Cross-national Standards of Living Comparisons

An Honors Thesis

by

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Abstract

Economists throughout the world are interested in developing a workable simple technique to compare standards of living among nations. The scientific curiosity has resulted in a variety of methods being applied to measuring living standards among countries.¹ The two most widely employed techniques are Gross National Product-based and social indicators-based standard of living comparisons. There are problems, however, with both methods. GNP was developed to measure the level of national income not standard of living. Social indicator indexes, on the other hand, are highly correlated with GNP numbers and tend to be very subjective, carrying a great deal of bias toward their architects' values. Thus, a search for a practical measure of standard of living continues. The paper is an investigation into the existing techniques and their weaknesses. It is also an attempt to provide a new practical approach to cross-national standard of living comparisons.

¹ The need for such comparisons is not limited to pure scientific interest. It is rooted into human nature. People are naturally competitive, and an individual always wants to know how well he does in respect to others. Similarly a country must be able to evaluate their citizens' standard of living relatively to other countries in order to plan and evaluate the performance of its economic and social policies.
I. Introduction

The investigation should begin with a short discussion of what standard of living attempts to measure. Understanding of the matter is essential for the further analysis of the existing and proposed comparison techniques, so as for meaningful comparisons one should know what he is attempting to compare. There are a number of approaches to standard of living comparisons. One of the most frequently followed approaches is to equate standard of living to an individual's total utility.

Economists and other social scientists, however, should understand difficulties of working with utility, because even if utility can be defined in terms of pleasure, happiness, or desire fulfillment, utility is not useful for comparative purposes. It is impossible to conclude which person is happier, more pleased, or more satisfied, because personal interpretations and valuations of happiness and satisfaction differ not only among people living in different societies, but even among individuals living together. Thus, any kind of utilitarian comparisons would be extremely subjective in its nature. "Utility and living standard are related," as Amartya Sen wrote in The Standard of Living, "but they are second cousins rather than siblings" (12).

An individual's standard of living, therefore, must be primarily determined by living conditions and capabilities of achieving desired living conditions. The capabilities of achieving desired living conditions are partially determined by income, but they are also related to notions of human freedom.
Because it is difficult to compare amounts of human freedom for the same reason as it is difficult to compare human utility, measuring standard of living must concentrate on measuring human living conditions. The living conditions are determined by available alternatives. Thus, standard of living comparisons should be similar to comparisons of available alternatives in living human lives.

II. The opulence approach to standard of living

The most frequently taken approach of measuring standards of living is to view human available alternatives in terms of commodity possession or opulence. If the approach is correct, then there is an obvious link between an individual's standard of living and his real income. An individual with higher income must have higher standard of living, because he is able to buy more goods and live a fuller life.

The idea of measuring standard of living by income was quickly adopted to cross-national comparisons. It is not difficult to calculate national income or Gross National Product (GNP). GNP divided by country's population, or GNP per capita, is a rough estimate of average personal living standard in a country. People living in a country with higher GNP per capita have greater capabilities to acquire goods and derive more satisfaction, and, therefore, have higher standard of living.

The opulence approach to standard of living measurement is in a sense similar to already discussed utilitarian approach.
The only difference is that, if utilitarian approach takes into account personal valuations of satisfaction, the opulence approach takes into account market valuations determined by groups of people. Although the opulence approach seems to be more objective, it still has some utilitarian weaknesses.

The approach predicts that if income doubles, satisfaction doubles and standard of living doubles. This might be true under certain circumstances. For example, if one assumes that an income of an American individual doubles from $15,000 to $30,000 a year, then it is probably pretty close true approximation that the individual's new standard of living is twice as high as the standard of living maintained by the previous lower income.

On the other hand, if the individual's income continuous to increase and goes up from $300,000 to $1,200,000, then comparison of his previous and new standard of living becomes less clear. In this case not everybody might agree that the individual's standard of living increased four times. The first three hundred thousand dollars might have already covered the basic needs of the individual, and additional nine hundred thousand might not bring the same amount of addition to capacity, when the GNP ratio comparisons assume that additional income must bring proportional amount of extra living standard. Thus, GNP-based comparisons assume that income is transformed into living standard at constant rate. But this is inconsistent with the basic economic principle of diminishing marginal utility. The first unit of income must be able to bring at least the same if not more satisfaction to an individual than the next marginal unit.
The major weakness of the opulence approach to living standard is that human well-being depends on more than simply being rich. For example, if a rich person suffers from a terribly painful disease, he can actually have a lower living standard compare to a healthy poor individual. Similarly, if the US per capita income is approximately fifty times of the per capita income in China, it should not be assumed that Americans are fifty times better-off compare to Chinese people.\(^2\) Of course, the number looks flattering on paper, but it is unrealistic, because the comparison implies that Americans on average eat, sleep, and enjoy their leisure fifty times more than Chinese people do. It would also imply that American parents derive fifty times as much living standard from cradling their children as their Chinese counterparts. Yet there is something implausible about such comparison. The conclusion is that income is important for standard of living determination, but there must be other factors influencing human well-being besides income.

\(^2\) The calculations were made based on GNP per capita estimates published in *The World Development Report 1995* (162-163).
III. Four major problems of GNP-based comparisons

There are four major reasons why GNP-based comparisons are problematic when developed and the third world countries are compared. The first problem can be found in the GNP's definition. Gross National Product is an aggregate value of all market activities which take place in an economy during a specified period of time (usually a year) (Beckerman, 592). By definition GNP includes only "activities with a price tag", and does not take into account non-market activities such as household production (Estes, 9).

The non-market sector, however, is especially important in the third world countries, where there is no high degree of specialization. Using the western world definition, it can be observed that China's labor participation rate is much lower than in the US. It is partially due to the higher percentage of population under 16 in China, but it is also due to the fact that many Chinese never sell their labor at market. They prefer to engage into household activities, because it promises higher payback compared to earning wages, which could be later exchanged for goods. The problem of not accounting for household production can be solved by adding to the conventional GNP an estimated value of such activities, and it will be developed later in the paper.

The second problem with using GNP for cross-national standard of living comparisons is that GNP does not account for some factors that contribute to wealth, which consists of
current consumption and future consumption. Current consumption is accounted in GNP in a form of household and government spending. Future consumption is hidden in the present value of machinery, which is equal to the expected production of goods in future. Investment into machinery contributes to an increase in future wealth, and depreciation of machinery is the transformation of future wealth into present wealth. Thus, net investment by firm and government is a good approximation of future consumption.

Machinery by itself, however, is useless. There must be labor able to operate the machinery to convert the potential goods into real goods. Therefore, human capital has to be taken into consideration, because an increase in human capital is an increase in a country's wealth. Investment in human capital is captured in GNP in a form of governmental and household spending on education and training. Thus, an official GNP accounts not only for current consumption and future consumption derived from capital stock, but also for future consumption derived from human capital.3

3 Capital and labor are the two major variables of a production function, which can substitute each other. A country with a great deal of machinery and less human capital may have the same conversion capabilities as a country with less machinery and more human capital. Thus, the ratio of the changes in capital stock and human capital is not important for estimating present wealth. Magnitudes and direction of change are important, and both these are reflected in an official GNP.
The future consumption, however, is not determined only by capital stock and human capital. Such factors as country's natural resources, social capital, or political stability might be considered to be important and have to be accounted for standard of living comparison purposes. For example, there are fewer incentives for people living in unstable environment to produce as well as invest, and also there is disutility of uncertainty. Thus, people living in politically unstable countries and expecting a revolt every day must have a lower standard of living compare to people living in politically stable countries, even if measured GNP is the same.

The third major downside of the GNP is that it does not account for subjective valuations that people place on happiness and satisfaction with life. An example is a comparison involving a farmer and a monk. The monk has less income than the farmer, but he also has certain ways of deriving satisfaction, which farmer does not have. Both the monk and the farmer are rational individuals. Both of them maximize their well-being or wealth. The only difference is that in monk's understanding happiness can not be found in material things, but rather is found in serving God. It is impossible to make any judgments about the relative standard of living in this case, because income is unimportant to the monk. The example could be fit to a case of comparing standard of living between countries. For instance, if it could be shown that Indians on average are more like monks, and Americans on average are more like farmers, then it is unclear whether Indians, who definitely have lower income, or Americans,
who definitely have higher income, have higher standard of living. Thus, if one wants to use GNP for cross-national comparisons, he must assume that people in countries of interest should share a set of values, which is quite an unrealistic assumption.

Finally, the fourth problem with GNP-based comparisons is inability of such comparisons to account for differences in consumption patterns. Actual expenditure patterns are important for comparison purposes. In two countries relative equilibrium prices of the same good could be different due to distinctions in demand and costs of production. For example, in Japan the supply of land is extremely limited relatively to the US, and the demand for housing is high. This results in relatively higher price of housing in Japan, or in higher cost of living. Japanese people must spend more of their disposable income on housing compare to Americans. Thus, given the same GNP per capita, Japanese people would have a lower standard of living. In order to maintain a similar to US standard of living Japanese people would have to have higher income.4

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4 This is the index number problem, which is not unique to cross-national comparisons. The problem arises frequently when time series comparisons are attempted. A classical example would be a problem of determining real GNP growth.
IV. Purchasing Power Parity Adjustment

The last problem of inability to account for differences in consumption patterns can be partially solved with help of purchasing power parity adjustments. The purchasing power parity concept predicts that under perfect information and free floating currency exchange, the "law of one price" must hold, and a unit of any currency should be able to buy the same quantity of goods in different countries (Dornbush, 1076). However, the information is not perfect in real world and exchange rates are frequently regulated, which results in different purchasing power of one currency in another country. In the real world, an American would pay $2.00 for a gallon of milk in the US and $1.00 for the same gallon of milk in Brazil.

The fact is important, because all cross-cultural comparisons should be done in one currency in order to be meaningful. The fact tells us that after converting Brazilian GNP per capita into US dollars less dollar denominated income is required in Brazil to support the American standard of living. Looking at it the other way, the Brazilian real income is higher, because in reality Brazilian income has more purchasing power than the traditional converted at market exchange rates income would suggest. To correct this real world anomaly a variety of
PPP-based adjustments are applied to GNP figures for comparative purposes.5

Even after purchasing power differences are accounted for, and the problem of differences in consumption patterns is solved, there is still another problem remaining. The adjustment does not take into account quality differences among products in different countries. The original price differentials between goods in two countries could be attributed to differences in quality of products.

For example, if quality of food is defined by the amount of calories, then food may be relatively cheaper in India than in Australia. This is because it is lower quality food, which contains less calories. Indians would have to buy more of Indian lower quality food to maintain the same level of calorie intake as Australians. When a purchasing power parity adjustment is made, an assumption is made that the quality of food is the same, and because Indian food is cheaper, people from Australia would be able to buy more food in India. Such statement, however, is false, because Australians would not derive the same amount of calories from Indian food as they would derive from Australian food in Australia. Australians would have to buy a greater amount of food to get the same calorie intake as they do in Australia. This implies that Australians would have to spend more money on food, or that the purchasing power of the rupee was

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5 For a detailed discussion of procedures used to make PPP adjustments refer to A system of International Comparisons of Gross Products and Purchasing Power by Irving Kravis et al.
overvalued. Thus, quality differences of food distort the PPP adjustment, because rupees can not buy as much as the PPP adjusted GNP figure suggests. Indian PPP adjusted GNP per capita is overstated.

The process of adjusting GNP figures for PPP is a tedious procedure, and if quality differences have to be accounted for, the problem becomes even more complex. Furthermore, if PPP adjustments are based on measurable quantities, a quality adjustment have to be based on subjective valuation of what constitutes measures of quality. So as peoples' values of quality differ significantly, the multitude of necessary quality-based adjustments makes such procedures almost impossible. PPP adjustments are not flawless, but they partially solve the problem of differences in consumption patterns, which makes PPP adjusted GNP comparisons more precise compare to conventional GNP comparisons.

V. Social Indicators

In late 70s GNP based comparisons were vigorously attacked by proponents of social indicators. The economists and sociologists observed that although GNP is a strong measure of economic growth, modernization, and industrialization, it is not capable of capturing all aspects related to enhancing the quality of human lives. They propose that standards of living comparisons should not be made based on economic factors alone, which are admittedly captured in relative GNP figures, but rather
should be supplemented or substituted by such welfare-oriented social indicators as life expectancy at birth, school enrollment ratios, infant mortality rate, etc. Their approach is to combine such social indicators into indexes that could be used for purpose of cross-national comparative studies.

A number of such indexes have been developed. In 1979, Morris D. Morris first proposed such an index, which he called the Physical Quality of Life Index (PQLI) (Morris, 20-40). The index is a weighted combination of infant mortality rate, life expectancy at age one, and literacy rate. PQLI did not seem to be comprehensive, and Richard Estes expanded the idea to construct his Index of Social Progress (ISP) (Estes, 1-13). ISP was composed of 36 variables with help of factor loading analysis. The most widely known, however, is Human Development Index (HDI). Developed under the leadership of the World Bank, HDI combines life expectancy at birth with an educational attainment index and an adjusted GNP per capita.6

All three indexes share the same set of problems. When social indicators are measured, they have attached normative values. For example, life expectancy is desired to be as long as possible, infant mortality rate should be as low as possible, and a higher ratio of people attending schools is preferred to a lower ratio. Even if normative directions of employed variables

6 For more precise methodology refer to Technical Note 1 in Human Development Report 1990.
are universal, combining the indicators represents a great challenge.

Social indicators usually represent different aspects of life, and they use different measuring units, which should be somehow combined into a single number for comparison purposes. When indicators are combined, a decision must be made on how much weight each indicator should receive in the final figure. The procedure of assigning weights increases the amount of involved bias (Miles, 109). It is difficult to determine which one is more important, an increase in education attainment or a decrease in mortality rate.

Even though, there are various tools to assess the necessary weights, including sophisticated mathematical techniques, the result is always somewhat absurd: an extremely subjective index. For example, according to the HDI, if human life expectancy increases by 0.0366 years (approximately 13 days and 8 hours), it is equivalent to an increase in income per capita by $4.70 or to an increase in mean years of schooling by 0.037 years (approximately 13 days and 12 hours). It is easy to see that some ethical values were embedded into the index while it was composed. The index gradually became a measure of western values.

7 Computations are made based on the World Bank's methodology used in HDI calculations in Human Development Report 1992 (Technical notes, 91-92).

It should also be noted that the GNP per capita figure is valid for countries below a defined by the study poverty line of $4,829. A greater number would be appropriate for countries with GNPs per capita above the poverty line.
Whenever social indicator indexes are used, one should also worry about correlation of variables and their linear dependence. Correlation of variables suggests that variables might measure the same attribute, and linear dependence of variables indicates that the variables do measure the same attribute. PQLI is the best example of a case in which the used social indicators are linearly dependent. Life expectancy at age one is directly proportional to infant mortality rate. Both variables can be used to describe variation of the same characteristic, longitude of life, and the composite index is based only on variation in the two significant aspects instead of three.

Estes attempted to minimize linear dependence in his ISP by grouping highly correlated variables and preindexing the variables before the final index was composed. The procedure eliminated the problem of high correlation between variables used to measure the same attribute. The situation was not improved significantly, however, because it resulted in highly correlated subindexes, which implied that subindexes were the measures of the same characteristic. The problem of correlation tends to expand as the number of variables increases.

The most interesting fact about social indicator indexes is that, although they were designed to absorb aspects different from what GNP tends to capture, the components employed to construct social indicator index are frequently highly correlated with GNP per capita figures. The high, but not perfect, correlation leads to almost identical results, when the two different methods are used to estimate standards of living. This
means GNP per capita alone explains almost as much variation as a
group of numerous variables.

The explanation of this phenomenon can be derived from the
fact that peoples' values tend to change with respect to their
wealth, or their standard of living. The values of long living,
equality, and security in general tend to increase as income or
economic well-being increases. It is expected to observe more
interest in having food and shelter than political stability and
security in poor countries. On the other hand, in relatively
wealthier countries people would prefer more equality and longer
lives.

In wealthier countries people not only want to be more
equal, secure, and live longer lives, they also can afford to do
all these things. So as they have fulfilled almost all their
needs in food and shelter, they can direct scarce economic
resources to higher value uses, to other goals to which people
aspire. As a result, in economically well to do countries people
have more equity, security, and stability. Thus, income or GNP
can be seen as a motor behind social indicators, and this results
in a strong positive correlation between GNP and social
indicators.

The Spearman rank correlation test was performed to
determine the degree of correlation between ranking of countries
based on their Human Development Index and ranking based on
adjusted for PPP real GDP per capita. The correlation
The coefficient for 174 countries was estimated to be 0.947. The obtained coefficient is statistically significant at 1% to reject the null hypothesis of zero correlation, which proves a strong positive correlation between the two ranking systems.

The obtained coefficient is also statistically significant at 5% to reject a null hypothesis of perfect positive correlation between the two ranking systems. This shows that social indicators do capture a small portion of differences that are left untouched by GNP-based comparisons. To ensure that the observation is not a result of obvious outliers such as oil-producing East Asian countries, which have gigantic GNPs and puny social indicators, the outliers were taken out. Even after the procedure, a one-tail test rejects the null hypothesis of perfect correlation. Despite the fact that the Spearman rank correlation test can not demonstrate a perfect transfer of HDI-based ranking into GNP-based ranking, the test shows that the two methods are highly correlated.

GNP and social indicator indexes produce very similar standard of living comparisons, but the major differences between the methods is that GNP-based comparisons are much more objective, because they are based on market valuations. A great deal of subjectivity is infused into social indicators, when they are selected and measured. In addition, due to cultural differences, every country must have its unique weight, when

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8 The data for calculations was obtained from Human Development Report 1995. A description of the Spearman rank correlation test can be found in Morris Hamburg's Basic Statistics (288-290).
social indicator are indexed. This seems to result in complex calculations and brings doubts about meaningfulness of final results. When two methods produce highly correlated results, the more objective method should be chosen. GNP is not an accurate, but definitely a better measure of standard of living.

VI. Extending GNP with the value of natural resources

So as social indicators are subjective, the technique of expanding the traditional GNP by some additional unaccounted figures has been developed. It is believed to be a more objective alternative to social indicators, because it involves dollar estimates of values measured in the same, usually dollar, units. It is a quite frequently practiced exercise. For example, recently a group of economists claimed by adding an ecological cost of industrialization to the US GNP that the United States' standard of living has been declining for the last four decades (Economist 27). There are numerous ways for adjusting GNP. The problem becomes to make the most necessary adjustments and avoid redundancy.

One of the possible ways of estimating a country's wealth is to add the market value of the country's natural resources to its GNP. The reasoning behind the procedure is that a country has a certain amount of future potential benefits hidden in and on the ground, just as it has future potential benefits hidden in the value of the country's capital stock. The valuation should be made at market prices, because market prices are a good estimate
of the goods' potential benefits. When people choose to consume a barrel of oil, they extract benefits from the oil. When people exchange a barrel of oil on market, they exchange potential benefits of consuming a barrel of oil for expected benefits of consuming another good. So as people exchange a barrel of oil only when the market price is higher than their potential benefit from consuming the barrel now or in future, the market price is a rough estimate of benefits associated with a barrel of oil.

According to the proposal to add the market value of natural resources to GNP figures, a country with abundant natural resources clearly must have a higher living standard than a country with relatively less natural resources. In the real world, however, it can be easily demonstrated that some countries with virtually no natural resources have higher standards of living than many countries with relatively large quantities of natural resources. The natural resources alone do not explain the miracle of Four Tigers or Japan or a small European country, which possess just a tiny bit of natural resources available to Russians, Indians, or Brazilians, but have relatively higher living standard.

This is primarily due to the fact that natural resources are worthless until they are converted into valuable goods or uses. One approach is to look at the conversion process as production. One can not be wealthy, if he sits on a pile of iron ore with no machinery or knowledge how to make something useful out of it. The second approach is to look at the conversion of natural resources by means of exchange. One can not be wealthy, if he
sits on a pile of iron ore, and there is no one who wants to exchange the ore for something else. It is clear that, if the person neither has capital to convert iron ore by means of production nor has a trading partner to offer something else in exchange, the persons wealth is limited to the potential uses of that iron ore (what is it good for besides for looking at it?).

A person without these alternatives is relatively poor compared to people who can convert the iron ore into other more valuable goods. Natural resources are worthless, or have extremely low insignificant value, if there is no market for them. The market arises only in case there is a production process to convert the natural resource into valuable goods. Finally, existence of machinery and labor skills is a precondition for existence of a production process. Thus, capital stock and human capital should be highly correlated with level of use of natural resources, and the standard of living in this case should be highly correlated with GNP figures, which capture the accumulation of capital stock. The conclusion is that the value of natural resources is not important for present standard of living comparisons, because it reflect the same information that is carried by the investment component of an official GNP figure. An incorporation of the value of natural resources would be redundant.9

9 The value of natural resources, however, is important for "potential" standard of living comparisons, so as a country with a greater valued natural resources has an option of converting the natural resources into capital stock and human capital, improving its standard of living.
VII. Other Common GNP adjustments

There are two major approaches to adjusting national income and product accounts. One group of researchers believes that measuring peoples' welfare is not possible due to subjectivity of such calculation. They prefer to concentrate on adjusting and expanding the traditional GNP, making it as precise measure of a nation's output of final goods and services as possible. Their utilitarian point of view sees well-being highly correlated with the total number of goods and services produced in an economy.

The second approach is motivated by the fact that many non-market activities contribute to people's well-being. The research concentrates on estimating the value of leisure activities. For example, it is impossible to account for illegal transactions unless one assumes they are already included in the traditional GNP. The illegal transactions, however, must result in satisfaction of needs, and, therefore, must have some value important for well-being comparisons. The second method results in measures of human well-being as a whole instead of only the legal material portion of human well-being, which is estimated by the first method.

During the last quarter of the century a great majority of world economists were primarily under influence of the first

10 There are many money-laundering businesses. Due to such legal businesses, which do not produce much, but generate high cash revenues and clean profits, the value of illegal activities might be at least partially already included in the traditional GNP.
point of view and attempted to fine-tune the official GNP to come up with a better measure of final output of goods and services, or economic well-being. The final results, however, were frequently somewhat mixed at least for a few welfare oriented economists, who not only changed the existing definitions of consumption and investment and incorporated household production, but also integrated into their frameworks the value of human leisure.

The fine-tuning began with redefining of the existing boundaries between consumption and investment. Zolotas, Jorgeson, Kendrick, Ruggles, and Eisner, all of them point out that consumer durables are investment and should be treated as such. Only the depreciation of the consumer durables stock should be treated as consumption. So as we have already discussed the importance of both the present consumption and future consumption, or investment, for human well-being, the precise classification of which is which is not really relevant for standard of living comparisons. We just want to avoid double counting.

Nordhaus & Tobin, Zolotas and Eisner insist on deletion of such regrettables as commuting to work, police and defense expenditures, sanitation, and road maintenance, which are viewed as intermediate goods. It is true that under idealistic world conditions such things would be unnecessary, but in the existing world all these expenditures produce intangible, or, in the case of road maintenance, tangible goods which satisfy peoples' needs, and, therefore, are important for standard of living comparison.
For example, if the case of defense expenditures is analyzed, it can be observed that, if government would not spent on defense, then due to their need for security from outside invasions individuals would begin to pull funds together and form firms that would produce such security. In the final arrangement government's would-be defense expenditures will be substituted with consumption. The same sort of arguments works for other "regrettables."

Many researchers proposed to broaden the measure of investment. For instance, Kendrick and Eisner propose to add the opportunity cost of student time as an estimate of a measure of investment in human capital. The value of human capital, however, is already accounted in GNP in a form of consumer and government expenditures on education. The only difference is that it is accounted as consumption, but such distinction is not significant to living standard comparisons.

GNP has long been criticized for exclusion of value of household activities, and as Eisner mentions "the exclusion tends to vitiate intertemporal and international comparisons" (p. 1612). For example, if one accounts for a country's household production, the adjustment might change the country's economic growth rate, because the growth might be at least partially attributed to a shift from non-market to market activities or vice versa.

In such dual economy, which has market and household production sectors, a depression might be caused by a nationwide shift from market activities to household production. Such shift
would result in a large drop in GNP, but it would not have such
great negative impact on peoples' material well-being as GNP's
growth rate decline would suggest. On the other hand, during a
quick expansion the market sector might draw labor-force from the
household sector. In such a case, a market economy is expanding
in expense of household production, and the real increase in
peoples' material well-being is not as large as the GNP's growth
rate suggests. Thus, after the household production adjustment
is made the economic growth rate would be somewhat more stable.

From the international perspective, exclusion of household
production undermines validity of present standard of living
comparisons. The present system of GNP-based comparisons places
zero value on labor of Chinese farmers, who grow just enough rice
to cover their own needs. Although such Chinese farmers never
sell rice on market, their standard of living is not as bad as
zero income would indicate. Low GNPs per capita of the
developing nations definitely underestimate standards of living
in those countries, because many things are simply produced in-
house instead of obtained on market. The absence of markets does
not imply such a low standard of living, and extension of GNP by
the value of household production is essential for more precise
cross-national standard of living comparisons.

Nordhaus & Tobin, Jorgeson, Zolotas, Kendrick, and Eisner,
all incorporated the value of household production into their
frameworks of adjusting GNP to reflect economic well-being. The
employed methodology of estimating the value is basically the
same, and it is based on approximating the opportunity costs of
comparable market labor. All of the economists, but Eisner, observed that a decline in work hours and an increase in leisure time should contribute to the well-being of a nation, and attempted to expand GNP by the value of human leisure.\textsuperscript{11} The general rule of thumb from their calculations is that leisure can be roughly estimated to be equal to GNP.\textsuperscript{12}

\textbf{VIII. Leisure}

Leisure composes the largest share of unaccounted in the traditional GNP human well-being. The importance of leisure to human well-being was observed a long time ago by Aristotle, who defined leisure as the time spend only in relaxation and wrote:

"Happiness is thought to depend on leisure; for we are busy that we may have leisure, and make war that we may live in peace."

Aristotle's notion of leisure was quite different from the present view. Aristotle believed that true leisure or true relaxation could be reached only during the time of

\textsuperscript{11} Eisner was more interested in total physical output than welfare, and decided to avoid adding leisure, which definitely contributes to welfare, but is not so essential for physical output. For a deeper discussion of used methodologies please refer to the original writings of Nordhaus & Tobin, Zolotas, Jorgeson, and Kendrick.

\textsuperscript{12} Kendrick estimated the value of leisure to be 95.9\% of GNP, and Nordhaus-Tobin study resulted in a 101.5\% of GNP estimate.
contemplation, but not during the time of amusement. The modern view is quite opposite. It treats brain activity as work and amusement as leisure. John Owen defines leisure in his book *The Price of Leisure* as:

"...consumption time, where consumption time is defined as time devoted to activities which are, at the margin, primarily carried on for their own sake, rather than for control over financial or other resources which the activity might yield."

Owen redefines leisure as time spent on non-work related activities. The strength of Owen's definition is that it opens a door for an economic analysis, because a trade-off must be made between utility of earned income and utility of leisure. An economic model has been developed to analyze such trade-offs with a primary purpose of determining the amount of labor supplied. The model assumes that an individual has a fixed number of units of leisure (L), which he can exchange at market for income at a market wage rate. Then, an individual's all possible combinations of leisure and income can be represented by constraint, which is a line (LI). As wage increases the constraint line pivots around point L upward. The new constraint is the line LI\(^1\). On the other hand, as wage decreases the constraint line pivots around point L downward. This new constraint is the line LI\(^2\).

An individual derives utility from both income, so as he can buy goods with it, and leisure, so as he can engage in activities that he likes during this time. A bundle of income and leisure
for which an individual should have the same level of utility must be represented by an indifference (isoutility) curve $U$. As the utility level increases the indifference curve should shift outward of origin. The new indifference curve is $U^1$. On the other hand, as the utility level decreases the indifference curve should shift toward the origin. This new indifference curve is $U^2$.

![Diagram showing indifference curves]

The analysis of leisure-work trade-offs is based on a fact that, in equilibrium, a utility maximizing individual would choose the point $E$ given constraint $LI$, at which the marginal utility of the income earned in additional hour's work equals the marginal utility of an hour of leisure.

One of the major implications of the model for international standard of living comparisons is that the analysis suggests that the market wage rate is an excellent approximation for an individual's marginal value of leisure. So as leisure contributes to human well-being, the analysis allows us to put a
dollar value on an individual's total leisure. When the imputed value of leisure is added to total income, a much more precise measure of a living standard can be obtained. The new standard of living measure does not depend only on an individual's material well-being as a conventional GNP-based, or income only, method would suggest, but it also depends on an individual's immaterial well-being which is measured by imputed value of leisure.

Furthermore, two individuals can have different preferences toward leisure and income, but have the same standard of living. This can be explained by the fact that the more leisure-loving individual A, who wants more leisure, is willing to sacrifice income in order to work less and have more leisure. Although individuals are located at two different equilibria and individual B has more income, after adjustments for value of leisure are made, both individuals have \( \text{IADJ} \) amount of economic well-being such that A's total well-being is equal to B's total
well-being. This fact should be especially important for cross-national comparisons. It implies that two countries can have different incomes per capita, but due to different total or average valuations of leisure, people in the two countries can actually have the same standard of living.

Marginal valuation of leisure at average wage, which is derived from leisure-income trade-off model, was employed by Nordhaus and Tobin in their calculations of Measurable Economic Welfare (MEW) numbers for cross-national economic growth rates comparisons.\(^{13}\) The adjustment did not have a significant influence on rankings of countries growth rates and were judged to be unnecessary (Beckerman, 50). Nordhaus and Tobin never converted their MEW numbers into the same currency units for cross-national standard of living comparisons.

In order to expand the application of leisure-income trade-off model to cross-national standard of living comparisons, Owen's definition of leisure should be modified. Leisure time should be defined as non-working time. If Owen's definition excludes such activities as household-production and commuting from leisure category, the new definition includes them.

\(^{13}\) Nordhaus and Tobin calculated MEW for ten European countries: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Sweden, the United Kingdom, and Norway; as well as for the United States, Japan, and Canada. They used two methods. When the assumption was that productivity of leisure remains constant over time, MEW's growth rates were approximately twice as low as GNP's growth rates. When the assumption was that the productivity of leisure increased according to the rise in real wages, MEW's growth rates were approximately equal to GNP's growth rates.
For standard of living comparisons it does not matter how people consume their leisure. What is important is at how much people value their leisure. When an individual decides to commute to his nice residence outside of city, he simply chooses to consume that leisure time in such manner, because he gets more satisfaction from living outside of city and commuting to work than from living in downtown and walking to work. It is simply a different bundle of consumption goods, but the marginal value of an hour of leisure would still be determined by value of income earned in the hour.\textsuperscript{14}

An additional modification of the traditional leisure-income trade-off model is that an individual's income should be divided into autonomous income derived from wealth, which will be called income from capital and denoted $I^K$, and labor income derived from sacrificing of the individual's leisure time, which will be called income from labor and denoted $I^L$. An individual in country A would on average have $I^K$ dollars of autonomous income. This extra autonomous income does not change marginal conditions of utility maximization, although it does affect the optimal amount of work at which the conditions are satisfied. The autonomous income can be represented by an upward parallel shift of a constraint boundary by the amount of the income (Beckerman, 18).

\textsuperscript{14} The same argument can be applied to an individual's decision to wash dishes, mow yard, or raise pigs. All these are various combinations of leisure consumption.
The conventional GNP per capita would be approximated by a country A's average individual's income from capital plus income from labor. If \( P \) is population, then GNP per capita:

\[
\text{(GNP/P)} = \left( \frac{I_K}{P} \right) + (\frac{I_L}{P})
\]  

(1)

The standard of living, as it was previously discussed, depends on people's value of leisure. Thus, in order to come up with the total income \( (I_T) \), the value of leisure \( (I_{LS}) \) should be added to income from capital and labor.

\[
I_T = I_K + I_L + I_{LS}
\]  

(2)

The total value of leisure can be estimated using the marginal value of leisure, estimated by average wage \( (I_{LS}/THW) \), where \( THW \) is total hours worked in the economy. If \( L \) are total hour available in the economy, then \( (L-THW) \) are total non-working or leisure hours in the economy, and the total value of leisure in the economy:

\[
I_{LS} = \left( \frac{I_L}{THW} \right) \ast (L-THW)
\]  

(3)

Substituting equation (3) into equation (2) yields:
\[ I_T = I_K + I_L + \left( \frac{I_L}{THW} \right) \times (L-THW) \]
\[ I_T = I_K + \left( \frac{I_L \times L}{THW} \right) \]

(4)

The per capita version of the last equation can be rewritten as:

\[ \frac{I_T}{P} = \frac{I_K}{P} + \frac{I_L \times L}{THW \times P} \]

(5)

So as \( L \) is the total number of hours available in economy it is equal to \( k \times P \), where \( k \) is number of hours available per individual. The equation (5) can be simplified even further:

\[ \frac{I_T}{P} = \frac{I_K}{P} + \frac{I_L \times k \times P}{THW \times P} \]
\[ \frac{I_T}{P} = \frac{I_K}{P} + \frac{I_L \times k}{THW} \]

(6)

Noting that total hours worked are equal to average hours worked per person (AHW) times number of individuals in labor force (N)\(^{15}\), the equation (6) can be rewritten in the following form.

\[ \frac{I_T}{P} = \frac{I_K}{P} + \frac{I_L \times k \times (AHW/N)}{15} \]
\[ \frac{EWB}{P} = \frac{I_T}{P} = \frac{I_K}{P} + \frac{I_L / N}{AHW / k} \]

(7)

Thus, economic well-being per capita (EWB/P) equals to total income per capita (I^T/P), which is equal to per capita non-labor income (I^K/P) plus income from labor of an average worker (I^L/N) divided by the fraction of time an average worker spends working (AHW/k).

\(^{15}\) The labor force number N should include actively seeking employment or unemployed as well as employed individuals, in order for average wage rate (IL/N) to be a more precise measure of the marginal value of leisure. If only employed individuals are used for wage rate calculation purposes, then during periods of cyclical unemployment average wages would overestimated marginal value of leisure.
The technique was applied to the following set of data:\(^ {16} \):

### Table I

<table>
<thead>
<tr>
<th>Country</th>
<th>Wages &amp; Salary ((I^L))</th>
<th>Other Income ((IK))</th>
<th>Population ((P))</th>
<th>Labor Force ((N))</th>
<th>Average Hours Worked ((AHW))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>132,640,000,000</td>
<td>76,170,000,000</td>
<td>15,970,000</td>
<td>6,886,000</td>
<td>41.9</td>
</tr>
<tr>
<td>Canada</td>
<td>274,610,000,000</td>
<td>151,510,000,000</td>
<td>25,590,000</td>
<td>11,634,000</td>
<td>38.7</td>
</tr>
<tr>
<td>France</td>
<td>2,696,100,000,000</td>
<td>1,037,130,000,000</td>
<td>55,390,000</td>
<td>20,970,000</td>
<td>38.6</td>
</tr>
<tr>
<td>Germany</td>
<td>1,642,800,000,000</td>
<td>667,330,000,000</td>
<td>61,070,000</td>
<td>25,270,000</td>
<td>40.4</td>
</tr>
<tr>
<td>Japan</td>
<td>181,660,000,000,000</td>
<td>102,091,000,000,000</td>
<td>121,670,000</td>
<td>58,530,000</td>
<td>41.0</td>
</tr>
<tr>
<td>Sweden</td>
<td>549,410,000,000</td>
<td>182,614,000,000</td>
<td>2,089,100,000,000</td>
<td>139,783,000,000</td>
<td>38.3</td>
</tr>
<tr>
<td>The UK</td>
<td>257,900,000,000</td>
<td>56,760,000</td>
<td>241,100,000</td>
<td>4,269,000</td>
<td>42.7</td>
</tr>
<tr>
<td>The US</td>
<td>8,370,000</td>
<td>24,756,000</td>
<td>109,600,000</td>
<td>38.3</td>
<td>40.7</td>
</tr>
</tbody>
</table>

The Economic Well-Being figures in first column of Table II were obtained by applying equation (7) to data listed in Table I.

---

\(^ {16} \) The income, population, labor force, and average hours worked data are from Thelma Liesner's *One Hundred Years of Economic Statistics*. The exchange rates and GNP per capita estimates are from *Statistical Yearbook*. 

---
The constant $k$ was assumed to be 112 hours a week, or 12 hours a day. It is important to note that calculations should be sensitive to the choice of $k$. Then, the EWB numbers were converted into the US dollars at market exchange rates and ranked.

Table II

<table>
<thead>
<tr>
<th>Economic Well Being per capita (local currency)</th>
<th>Market Exchange Rate per capita (US$ MER) &amp; rank</th>
<th>EWB per capita (US$ MER) &amp; rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia A$ 56,260</td>
<td>1.496</td>
<td>37,607 (7)</td>
</tr>
<tr>
<td>Canada C$ 74,332</td>
<td>1.389</td>
<td>53,443 (5)</td>
</tr>
<tr>
<td>France Fr 402,710</td>
<td>6.926</td>
<td>58,145 (2)</td>
</tr>
<tr>
<td>Germany DM 124,707</td>
<td>2.171</td>
<td>57,442 (3)</td>
</tr>
<tr>
<td>Japan Y 8,479,260</td>
<td>168.52</td>
<td>50,316 (6)</td>
</tr>
<tr>
<td>Sweden Skr 407,160</td>
<td>7.124</td>
<td>57,153 (4)</td>
</tr>
<tr>
<td>The UK Pd 21,811</td>
<td>0.682</td>
<td>31,981 (8)</td>
</tr>
<tr>
<td>The US $ 59,109</td>
<td>1.000</td>
<td>59,109 (1)</td>
</tr>
</tbody>
</table>

As it can be seen the inclusion of imputed value of leisure did change ranking to some extent. The Spearman rank correlation coefficient between ranking based on GNP per capita (US$ MER) and ranking based on EWB per capita (US$ MER) is 0.643; however, the t-test fails to reject the null hypothesis of zero correlation at significance level of 5%. It should also be noted that the strength of correlation might change once more countries are taken in consideration. Thus, for more definite test results a larger sample of countries should be considered. So as we have already established that PPP adjusted GNPs per capita are more
precise for standard of living comparisons, the obtained EWB was converted into PPP adjusted US dollars.

Table III

<table>
<thead>
<tr>
<th>Country</th>
<th>EWB per capita (US$ PPP)</th>
<th>GNP per capita (US$ PPP)</th>
<th>Rank &amp; Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>46,369 (5)</td>
<td>13,669 (4)</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>61,673 (1)</td>
<td>16,374 (2)</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>57,407 (3)</td>
<td>13,025 (5)</td>
<td></td>
</tr>
<tr>
<td>Germany</td>
<td>31,427 (8)</td>
<td>12,264 (7)</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td>39,735 (6)</td>
<td>12,909 (6)</td>
<td></td>
</tr>
<tr>
<td>Sweden</td>
<td>51,152 (4)</td>
<td>14,173 (3)</td>
<td></td>
</tr>
<tr>
<td>The UK</td>
<td>38,086 (7)</td>
<td>11,807 (8)</td>
<td></td>
</tr>
<tr>
<td>The US</td>
<td>59,109 (2)</td>
<td>17,580 (1)</td>
<td></td>
</tr>
</tbody>
</table>

Ranking based on PPP adjusted EWB per capita seems to be similar to ranking based on traditional GNP per capita. Only three couples of countries exchanged their relative ranks. The observation might lead to a conclusion that EWB is almost perfectly correlated with GNP, and has the same value for standard of living comparisons as GNP. But because EWB technique is more complicated, GNP-based comparisons should be preferred.

It should be understood, however, that when value of leisure is added to income, leisure’s price is estimated to be equal to average wage. The traditional PPP adjustment did not take into account that leisure is now defined as a commodity and has a

17 The calculations were made based on PPP adjustment that did not account for value of leisure.
"price tag." So we are back to the famous index problem. The used PPP adjustment is biased toward goods and services, because it assigns zero price to leisure. As a result, when EWB converted into PPP adjusted EWB, using the biased PPP factors, PPP adjusted EWB is almost perfectly correlated with PPP adjusted GNP. Therefore, we disregard the results of Table III as having little meaning, and concentrate on results of Table II.

Although we can not really conclude which method GNP-based or EWB leisure-added is better until we examine a larger sample of countries, a number of observations are noteworthy. The EWB approach moved France up in ranking primarily due to the fact that there are relatively less French people working and they work shorter hours. The observation makes economic sense. If French people have only sixty percent of income compare to Germans, but both countries have almost identical EWB, this means that French people are more leisure loving individuals compare to workaholic Germans. Thus, as it can be seen from the pilot calculations the major advantage of EWB-based comparisons is that such technique leads to more realistic living standard comparisons.
IX. Conclusion

As it was determined in introduction cross-national standards of living must be compared based on available human alternatives. One of the most frequently used approaches to measuring human available alternatives consists of measuring people's income, or GNP. Income is important, but there are other factors that influence standard of living, and GNP-based approach has four major problems.

The first problem of GNP not accounting for differences in consumption patterns, or the index number problem, can be partially solved with help of Purchasing Power Parity adjustments. Although, PPP adjustments do not solve the problem of differences in quality of products, a PPP adjusted GNP is definitely a better, more precise measure of living standard compare to conventional GNP.

The second problem of GNP not accounting for subjective valuations of happiness and satisfaction with life has been attacked by proponents of social indicators. A variety of indexes has been proposed and calculated. Social indicators, however, are difficult to combine and a great deal of bias is introduced into indexes, when they are composed. In addition, after social indicators are combined into indexes, the indexes highly correlate with conventional GNP. This leads to a conclusion that GNP should be supplemented not replaced with social indicator indexes for standard of living comparisons.
The third problem of GNP not accounting for use or accumulation of production factors other than physical and human capital can be solved by adding the market value of such factors to GNP. This market valued extensions, however, will be very highly correlated with values of existing stocks of physical and human capital, which are measured in GNP. Thus, adding such market values to GNP would not result in any changes relevant to standard of living comparisons, and, therefore, should be considered unnecessary for such purposes.

Finally, GNP does not account for some non-market productive activities that have direct affect on human available alternatives, or standard of living. This problem can be solved by adding values of leisure and household production to conventional GNP. The paper presents an alternative to existing methodology technique of calculating the imputed value of leisure, which includes the value of household production. The technique is based on the existing leisure-income trade-off labor supply model, and measures Economic Well-Being per capita.

The Economic Well-Being per capita can be calculated by adding per capita income from non-labor sources to income from labor activities of an average worker divided by the fraction of time an average worker spends working. The technique was applied to a set of eight countries. Although these pilot calculations demonstrated that EWB technique has a number of advantages in explaining economic phenomena, a study of a more extensive sample of countries is required before final conclusions about
usefulness of EWB technique for living standard comparisons can be drawn.
Bibliography


"Funk by Numbers" (September 30, 1995) *Economist*. p.27


