ranked 27th according to IISP.⁹⁹

Many attempts have been made to incorporate measures of sustainability in composite indices. GPI and ISEW discount consumption for the depletion of or damage to environmental resources by deducting estimated costs associated with water, air and noise pollution as well as those resulting from the loss of wetlands, farmland, primary forests, CO₂ damage and ozone depletion. Natural resources depletion is valued by measuring the investment necessary to generate a perpetual equivalent stream of renewable substitutes. Sen and Stiglitz observed that these and similar measures such as Green GDP do not characterize ecological sustainability per se or assess how far we are from achieving sustainability targets.¹⁰⁰ Another composite index, the Ecological Footprint (EF), attempts to measure the impact of human activities on the regenerative capacity of the biosphere by calculating the amount of biologically productive land and water area required to support a given population at its current level of consumption and resources. EF couches the results in units of land rather than market prices. These approaches offer valuable insight into the true costs and sustainability of current economic activity. At the same time they introduce elements of complexity and subjective valuation which prevent their widespread acceptance and adoption as the basis for policy-making. They also depend on access to reliable data which is not available for most countries.

⁹⁶ Max-Neff, M. A. "Economic Growth and Quality of Life: A Threshold Hypothesis", *Ecological Economics*, 15(1995): 115-118.

⁹⁷ "In Pursuit of Happiness Research. Is it Reliable? What Does it Imply for Policy?", The Cato institute, April 2007 for Vergata Conference on Subjective Well-Being.

⁹⁸ M. Degutis *et al.* "Relation Between GDP and life Satisfaction in the EU", *Ekonomika*, 89 (2010): 9- 21. C. Bjørnskov *et al.* "Analysing Trends In Subjective Well-Being In 15 European Countries", *Journal Of Happiness Studies*, 9 (2008): 317-330. Bruno S. Frey, And A. Stutzer. "Happiness And Economics", Princeton Univ. Press, 2001.

⁹⁹ IISP Report 2003. "International Index of Social Progress", 5th International Conference of the International Society for Life Quality Studies, 15-17 November 1998, Baltimore, Maryland, USA.

¹⁰⁰ Stiglitz *et al.*, *op. cit.*, p. 66-67.

There is certainly a need for indices that assign value to natural resources and the costs associated with pollution, as well as the inherent risks and uncertainties of current economic models. While recognizing the value of these comprehensive efforts to sustainable economic activity, the authors propose a more modest and limited approach to factoring environment concerns into a composite index of economic welfare, one which can be adopted worldwide based on available data. For this purpose, we focus on a single dimension of sustainability, fossil energy efficiency. Eurostat includes the ratio between the gross inland consumption of energy (coal, electricity, oil, natural gas and renewable energy sources — available for consumption) and the GDP as an index of energy efficiency. From 1980 to 2007, energy efficiency as measured by GDP per unit of energy consumed in 2005 international dollars has improved substantially, ranging from an increase of 25% in Japan and 27% France to 71% in India and USA, 88% in UK and 200% in China.¹⁰¹ This indicator reveals a progressive decoupling of energy use from GDP growth as the result of the shift from industry towards services and within industry to less energy-intensive activities; the closure of inefficient, high-polluting units; as well as end-use efficiency gains, such as lower energy-consuming appliances.

The objective here is to measure human economic welfare rather than sound environmental practices or quality of life per se, however important these goals may be. Sustainability of economic activities is an essential aspect of economic welfare. Therefore, it is essential that it be reflected in any measure of economic welfare. The authors propose an Energy Efficiency Index (EEI) designed to promote policy-decisions that will reduce dependence on fossil fuels, while promoting improvements in the overall efficiency of all forms of energy consumption as a contribution to economic sustainability. The index takes into account only energy generated from fossil fuel sources, since fossil fuel based energy consumes non-renewable resources and releases CO₂ into the atmosphere.

Some may argue that the effort to assign value to reduced dependence on fossil fuels is necessarily subjective and arbitrary, and therefore inappropriately included in a composite measure of economic welfare. This points to the underlying insufficiency of the prevailing economic concept of value discussed in Section 4 of this paper. As Orio Giarini has so aptly stressed, economic value in a modern service economy cannot be divorced from risk and uncertainty. No greater risk or uncertainty confronts economy today than the future risks of ecological disaster. We need only reflect on the central purpose and methods of valuation employed by the insurance industry to realize that we assign concrete economic value to risks and uncertainties all the time. That value may be related to the anticipated costs of avoidance or the costs of remediation or some less tangible value of security.

In order to assess efficiency of energy usage for economic welfare rather than for economic growth, EEI is based on the ratio of fossil fuel energy consumption (FFEC) to total human economic consumption expenditure (HWE) — not to GDP. EEI is calculated as the percentage change in the ratio of fossil fuel energy consumption to HWE over time. Like education, investments in energy generation have a long gestation period, which ranges from about one year for wind turbines to 5 years or more for nuclear power, and an even longer period of utilization, which averages 30 years. Thus, each increase in the percentage of fossil fuel energy efficiency represents a long term investment in sustainability with repercussions for many years to come. Since improvements in energy efficiency can also be achieved by short term measures such as use of energy efficient lighting or refrigeration, we estimate the life span of the enhancements as a much shorter period of 10 years, though it is probably much higher.

¹⁰¹ Based on Data Tables from “International Energy Agency”, Accessed August 23, 2010, <http://www.eia.doe.gov>.

The index measures the changes in fossil fuel energy efficiency over time, where $FFEC_1$ and $FFEC_0$ represent fossil fuel energy consumption in year one and the previous year, and HWE_1 and HWE_0 represent human welfare consumption expenditure year one and the previous year.

FFER is the ratio of fossil fuel energy consumption to HWE. $FFER_{\Delta 1}$ is the change in the ratio for year one. $FFER_{\Delta-1}$ is the change in the ratio the previous year. $FFER_{\Delta-2}$, etc. are defined analogously.

$$FFER_{\Delta 1} = \frac{\left\{ \frac{FFEC_1}{HWE_1} \right\} - \left\{ \frac{FFEC_0}{HWE_0} \right\}}{\left\{ \frac{FFEC_0}{HWE_0} \right\}}$$

EI for any year assigns present value (V_{FFER}) to changes in FFER during the previous 10 years as represented by $FFER_{\Delta-1}$, $FFER_{\Delta-2}$... $FFER_{\Delta-10}$. V_{FFER} starts with a value of 1 and diminished at the rate of 0.1 per year. Thus, $V_{FFER-1} = 1$, $V_{FFER-2} = 0.9$, $V_{FFER-3} = 0.8$, ... $V_{FFER-11} = 0.0$.

$$\text{Energy Efficiency Index } EEI_1 = 1 - [(V_{FFER-1} \times FFER_{\Delta-1}) + (V_{FFER-2} \times FFER_{\Delta-2}) + \dots (V_{FFER-10} \times FFER_{\Delta-10})]$$

$$\text{Energy Efficiency Index } EEI_1 = 1 - [(0.1 \times FFER_{\Delta-1}) + (0.2 \times FFER_{\Delta-2}) + \dots (1.0 \times FFER_{\Delta-10})] \quad \text{-----}(7)$$

As EEI increases, the number within brackets becomes more negative in value. EEI increases either as a result of improving overall energy efficiency per unit of HWE or by replacing fossil fuel with renewable energy sources, i.e. either by decreasing FFEC or by increasing HWE.

Table 7 shows the fossil fuel consumption (FFEC) per unit of human consumption expenditure (HWE), FFEC as a % of total energy consumption, and the derived Energy Efficiency Index (EEI) for select countries. FFEC as a % of total energy indicates the extent of dependence on fossil fuel energy sources vs. renewable energy sources, which ranges from a low of 36% in Sweden to a high of 93% in China.¹⁰² FFEC per unit of HWE (in constant 2005 intl dollars) ranges from a low of 4683 btu per dollar in Sweden to a high of 30,386 btu in China, a factor of 6.4. About 60% of this difference is the result of Sweden's lower dependence on fossil fuel energy sources in comparison to China. The remainder of the difference is due to Sweden's higher overall energy efficiency.

EEI measures the change in the FFEC/HWE ratio between 1995 and 2005. Values greater than 1.0 indicate decreasing use of fossil fuels and/or increasing HWE. While China's FFEC rose by 90% during this period due to a huge expansion of manufacturing capacity, HWE rose 104%, resulting in an EEI of 1.04. Russia's FFEC rose only 5% during the same period, while

¹⁰² Historical Data on Fossil fuel consumption values, British Petroleum, Accessed September 4, 2010, http://www.google.co.in/url?sa=t&source=web&cd=2&ved=0CBsQFjAB&url=http%3A%2F%2Fwww.bp.com%2Fliveassets%2Fbp_internet%2Fglobalbp%2Fglobalbp_uk_english%2Freports_and_publications%2Fstatistical_energy_review_2008%2FSTAGING%2Flocal_assets%2F2010_downloads%2Fstatistical_review_of_world_energy_2010.xls&ei=gnOQTPabLlu0vgPDuNDmCw&usg=AFQjCNGWz6t-abAZPzj7T3QmZFQbbLek_A&sig2=It7VDqABaT8xhuNr_VOeg.

its HWE rose by 54%, resulting in an EEI of 1.05. The full benefits of these improvements will only be reflected by 2015. We were unable to include Russia in Table 8, due to the absence of reliable data during the period immediately prior to and subsequent to the breakup of the USSR. Thus, data on Russia's EEI for the period 1995-2005 must be taken with caution.

Table 7: Total energy consumption per (2000) dollar GDP, Fossil fuel consumption (FFEC) per unit of human consumption expenditure (HWE), FFEC as % of total energy consumption, and the derived Energy Efficiency Index (EEI) for select countries. FFEC/HWE is in BTU per (2005) dollar. HWE is in constant \$ 2005 PPP. Values are calculated for year 2005

Country	Total Energy to GDP	FFEC as % of total	FFEC/HWE 1995	FFEC/HWE 2005	EEI 2005
Brazil	6,906	60%	5145	5508	0.98
China	13,919	93%	30386	28181	1.04
Croatia	7,881	79%	7875	7062	1.00
Germany	6,573	85%	7611	6732	1.05
India	7,582	92%	11911	9834	1.06
Italy	5,793	91%	6664	6488	1.01
Japan	6,636	83%	7707	7465	1.02
Korea, Rep	12,376	85%	14501	14067	1.05
Mexico	5,987	92%	7684	6511	1.06
Russia	19,950	89%	26199	17852	1.05
South Africa	20,228	98%	17627	15855	1.01
Spain	6,481	85%	6104	6455	0.94
Sweden	8,857	37%	6356	4683	1.13
Turkey	5,850	90%	5871	6032	1.02
UK	5,451	89%	7667	5765	1.15
US	9,146	85%	11499	8941	1.16

India's FFEC rose by 42% while its HWE rose by 72%, resulting in an EEI of 1.06. Spain's FFEC rose 54% while its HWE rose only 46%, resulting in a decline in overall fossil fuel energy efficiency as reflected by an EEI of 0.94. Of the countries studied, the only other one to report a decline in energy efficiency was Brazil with a CEI of 0.98.¹⁰³ Three countries — USA, UK and Sweden — registered EEIs of more than 1.10.

Table 8 presents historical data on changes in fossil fuel energy efficiency per unit of economic welfare from 1975 to 2005 as measured in terms of energy units per unit of HWE. It also shows the historical values for EEI from 1985 to 2005 and a 30 year average of the change in FFEC/HWE (EEI30). Of the nine countries studied, only Korea and India recorded a decline in fossil fuel energy efficiency over the period 1975-2005, as reflected in EEI30 values of less than 1.00. China registered the largest improvement over the 30 year period (65%), followed by Sweden (63%), UK (57%) and USA (56%).

¹⁰³ Methodology and data analysis for the Energy Efficiency Index, Saraswathi Mukkai and Ranjani Ravi, "Research Methodology and Data for a Fossil Fuel Energy Index", MSS Research Working Paper, The Mother's Service Society, September 2010. Available online http://mssresearch.org/?q=Research_Methodology_and_Data_for_a_Fossil_Fuel_Energy_Index.

*Table 8: Trends in Energy Efficiency Index (EEI) from 1985 to 2005 for select countries.
FFEC/HWE is in BTU per dollar*

Country	FFEC/HWE for 1975	FFEC/HWE for 2005	EEI 1985	EEI 1990	EEI 1995	EEI 2000	EEI 2005	EEI ₉₀
China	81,589	28,181	1.22	1.16	1.04	1.09	1.04	1.65
India	8,664	9,834	1.00	0.91	0.92	0.93	1.06	0.87
Italy	10,505	6,488	1.23	1.07	1.01	1.01	1.01	1.38
Japan	13,799	7,465	1.33	1.14	1.01	1.03	1.02	1.46
Korea, Rep	11,506	14,067	0.95	1.13	0.86	0.82	1.05	0.78
Spain	7,316	6,455	1.02	1.06	1.03	1.01	0.94	1.12
Sweden	12,774	4,683	1.35	1.23	1.08	0.97	1.13	1.63
UK	13,299	5,765	1.21	1.14	1.13	1.11	1.15	1.57
US	20,161	8,941	1.40	1.26	1.07	1.08	1.16	1.56

11. Human Economic Welfare Index (HEWI)

Based on the analysis discussed above, we propose the creation of a new composite index that focuses on the economic dimension of human welfare. This approach can be fairly criticized as too narrow, since it gives less prominence to the issue of long term sustainability than alternatives such as GPI and ISEW. We acknowledge the validity of the criticism, but argue that an index is a tool whose ultimate value must be judged by its utility. Other indices may offer greater insight, but their inherent complexity and subjectivity as well as the difficulty in obtaining data diminishes their value as a tool for policy-making and international comparisons.

This index has been constructed with the following objectives: each component indicator should be reliable, easily and promptly available, sensitive, robust, and uniquely related to its own objective; the components should be incorporated in the composite index in such a manner that there is no cancellation; and in contrast to more comprehensive composite indicators, the number of sub-indices should be kept to the minimum possible. These objectives have been only partially met.

11.1 Characteristics of HEWI

1. It is denominated in international dollars adjusted for purchasing power parity.
2. It is based on data that is currently maintained by international organizations and available for 70 countries. Though we have already emphasized that some of the data is not entirely reliable, it is the best and most consistent available and free from value assessment.¹⁰⁴
3. It is meant for use as a tool, as a policy-instrument and education of the public. Improvements in performance on HEWI are designed to broadly reflect real improvements in present and future welfare.

¹⁰⁴ Computations of GDP based on the expenditure method provide the essential information required to calculate HWE. Data for net household savings and PDI is more difficult to obtain for many developing countries. Until more accurate national accounts are available, HWE is taken as a rough approximation for PDI at the national level and consumption inequality as a rough approximation for income inequality.

11.2 Limitations in HEWI

It may be useful at the outset to clarify some of the limitations in this approach.

1. It partially overcomes the distorting impact of GDP by focusing on those aspects of national income that directly benefit human beings, but it does not adjust the value of national product to reflect non-monetized activities, risk and uncertainty, price distortions and the true value of quality. The absence of qualitative measures is especially relevant for assessment of progress on education and employment.
2. It is a rough indicator of sustainable development, since it does not fully reflect the real costs and risks associated with over-consumption of natural resources, pollution and other ecological, social and political issues.
3. It measures economic change, not social development, by monitoring some key determinants of sustainable economic welfare. It does not attempt to assess the underlying social, organizational, technological and cultural factors that contribute to the capacity of society to adapt and evolve over time or to the impact of social change on life styles, happiness or psychological fulfillment.
4. As with any index for international comparisons, it is constrained by the paucity and low quality of the information related to personal disposable income, inequality, employment and education.

11.3 Components of HEWI

HEWI improves upon GDP per capita as a measure of human economic welfare in six ways:

1. *Personal Disposable Income (PDI)* — It focuses on that part of national income which directly accrues to households and individuals for promoting human welfare, thereby avoiding the tendency to value growth for growth's sake.
2. *Human Welfare Expenditure (HWE)* — It focuses only on that part of private and public expenditure that directly promotes the welfare of human beings.
3. *Income Inequality (EWI)* — It adjusts per capita income to reflect the impact of income inequality on household economic welfare.
4. *Full Employment (FEI)* — It takes into account levels of employment and unemployment which directly impact on personal economic welfare and utilization of human capital.
5. *Combined Educational Enrollment (CEI)* — It considers the future economic impact of current investments in education.
6. *Energy Efficiency (EEI)* — It includes a measure for changes in fossil fuel energy efficiency over time as an index of ecological risk and sustainability.

Each of these components has been discussed separately in Section 10. This section summarizes each sub-index, discusses how they can be assembled into a composite index, and examines comparative data.

11.4 Sustainability

HEWI is based on a broad conception of sustainability that incorporates economic, ecological and social factors. It is structured to give balanced weightage to current and

future welfare. In addition to measuring personal disposable income and welfare-related consumption, it monitors two negative components that limit present welfare — income inequality and unemployment — and three positive components that have the potential to significantly enhance long term sustainability — education, energy efficiency and net household savings. Income inequality is viewed as a constraint on growth of consumer demand, which limits present consumption and employment. Unemployment is viewed as a constraint on the full utilization of human resources and social productivity, which limits the economic welfare of both the unemployed and the rest of society. Rising levels of education are viewed as an investment in human capital that promotes future economic welfare. Rising levels of fossil fuel energy efficiency are viewed as an investment in physical capital that supports future ecological welfare. Net household savings provides the financial basis for future investment and human welfare consumption.

Figure 7: Dimensions of sustainable economic welfare



12. Composite HEWI

The design of the component sub-indices and composite index are intended to provide a tool that is of maximum value for policy and decision-making.

12.1 Consumption Expenditure (HWE)

HWE represents the consumer and household-related components of GDP that most closely relate to the welfare of human beings. Comparative data for all countries is taken primarily from the UN, which presently maintains national accounts information in a common standard format for 70 countries. The calculation of HWE starts with the household consumption expenditure (HCE) component of GDP as the base, thereby omitting other GDP components related to capital formation, change in inventories, imports and exports. It then adds in those categories of government expenditure directly related to personal welfare

(HWGE), including education (Ed), health (He), housing and community amenities (HC), social protection (SP), environmental protection (EP), recreation, culture and religion (RCR), thereby omitting expenditure on general public services, defense, public order and safety, and economic affairs. The sum of the above two components is divided by the total population to derive the per capita HWE. Then per capita HWE is adjusted for 2005 international dollars PPP. HWE serves as the baseline which is adjusted by the other four sub-indices. On average the value of HWE ranges between 60 and 80% of GDP. Thus,

$$\begin{aligned} HWE &= HCE + HWGE \\ HWE &= HCE + HWGE (Ed + He + HC + SP + EP + RCR) \\ &\text{-----} (1) \end{aligned}$$

12.2 Personal Disposable Income (PDI)

PDI represents that portion of national income which is directly available to individuals for consumption expenditure after taxes. It is derived by extracting from GDP the data for household consumption expenditure (HCE) and adding to it the net household savings (NHS).

$$\begin{aligned} PDI &= HCE + NHS \\ &\text{-----} (1a) \end{aligned}$$

12.2.1 Economic Welfare Index (EWI)

The economic welfare of the population can vary widely between two countries with the same per capita income, if in one case a large percentage of GDP goes to the top 10 or 20%, while in the other it is more evenly distributed throughout the population. Therefore, HWE is adjusted to take into account the impact of income inequality on the real economic welfare of people. Here our objective is not to measure income inequality per se, which is simply a statistical result, but rather to measure the impact — the stimulating and depressing effect — of income inequality on overall human economic welfare as measured by HWE. As discussed in Section 9.2, income inequality plays both a positive and negative role in economic progress. Within certain limits it acts as a gradient or voltage differential that spurs people to aspire and strive to elevate their position to equal or exceed that of others. At the same time it concentrates disproportionate income among those with the lowest propensity to consume and the highest propensity to speculate, thereby curtailing demand for greater production and employment.

Economic Welfare Index (EWI), is a variant of Sen's SWF, in which we adjust Gini to arrive at a new coefficient, G_{ec} , which represents that proportion of Gini that is compatible with optimal levels of economic welfare as measured by household consumption expenditure. G_{ec} increases in value as Gini rises, reflecting the fact that high Gini countries have a greater potential for reducing inequality without dampening economic incentives that promote human welfare.

$$\begin{aligned} G_{ec} &= 0.65 \text{ Gini} - 0.1 \\ &\text{-----} (2) \end{aligned}$$

EWI is personal disposable income (PDI) multiplied by G_{ec} plus Government Welfare consumption expenditure on households (HWGE). Note that HWGE is not adjusted by G_{ec}

since the distribution of government services is far more equitable than the distribution of income and consumption expenditure and is skewed in favor of lower income families.

$$\begin{aligned} EWI &= PDI (1 - Gec) + HWGE \\ EWI &= PDI (1.1 - 0.65G) + HWGE \\ &\text{-----} (3) \end{aligned}$$

12.2.2 Full Employment (FEI)

Section 10.3 discussed the importance of incorporating some measure of employment in an index of human economic welfare. In a market economy where economic survival and well-being depend on each individual's access to gainful employment, employment must be regarded as a basic human right. Rising levels of unemployment is both OECD and developing countries among youth as well as among older workers represents one of the greatest obstacles to securing economic welfare for all. Employment is related to changes in demography, education and social attitudes, such as those regarding women in the workforce. No single measure of employment can satisfactorily capture all its dimensions. Unfortunately in many countries even the most basic data on unemployment rates is unreliable, while the range of variables measured is severely limited. The composition of an employment index useful for international comparisons must work within these constraints. FEI is a composite index that takes into account levels of employment and unemployment which directly impact on personal economic welfare and national utilization of human capital.

FEI is a composite index that takes into account levels of employment and unemployment which directly impact on personal economic welfare and national utilization of human capital.

- *Employment-Population Index* — EPI is arrived at by taking the Employment-Population Ratio (EPR) for those aged 25+ and converting it into a scale ranging from .01 to 1, assuming that 66% EPR represents full employment. Countries with EPR greater than 66% are assigned a value of 1.0.
- *Adult Employment Index* — AEI measures the rate of employment among members of the labour force aged 25+. The adult unemployment rate is derived by deducting from total employment and unemployment data, those under 25 years of age. Adult underemployment is estimated by taking twice the level of adult unemployment. Thus, $AEI = 1 - 2(AUR)$.
- *Youth Employment Index* — YEI measures the rate of employment among members of the labour force aged 15-24. It is derived by taking 1 minus the youth unemployment rate for ages 15-24 (YUR). In consideration of the great importance of providing employment opportunities to the young generation, we have assigned an equal weightage to YEI and AEI, even though the percentage of youth in the workforce ranges from 10 to 50% in different countries. $YEI = 1 - YUR$.
- *Job Creation Index* — JCR measures the net change in the total number of jobs from year to year, which serves as the basis for the index, JCI. $JCI = (1 + JCR) = JCI = 1 + \frac{TE_2 - TE_1}{TE_1}$ where TE1 & TE2 are total employment in the previous and subsequent year. A value less than one for JCI signifies a decline in total employment from the previous year. A value of more than one signifies an increase in employment. Thus, a growth rate of employment of 10% would be indicated by a value of 1.10.

12.2.3 Full Employment Index

(FEI) is a composite index equal to the average of the four sub-indices. FEI could be greater than 1.0 if JCI is very large. FEI is expressed by the formula

$$FEI = \frac{EPI + AEI + YEI + JCI}{4}$$

-----(4)

The function $EWI * FEI$ reflects the impact of employment on human economic welfare.

12.2.4 Combined Educational Enrollment Index (CEI)

CEI considers the future economic impact of current investments in education based on current school enrollment rates. It is based on the combined gross enrollment rates for primary (PER), secondary (SER) and tertiary (TER) levels normalized to 100% by UNDP and incorporated in the HDI index (CGER). CGER is modified to assign double weightage to changes in tertiary enrollment rates. We designate this modified CGER as CER_H .

$$CER_H = \frac{3CGER + TER}{4}$$

$$CER_H = 0.33 PER + 0.23 SER + 0.44 TER$$

-----(5)

In recognition of the time lag between acquisition of education and its impact on economic activity, we define the Combined Education Index (CEI) through $CER_{\Delta n}$.

$$CEI_n = 1 + [1.0 * CER_{\Delta(n-5)} + 0.9 * CER_{\Delta(n-6)} + 0.81 * CER_{\Delta(n-7)} + \dots 0.14 * CER_{\Delta(n-25)}]$$

-----(6)

Where

$$CER_{\Delta n} = CER_{Hn} - CER_{H(n-1)}$$

----- (6a)

$CER_{\Delta n}$ measures the absolute change in combined enrollment levels over time given by formula (6a). CEI measures the cumulative impact of that change on human economic welfare at any point during 25 years in time subsequent to the change in CER_H . As the more educated youth enter the workforce and the impact of rising levels of education gradually impacts on actual GDP and HWE, the factor multiplying $CER_{\Delta n}$, i.e. 1, 0.9, 0.81 etc. for past educational achievements declines proportionately. Namely, we argue that the impact of earlier education enrollment is already included in the GDP and in our HWE.

12.3 Energy Efficiency (EEI)

EEI is an index of sustainability based on fossil fuel energy efficiency (FFEC) per unit of consumption expenditure (HWE). The index measures the consumption of energy generated from fossil fuel sources, which are non-renewable and release CO_2 into the atmosphere. Note that by basing the measure of fuel efficiency on HWE rather than GDP, which is commonly used, we assess the extent to which energy is being efficiently utilized for the ultimate benefit

of human beings, not merely for production and growth for their own sake. In calculating EEI, we take into account the long gestation period and long life span of investments in renewable energy and energy efficiency. For the purpose of this study, we have used a period of 10 years. The index measures the change in fossil fuel energy efficiency over time, where $FFEC_1$ and $FFEC_2$ represent fossil fuel energy consumption in year one and two and HWE_1 and HWE_{10} represent human welfare consumption expenditure year one and two. $FFER$ is the ratio of fossil fuel to HWE. $FFER_{\Delta 1}$ is the change in the ratio for year one. $FFER_{\Delta-1}$ is the change in the ratio the previous year. $FFER_{\Delta-2}$, etc. are defined analogously.

$$FFER_{\Delta 1} = \frac{\left\{ \frac{FFEC_1}{HWE_1} \right\} - \left\{ \frac{FFEC_0}{HWE_0} \right\}}{\left\{ \frac{FFEC_0}{HWE_0} \right\}}$$

The Energy Efficiency Index EEI for any year assigns present value (V_{FFER}) to changes in $FFER$ during the previous 10 years as represented by $FFER_{\Delta-1}$, $FFER_{\Delta-2}$... $FFER_{\Delta-10}$. V_{FFER} starts with a value of 1 and diminished at the rate of 0.1 per year. Thus, $V_{FFER-1} = 1$, $V_{FFER-2} = 0.9$, $V_{FFER-3} = 0.8$, $V_{FFER-11} = 0.0$. EEI is given by

$$EEI_1 = 1 - [(V_{FFER-1} \times FFER_{\Delta-1}) + (V_{FFER-2} \times FFER_{\Delta-2}) + \dots + (V_{FFER-10} \times FFER_{\Delta-10})]$$

$$EEI_1 = 1 - [(0.1 \times FFER_{\Delta-1}) + (0.2 \times FFER_{\Delta-2}) + \dots + (1.0 \times FFER_{\Delta-10})]$$

----- (7)

As EEI increases, the number within brackets becomes more negative in value. EEI increases either as a result of improving overall energy efficiency per unit of HWE or by replacing fossil fuel with renewable energy sources, i.e. either by decreasing $FFEC$ or by increasing HWE .

12.4 Human Economic Welfare Index (HEWI)

We define the Human Economic Welfare Index by the formula:

$$HEWI = EWI * FEI * CEI * EEI$$

----- (8)

12.4.1 HEWI 2005

In Table 9 below, columns A-C show the per capita GDP, PDI, and EWI (PDI adjusted for inequality in PPP 2005 international dollars). Columns D-F show scores on the indices for employment, education and energy. Columns G & H show the final adjusted human welfare index HEWI and HEWI as a % of per capita GDP. Data is for 2005.

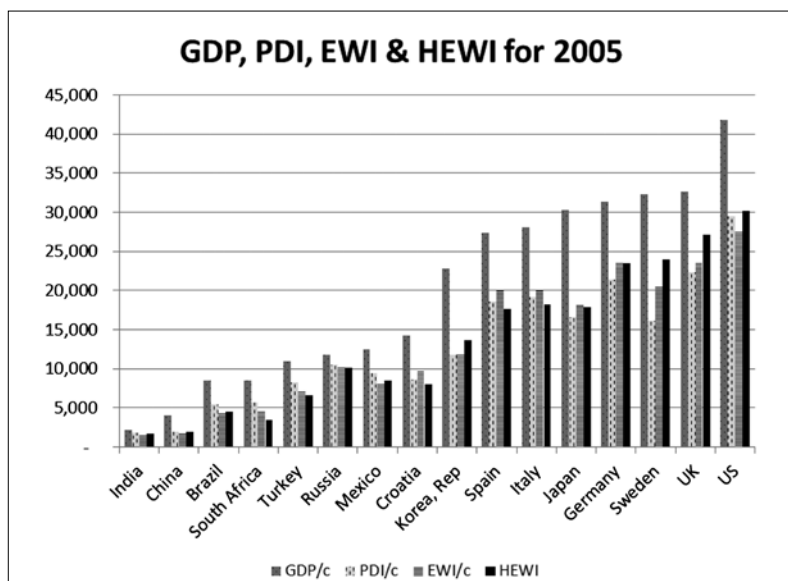
As we saw earlier, USA ranks 1st in GDP per capita with a value 28% higher than 2nd ranked UK; but when compared in terms of HEWI, the US is only 11% higher. The GDP gap between USA and Sweden is 29%, while in terms of HEWI it is 26%. As we saw in Table 2, US retains a far larger percentage of GDP as personal disposable income (71% vs. 50% for Sweden). Sweden performs better on inequality and education, USA on employment and energy. Russia (85%), UK (83%) and India (76%) record the highest values for HEWI as a percentage of GDP. South Africa (41%), China (47%) and Brazil (53%) record the lowest ratio of HEWI to GDP.

Figure 8 shows the relative differences between GDP, PDI, EWI and HEWI for year 2005.

Table 9: HEWI as % of GDP/c, PDI and EWI. Values are for year 2005.

	A	B	C	D	E	F	G	H
Country	GDP	PDI	EWI	FEI	CEI	EEI	HEWI	HEWI as % of GDP
India	2,234	1,821	1,638	0.96	1.02	1.06	1,702	76%
China	4,076	2,019	1,827	0.96	1.06	1.04	1,924	47%
South Africa	8,504	5,782	4,690	0.69	1.06	1.01	3,465	41%
Brazil	8,505	5,459	4,420	0.92	1.12	0.98	4,479	53%
Turkey	10,977	8,291	7,112	0.84	1.08	1.02	6,596	60%
Croatia	14,271	8,667	9,720	0.80	1.03	1.00	8,032	56%
Mexico	12,563	9,492	8,060	0.96	1.04	1.06	8,466	67%
Russia	11,861	10,564	10,297	0.92	1.02	1.05	10,119	85%
Korea, Rep	22,783	11,875	11,764	0.95	1.16	1.05	13,606	60%
Spain	27,377	18,569	20,057	0.86	1.09	0.94	17,676	65%
Japan	30,310	16,571	18,186	0.92	1.05	1.02	17,916	59%
Italy	28,144	19,205	20,082	0.83	1.08	1.01	18,196	65%
Germany	31,378	21,449	23,700	0.85	1.11	1.05	23,504	75%
Sweden	32,319	16,183	20,592	0.89	1.16	1.13	24,001	74%
UK	32,690	22,364	23,488	0.91	1.10	1.15	27,196	83%
US	41,833	29,516	27,483	0.93	1.01	1.16	30,146	72%

Figure 8: GDP/c, PDI/c, EWI/c and HEWI for year 2005



12.4.2 Historical HEWI 1985-2005

Table 10 presents historical data on HEWI for select countries from 1985 to 2005 along with their relative rank order during the period. We select here a few countries for historical analysis to illustrate how HEWI can be applied to gain insight into the development of human economic welfare over longer periods of time.¹⁰⁵

12.4.3 Discussion

Our discussion concerns the period 1980 to 2005 and, therefore, omits the present economic crisis. In Table 9 we compare the performance of 16 countries on GDP/c and with the proposed index HEWI, including the effects of each sub-index: PDI and EWI as well as FEI, CEI and EEI. This allows us to assess whether and if, to what extent, HEWI provides better insight into changes in human economic welfare than GDP/c.

- *Korea*

HEWI vs. GDP: Of the nine countries analyzed historically for the period 1985 to 2005, Korea, as well as China, registered the largest increase in HEWI (202%), while its per capita GDP also grew by 202%. Thus, HEWI rose at the very same rate as GDP, signifying that country followed a human welfare-oriented development strategy.

HWGE: Progress on the human welfare index was buoyed by a 262% rise in Government welfare-related expenditure, signifying a conscious effort of the government to direct the gains of economic growth for human welfare.

G_{ec}: Korea scores relatively well on income inequality with a G_{ec} value of 0.10, down from 0.12 in 1975 and a Gini of 0.31 in 2005. This is the lowest value of the countries studied after Sweden, demonstrating its serious commitment to the equitable distribution of the gains of economic growth. Recall that G_{ec} measures income inequality against a hypothetical state of 'optimal welfare inequality' in which both overall human welfare and equitable distribution are in optimal balance.

FEI: Korea maintained one of the highest performances of any country on the employment index, averaging 0.96 on FEI over 20 years, as shown in Table 4.

CEI: Korea's combined enrollment rate (CER_{H25}) rose from 0.56 to 0.96 in 25 years, giving it the highest CER_{H25} value of 1.70 of all the countries studied.

EEI: These impressive gains were offset to some extent by a gradual increase in Korea's energy intensity as a result of heavy dependence on manufacturing in the composition of its economic growth, which constitutes 39% of Korean GDP vs. 22% for USA and Japan and 25% for the EU). The country remains dependent on fossil fuel for 85% of its energy needs, down from 98% in 1975. According to International Energy Agency, Korea's overall energy intensity for all forms of energy (measured in terms of GDP per unit energy consumption) declined 54% from 1980 to 2006, but still overall energy intensity per unit of GDP is high compared with many OECD countries, 50% higher than USA and almost double that of Japan.¹⁰⁶ Although energy intensity per unit of GDP declined, fossil fuel intensity per unit

¹⁰⁵ Research data on specific countries. MSS Research Working Paper, The Mother's Service Society, September 2010. Available online <http://mssresearch.org/?q=HEWI-Human-Economic-Welfare-Index-Country-Studies>.

¹⁰⁶ International Energy Agency data for GDP per unit of energy consumed and World Bank data for GDP (PPP). Accessed August 20, 2010, <http://www.eia.doe.gov/pub/international/iealf/tablee1p.xls>

of HWE actually rose between 1975 (the base year for the 1985 EEI) and 2005 as shown by the value for EEI30 of 0.78 in Table 8, signifying a significant decline in fossil fuel energy efficiency over 30 years, although the trend has reversed after 2000, probably as the result of a 22% rise in HWE vs. a 15% rise in FFEC. Korea still pursues an energy intensive and fossil fuel energy intense strategy which is unsustainable and a poor model for other nations to emulate. The lengthy discussion of EEI is necessitated by the fact that we have not divided the index into sub-indices that transparently reveal the sources of variation in the overall index, an omission to be corrected in future versions.

Thus, HEWI provides both an overview of Korea's progress on human welfare as well as insights into the sustainability of its strategy. It scores impressively on development of human capital through high investment in education, high levels of employment and continuous gains on income distribution. Excessive dependence on an energy-intensive fossil fuel strategy represents Korea's largest obstacle to sustainable human welfare, although the most recent trend is encouraging. With the crucial exception of energy, Korea's performance demonstrates that progressive welfare related strategies can significantly magnify the welfare benefits of economic growth in a sustainable manner.

- *Japan*

HEWI vs. GDP: In contrast, Japan's HEWI/c rose just 1% between 1985 and 2005, the smallest gains of any country studied, in spite of a 44% growth in GDP/c during this period.

HCE & HWGE: Government welfare expenditure grew faster (110%) than GDP, while growth of household expenditure just kept pace with GDP. Inequality declined by 19% over the 20 years as a result of this government transfer.

NHS: Net savings declined from 12% to 1% of GDP, signifying that households are relying increasingly on past savings and current debt to sustain their high level of personal consumption.

Gec: The level of income inequality has declined by 19%, from a Gec value of 0.13 in 1985 to 0.11 in 2005. While this performance was better than most countries, which recorded a rise in inequality during this period, the gains were modest and the absolute level of inequality leaves considerable scope for further reduction.

FEI: Although once regarded as a model for employment security, Japan's employment index declined by 5% since 1985 to 0.93 in 2005.

CEI: Japan's CERH25 is 1.2, reflecting an increase in CERH from 67% to 78% during the period 1980-2005. This growth rate ranks lowest of the countries studied along with USA, but the absolute level of enrollment in USA is far higher (90% vs. 78% for Japan).

EEI: Although Japan's overall energy efficiency (gdp per unit energy) improved 25% from 1975 to 2005, its fossil fuel efficiency for human welfare (FFEC/HWE) as measured by EEI rose 46%. Significant gains were achieved up to 1990 while GDP was still growing rapidly. Since then progress on EEI has been negligible. From 1995 to 2005, Japan's EEI averaged 1.02. Japan still remains highly dependent on fossil fuels for 91% of its total energy. In absolute terms, Japan's FFEC/HWE is equivalent to the average of all the countries studied, excluding China. Its current fossil fuel energy efficiency is 89% higher than Korea, 278% higher than China, and 20% better than USA.

In combination, these indices indicate a country which has stagnated both economically and in terms of its efforts to boost human welfare. During this period, levels of household

savings and employment declined, education grew slowly, and inequality declined slightly. Improvement on EEI is the most notable gain for Japan during the period, but its high dependence on fossil fuels makes this present course unsustainable.

- *China & India*

HEWI vs. GDP: When viewed from a historical perspective, China's position relative to India changes dramatically. Although China started in 1985 from a GDP/c (PPP) 19% lower than India's and a HEWI 22% lower, China's GDP has risen by 401% and its HEWI by 202%. In contrast, India's GDP rose by 122% and its HEWI by 108%, signifying slower growth but growth more oriented to human welfare than in China.

HCE & HWGE: China's household consumer expenditure has grown (223%) at just half the rate of GDP growth, while India's increased 79% in real terms. China's government welfare-related spending grew even faster than GDP (463%), while India's grew at a slightly slower pace than GDP (118%).

NHS: Both countries achieved notable gains in net household savings. China's rose from 10 to 24% of personal disposable income, while India's grew from 19% to 30%.

Gec: Income inequality in China has risen by 63% as measured by Gec, whereas India's increased by a much lower value of 29%, which has significant impact on the distribution of economic gains throughout the population.

FEI: Historical data from ILO for both China and India indicate a continuously high score on employment, but the reliability of this data is highly questionable, so we prefer to discount its value.

CEI: India started out with a lower enrollment base (29% lower in 1975) as measured by CERH than China (42%), however it has grown at nearly twice the rate with a CERH25 of 1.5 vs. 1.3 for China. Both countries have enormous scope for enhancing both the quantity and quality of education. Indeed, investment in education may be the single most important lever for enhancing human economic welfare in both countries.

EEI: China's total energy intensity per unit GDP has declined by 63% over the past three decades, but its absolute energy intensity is still double that of Japan and 46% higher than India's.¹⁰⁷ Both countries depend on fossil fuels for more than 90% of their energy needs. India's fossil fuel energy efficiency (FFEC/HWE) is about one-third that of China, meaning India produces nearly three times more HWE per unit of fossil fuel. China's performance on EEI has declined drastically from 1.22 in 1985 to 1.04 in 2005, signifying much slower progress on this factor than in the past. In both absolute terms and in terms of trends, China is pursuing an unsustainable and inefficient path for enhancing human economic welfare. In this context, China has taken considerable effort in recent years to develop renewable energy resources in order to address this imbalance. Today China produces more than half of the world's supply of solar panels and almost half its wind turbines.

- *USA & UK*

HEWI vs. GDP: USA's real per capita GDP (PPP) grew by 46% from 1985-2005, while per capita economic welfare as measured by HEWI rose just 9%. By comparison, UK's GDP grew by 60% while its HEWI rose by 74%. Among OECD countries, the US performance

¹⁰⁷ *Ibid.*

was slightly better than Japan's 1% and Italy's 4%, but far below Korea's 202% and Spain's 104%. Although USA retained the first rank in GDP and HEWI among the countries studied throughout the period, the difference between US and second ranked UK in GDP shrank from 40% in 1985 to 28% in 2005 and in HEWI it shrank from 76% to 11%.

HCE & HWGE: US household consumption expenditure rose by 54% and government welfare-related expenditure rose 33% over the two decades. By comparison, UK's HCE rose 80% and its HWGE rose 63%.

NHS: US net household savings declined from 9% to zero during the same period, while UK NHS fell from 10% to 4%.

Gec: Welfare related income inequality as measured by Gec in the USA rose 21% from 0.12 to 0.15, which means that human welfare as measured by HEWI is reduced by 15% due to non-optimal income distribution. Of course, the actual levels of income inequality as measured by Gini are much higher at 0.38 in 2005. By comparison, UK's Gec rose by 50%, but remains 20% lower in absolute terms at 0.12.

FEI: US performance on employment remained constant over the 20 years (.92-.93), though its FEI has fallen by an estimated 4% since 2005. UK's employment performance has risen nearly to USA levels, rising from 0.86 in 1985 to 0.91 in 2005.

CEI: From 1980 to 2005, US raised its overall CER_{H25} by 20%, which largely reflects a rise in tertiary enrollment from 56% to 82%. By comparison, UK raised its CER_{H25} 40%, including a 212% rise in tertiary enrollment from 19% to 59%. During this period, US fell from first to second place in both total enrollment and tertiary enrollment behind Korea.

EEL: In terms of overall energy efficiency measured by GDP per unit energy consumed, both UK and US reduced its energy intensity by 42% between 1980 and 2006. In absolute terms, UK produces 69% more GDP per unit of energy than USA. Both countries remain highly dependent on fossil fuels — 85% in USA, 89% in UK. Both substantially improved fossil fuel energy efficiency as measured in terms of FFEC per unit HWE from 1975 to 2005 — the US by 56% and UK by 57% as shown in Table 8.

As a result of these differences in performance, UK has substantially closed the gap with USA on HEWI. It performs substantially better on HCE, HWGE, NHS, significantly better on Gec and slightly better on EEL. On FEI US scores higher, but remained flat while UK raised its performance. Although there is still a 28% gap in GDP between the two countries, the UK's continuously higher investment in education is likely to reduce that difference significantly. Based on present trends, its HEWI may exceed the US level over the next few years.

The comparative historical analysis is not intended to be comprehensive or in-depth, but rather to illustrate how HEWI and its sub-indices can be utilized to gain insight into the real impact of economic growth on human welfare and some of the critical policy issues that need to be addressed in order to enhance that performance.

For the latest information and research papers on HEWI and its sub-indices, our statistical methods and the country studies, please visit the HEWI project pages on www.neweconomictheory.org¹⁰⁷ or at www.mssresearch.org.

¹⁰⁷ Statistical Methods and the Country Studies on HEWI Project. Available online <http://neweconomictheory.org/content/hewi-human-economic-welfare-indicators-project>.

13. Conclusions

13.1 Economic Policy Implications of HEWI

In contrast to most other composite economic indicators developed or proposed in recent years, HEWI incorporates a minimum number of sub-indicators. In addition, each indicator is uniquely related to its own objective and there is no cancellation effect between the sub-indices. In this way the policy implications of each measure can be derived from the individual sub-indices and the resultant measure is made transparent to facilitate decision-making. Of course, we readily concede the limitations of this broad approach. For instance, FEI does not distinguish between the type or quality of new jobs created, whether they are in healthcare and education or in the military, construction and road building, whether these jobs generate pollution or improve energy efficiency. Therefore, although FEI does measure components of employment, it is only a partial quantitative measure. Similar constraints apply to CEI and EEI as well. In spite of these inadequacies, we believe that HEWI can serve as relevant and useful tool for assessment and decision-making.

The relationship between measurement, theory and decision-making may be usefully illustrated by comparing economy and health care. The principal aim of both activities is to promote human well-being. Both activities are extremely complex. Healthcare draws on knowledge from the life sciences, fields which are based on sound theory. Measurements are used extensively in health care to formulate diagnoses. Some health care “measurements”, e.g. X-rays, are useful, but at the same time detrimental to the patient. The decision whether or not to apply these measures requires careful assessment of the patient’s condition, always keeping in mind the essential goal, human well-being. Although healthcare is based on sound underlying theory, it is subject to real uncertainties and risks, as it is based on incomplete information, which sometimes generates unexpected complications and cascading negative consequences. Comparing this chaotic behavior with the butterfly effect observed in classical physics underlines the enormous complexity in healthcare as well as economy. The status of theory in economy is far less satisfactory. We use mathematical models, but we lack adequate theory to explain underlying causes, social processes and consequences. We also face extreme difficulties in obtaining precise, timely information. In economy also “measurements” can be detrimental, as in the case of GDP. Wrong, inaccurate or misleading measures, rightly or wrongly applied, can lead to wrong public policy as well as wrong perceptions and actions by the general public. In healthcare our aim is to restore the patient to normal health — not to fully understand the problem, though understanding the problem certainly helps. In economy we start from a position of insufficiency characterized by widespread poverty, endemic underemployment, inadequate development of human capital, financial instability and activities with dangerously unsustainable environmental consequences. In healthcare, illness represents a disturbance of the natural harmony of the human body, which may be acute or chronic. In economy, too, both acute and chronic imbalances are possible. Indications are that the present system is perpetually out of balance. Here we will never succeed in evolving effective and sustainable policies until we arrive at a more comprehensive theoretical knowledge on which to base our actions. Until then we must have the frankness and modesty to admit the limits to our knowledge and the insufficiency of our measures. With this qualification in mind, the development and application of new measures such as HEWI can be of great practical value for enhancing public policy and initiative.

HEWI seeks to provide policy-makers with a clear and focused set of indicators that can serve as a basis for a broad range of initiatives designed to enhance human or household

economic welfare with a focus on future sustainability. While the composite HEWI can serve as an overall index of progress, the component indices and their sub-indices can provide specific guidance on ways to improve overall performance. For example, performance on the Full Employment Index (FEI) can be directly enhanced by measures which reduce youth and adult unemployment, raise the employment to population ratio or stimulate net new job creation. Other policy measures that can be directly deduced and monitored by HEWI include:

1. Redirect national expenditure from non-consumer-related categories of expenditure such as defense and general administration to greater investments in human welfare.
2. Revise policies to reduce income inequality, which might include minimum wage legislation, land reform, increased investment in education, labor market policies, innovative tax and transfer policies such as changes in employee taxation and capital gains as well as taxing of speculative investments and foreign exchange transactions.
3. Promote full employment policies such as national legislation guaranteeing the right to work, temporary public job programs, vocational training programs, work-for-welfare, entrepreneurship development, micro-credit, and internet-based self-employment programs.
4. Promote measures designed to increase energy efficiency, while shifting reliance from fossil fuels to renewable energy sources.
5. Provide financial and social incentives to raise educational enrollment rates, including national legislation to raise the mandatory minimum level of schooling by two years.
6. Promote development-oriented policies such as those that increase the speed of communication, transportation, financial transactions, technology dissemination and adoption, and government decision-making as a stimulus to all economic activity.

13.2 Beyond HEWI

In this paper we have tried to emphasize the crucially important role that measurement plays in human progress and the justification for continuous efforts to improve existing measures and develop better ones. The paper examines some of the most widely-accepted limitations in GDP as a measure of human economic welfare and explores some alternative approaches to compensate for its deficiencies. We have drawn attention to the considerable challenges implicit in this effort, which are only partially addressed by alternative approaches, including our own. We have also tried to suggest that in an effort to evolve more comprehensive and inclusive indices, we should take care not to sacrifice clarity and specificity.

We cannot overemphasize the potential value of precise information for enhancing economic welfare. While national accounts data is available for all OECD countries and for 70 countries through the UN, net household savings, disposable incomes, unemployment and reliable enrollment rates are not available for many countries. Availability is one thing, reliability is another. Too often governments feel constrained to manipulate data to meet domestic political concerns or international pressures, as the recent controversy over Greek financial reporting illustrates. The paucity of timely and reliable data is a serious impediment to immediate application of this and alternative measures on a global basis. More importantly, it is also a serious impediment to optimizing policy-making to maximize human welfare.

Where data is available, it is also necessary to keep in mind that, like everything else, our accounting systems and measures are undergoing a process of evolution. Measurement

of almost everything, everywhere is more accurate and comprehensive than in the past. Historical comparisons often reflect changes in our measures as much as they reflect changes in actual performance. As Indian leaders realized 30 years ago, data must always be validated by observable facts and confirmed by intuitive judgment.

Ultimately, good measures must be judged by the policy decisions they engender. Therefore, we have tried to emphasize practical utility over technical perfection. Regardless of the inaccuracies and approximations they may contain, we believe HEWI and its sub-indices can provide sound direction for policies that focus on what must be considered the most central objective of every society; enhancing human welfare, not economic growth for its own sake. Comparative rank order indices may be a source of pride or humiliation, and both can be serviceable if they prompt us and others to more effective action. Comprehensive composite indices alert us to crucial issues of sustainability, but may overwhelm us with so much information and so many priorities that they deter rather than facilitate concerted action. All indices incorporate arbitrary and subjective assumptions, whether implicit or explicit. GDP itself is a measure of gross economic activity, but it is widely being applied as an indicator of human welfare and social progress. As a measure of activity it contains faults, but it may still be serviceable for some purposes. As an indicator of economic or social welfare, it is deeply flawed and dangerously misleading.

Our objective here has been to present the framework for an indicator of economic welfare derived from GDP that compensates for some, but not all, of its most serious deficiencies. We seek to illustrate the potential for an alternative approach which offers considerable advantages and yet keeps centrally focused on human economic welfare. Many commendable efforts are underway to improve on measurement of economic performance, some more narrowly and others more broadly focused than HEWI. There is a place and role for numerous approaches. The narrowest measures will help us to improve precision. The broadest serve as a constant reminder of the wider social and ecological context on which all economic activity is founded and carried out.

An evolutionary perspective highlights the fact that economic growth is one expression of the more fundamental process of social development, which occurs simultaneously in all fields and determines the course of political, social, economic, demographic, ecological, and cultural progress. Thus far all of the indices related to economic and social development focus almost exclusively on the measurement of results. But as we described above, social development is not a result or even a set of results, but an on-going process of progress by which humanity acquires increasing knowledge, skill and organizational capacity to achieve the goals it aspires for. An index of end results serves a limited purpose by telling us how fast and how far we are moving in the right direction and how close we are to achieving the goals we aspire toward. But a process-based index will go much further. To the degree it is perfected, it will provide insight into the essential steps of the underlying social process as well as their sequencing and timing. We hope that this paper will act as an impetus for others to suggest necessary modifications and improvements to this as well as alternative frameworks.

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CADMUS: The Personality of a Journal

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At great moments, great movements arise. Life makes history memorable by its revelation at such moments. Military movements were led by generals, political movements by great personalities. After the war, leadership of such movements was offering itself to great international organizations. Initially the UN responded to the mature moment. The world has been waiting for one organization or a group of them to accept such a leadership. It is a leadership of thought. Several organizations sprung up and played active roles. They often go into dormancy, while their original ideas organize themselves more solidly below the surface of life. When they resurface, they emerge with a greater effectivity and a compelling force for effectuation. They usually do so at the time of great anniversaries.

The world needs political direction with a realistic economic content to organize itself as a global eminence. Democratic liberties become real to the society when they are based on economic equality. Seminal ideas about service economy and unmonetized economic activity broaden the base of economic science, so that it may play a more energetic role in the affairs of the world. The spirit of the times recognizing the value of great ideas and the significance of the evolutionary movement seeks a forum for expression. As organizations followed outstanding leaders in the post war period, journals offer themselves as vehicles of leadership.

It is their personality. Britain, which went in search of trade, was offered an empire in the 18th century. America, which was isolationist, in the 20th century was offered world leadership, as she had that immense capacity for production. Trade alone was the creator of great wealth in the 18th century. Hence empire came to Britain.

The essence of today's world leadership appears to be economic but, in truth, it requires political maturity to express it. Political inspiration that underlies economic realities qualifies for leadership in today's world. Such a leader may, in time, offer helpful ideas to the world that is beset with problems. Great ideas are preceded sometimes by great crises, as if they are seeking redress. The 50th anniversary of an international organization is a ripe moment for its founding ideas to reemerge with greater vigour and a self-effectuating capacity. A journal with a personality can carry out that mission successfully.

SEED

South-East European Division of The World Academy of Art and Science

The Board of Trustees of the World Academy of Art and Science (WAAS) established its South-East European Division (SEED-WAAS) in 2005. SEED-WAAS includes fellows, associate and junior fellows of WAAS from South European countries, i.e. from Portugal and Spain to Greece and Turkey. Since 2005 membership of SEED-WAAS has more than tripled. SEED-WAAS is a member of the Central-Eastern European Network of national academies and of the ALLEA - association of all European academies. SEED-WAAS cooperates with The Club of Rome and national associations of the Club, with the Pugwash Movements and its national associations, and with The Balkan Political Club. Many fellows of SEED-WAAS are also members of these organizations.

Together with its partners SEED-WAAS has organized numerous international conferences, sessions during international conferences and meetings, including events at Barcelona (2010), Ljubljana (2008), Zagreb (2006, 2007, 2008 and 2009), Banja Luka (2006, 2010), Sarajevo (2006), Dubrovnik (2009), Podgorica (2009) and Istanbul (2006 and 2009). Proceedings of some of these conferences are published and distributed to Fellows of WAAS and to participants. One remarkable achievement worthy of specific mention was the initiative by Orio Giarini, Fellow of SEED-WAAS and Member of The Club of Rome, who initiated and now for more than five years successfully directs the journal "The European Papers on New Welfare - The Counter-aging Society". That journal served as a foundation and inspiration for the launching of CADMUS.

SEED-WAAS members are actively engaged and have initiated several recent and on-going programmes of the World Academy, notably the Initiative for Abolition of Nuclear Weapons, Global Employment Challenge, The Evolution of Individuality, From Crisis to Prosperity and Limits to Rationality. Other notable SEED activities include: a bilingual English-Croatian website www.vrijemeje.com (it is time!) publishing articles on economic and related issues by SEED-WAAS fellows and serving as a platform for interaction with the public; formulation of long-term energy strategy; proposals to raise employment in the region; and a proposal to declare SE Europe as a nuclear weapons free zone with guarantees for peace and security under the umbrella of NATO.

Ivo Šlaus, President
