THE CHAMPIONS OF GDP PER HEAD AND THOSE OF STANDARD OF LIVING

GDP per inhabitant is the most commonly used indicator for making international comparisons between standards of living. Yet it ignores the non-monetary components which may differ widely from one country to another. Here, on the contrary, we start from the premise that there is no exclusive preference for monetary income but that choices are made between the different components of the standard of living which can then be expressed in terms of "equivalent income". Corrections are made to the GDP per head of 24 OECD countries to obtain a standard of living indicator that includes several aspects of individual and social well-being (leisure, health, inequalities, sustainability etc.). In the classification by country, Japan and France, in particular, move up places whereas the United States moves down.

GDP, which measures the production of domestic businesses and public administrations, is, in relation to the population, an unsatisfactory indicator of the standard of living. It would be preferable to use an indicator based on national income; one country can be richer than another whilst producing less if it receives a higher financial income or pays out lower dividends to the foreign shareholders in its businesses. But it is still true that income only takes into account the monetary component of the standard of living. Two individuals in two different countries with identical monetary incomes (with equal purchasing power) could nevertheless have a very different standard of living if one works twice as much as the other or has twice as high probability of being unemployed next year or of dying prematurely and if he or she lives in a more degraded environment.

For several years now, efforts have been made to include these other aspects of living conditions. Several indicators have been proposed, one of which is the Human Development Index (HDI), established by the United Nations Development Programme. However, the UNDP method has been heavily criticised, notably due to the arbitrary weighting of the different components in the index and the threshold effects that it introduces. In this article, we present the results of an alternative method[1]. Taking the economic theory of well-being as our starting point, we translate the various elements of the standard of living into an "equivalent income". Our study is limited to 24 OECD countries, sufficiently similar for these equivalents to have a meaning and amongst which there are nevertheless significant differences.

■ The components of the standard of living

The economic theory of well-being postulates that each of us attributes different degrees of priority to the different components of our standard of living: income, health, leisure etc. We are not ready to sacrifice all our free time or all of our health for additional income. On the other hand, we may make a choice between a little less leisure and a little more income. An individual who works 35 hours a week for an income of 100 would, for example, be ready to work 42 hours for an income of 150. But he or she would consider working 42 hours and only receiving 130 to be the same as the initial situation: for him or her, 7 seven hours less work would be equivalent to an additional income of 30. Similarly, he or she would consider that a neighbour

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1. For a more complete presentation, see M. Fleurbaey & G. Gaulier (2007), "International Comparisons of Living Standards by Equivalent Incomes", *CEPII working document*, n° 07-03, January.

who worked 42 hours and earned 130 had the same standard of living as him or herself. Once the non-monetary elements of the standard of living can be expressed in terms of "equivalent income", aggregating them is easy and it is possible to make comparisons between individuals (or between countries).

If an individual can indicate his or her preferences in terms of equivalent income (or willingness to pay), how can we take the average national preferences into account when making international comparisons? For some components of the standard of living, our method consists of using the preferences revealed by the average values of the variables considered and for others, using the results provided by Becker, Philipson and Soares[2]. We start from the net national income per inhabitant expressed in dollars at purchasing power parity dollars. We make six successive corrections to it:

✦ *Work time* – This takes into account the division, different according to the countries, between "leisure" time and "work" time: an income combined with less (more) free time will be revised downwards (upwards). To evaluate this division, we must not only take into account the time worked by people in employment but also consider the situation of those who, even though they are not in employment, are not at "leisure". Thus, given the constraints imposed on them, we consider that each member of the unemployed "works" as much as a person who is employed. We also estimate that for each unemployed person registered there is another who is either discouraged (inactive) or unemployed but not registered and we consider that he or she "works" as much as a person who is employed. Finally, we consider that prisoners "work" twice as many hours as the rest of the employed population, given the extremely strong constraints that are placed on their time.

We have thus reached an evaluation of the time worked for each of the 24 countries; the median is 876 hours per inhabitant per year. This median is considered to be the norm on which we standardised the various countries by increasing (for those that work less) or reducing (for those that work more) the national income by the equivalent income of this difference in hours. For an hour's difference, this equivalent income is on average, in each country, equal to the net hourly wage: this is what someone gives up, on average, when they work one hour less (or what they would have to receive in order to accept working one hour more). Of course, this average encompasses different individual preferences: the equivalent income of an additional hour of work is higher for a person whose leisure time is chosen (a 60-year-old pensioner) than for a person whose leisure time is enforced (an involuntary part-time worker).

✦ *Job insecurity linked to unemployment* – Unemployment affects the income directly by situating the domestic product below its potential; it also creates a risk of instability of incomes that affects the whole of the population. Given the aversion to this risk, we consider that everyone will be ready to agree to a reduction in their standard of living to guard against it, i.e. pay an insurance premium against the risk of instability. This premium depends on the level of unemployment benefits and duration of unemployment. But, given the very negative impact of unemployment in terms of social status, we consider that the loss of income suffered is greater than the loss of income observed and estimate the additional downgrading at 20% of the activity income. The population's risk aversion is taken from Becker *et al.*

✦ *Life expectancy in good health* – Health is often mentioned as the first source of well-being and having better health may be considered to be equivalent to having higher income. The amount of income that the average person would be ready to forego (the willingness to pay) in order to increase his or her life expectancy in good health by one year is calculated using the method of Becker *et al.*. The results range from $200 to $650 of annual income throughout a lifetime according to the country.

We use the data on life expectancy in good health to set the norm at the highest level of 75 years, attained in Japan. We can then calculate the willingness to pay to be brought up to this standard for each country. For example, in France and in Germany the income equivalent to an increase of about three years in life expectancy in good health (which people would be ready to give up) would be 3% of GDP (table 1).

Table 1 – Willingness to pay to attain the life expectancy in good health norm - Examples of a few countries, 2004

	Years difference relative to the reference (75 years)	Willingness to pay for an additional year (in dollars)	Variation of equivalent income	
			in dollars	in % du GDP
Japan (reference)	0	0	0	0
Sweden	-1.7	284	-482	-1.6
Italy	-2.3	273	-628	-2.2
France	-3.0	291	-872	-3.0
Germany	-3.2	278	-889	-3.2
Ireland	-5.2	326	-1 696	-4.2
United States	-5.7	405	-2 306	-5.8
South Korea	-7.2	190	-1 366	-6.7

Source: The authors' calculations; for the sources of data see M. Fleurbaey & G. Gaulier, *op. cit.*.

✦ *The composition of households* – A household with more people in it can use its income more efficiently because the same local public good - space, heating, domestic appliances, some items of furniture, car - benefits all its members. Therefore, a two person household does not have to have a total income of

2. G. Becker, T. Philipson, R. Soares (2005), "The quantity and quality of life and the evolution of world inequality", *American Economic Review* 95(1).

40,000 dollars to guarantee each of them the same standard of living as a person on their own who has 20,000 dollars; according to our hypotheses, 28,280 dollars are needed to ensure this equivalence[3]. Therefore, the average standards of living, which relate the income to the population as if everyone lived alone, should be re-evaluated to take account of the average size of households in the different countries.

✦ *Inequalities* – The corrections made so far only cover the average situation of the population. However, an average income does not have the same value for social well-being if it is distributed in different ways. If you have an aversion for inequalities, you will prefer a lower national income that is distributed more evenly. It is no longer a question here of introducing a correction in terms of equivalent income but of giving a higher weighting to the situation of the most disadvantaged. To do this, we deduce from the average income a fraction giving an inequality index (Kolm-Atkinson index). Our correction considers that an individual who has an income twice as large as another individual has a priority of about three times less: a situation in which a poor individual receives a dollar is preferred to a situation in which an individual twice as rich receives three dollars.

✦ *"Sustainability"* – Natural resources are part of wealth. The current exploitation of these resources appears in the GDP, but the cost represented by the exhausting of the stock of non renewable resources is ignored. Weiztman showed that this cost could be measured by pricing the current production at the price of the rent (market price minus the marginal cost of extraction)[4]. However, subtracting the cost of the exhaustion of its resources from the producer country, as suggested by the World Bank[5], neglects the fact that the exhaustion of resources on a planetary scale also puts at risk the future standards of living of the consumer countries. To get nearer to the true costs borne by each country, we attribute to each a cost proportional to its share of world consumption and not production. On the same principle, and this time in the same manner as the World Bank, we measure the cost of global warming using of the quantity of greenhouse gases emitted and a price of a tonne of CO_2 set at 25 dollars (the World Bank sets it at 20 dollars).[6]

◼ Another classification of the OECD countries

The corrections made significantly modify the levels of income per head.

The correction for work time is positive for many European countries, particularly for France (in spite of its high level of unemployment), Norway and the Netherlands (table 2a). On the other hand, it leads to a reduction in income per head for Japan, the United States and Canada and, to an even greater degree, for South Korea.

When the uncertainty linked with unemployment is taken into account, there is a very minor correction in standard of living. There are two reasons for this: in the countries where unemployment is high, the length of unemployment is often relatively long, which reduces the turnover and reduces the probability of becoming unemployed for those who are not already. Furthermore, in those countries, unemployment benefits are often more generous, which reduces the loss of income of the unemployed.

The size of households particularly benefits South Korea and Japan along with Spain and Portugal. The correction for health has a notable effect for certain countries. Japan (the benchmark in this field) moves up in relative position as do Sweden and Switzerland, in particular. South Korea, the United States and Portugal are subject to quite significant negative corrections.

The correction for inequalities is large, even though we deliberately chose a moderate coefficient for aversion to inequality. It moves the United States, the United Kingdom, Australia and New Zealand down significantly as well as Portugal and Italy (table 2b). Conversely, it benefits Japan and several north European countries.

Taking sustainability into account has a lesser impact. It benefits the countries which are (relatively) thrifty with non renewable resources, due to their extensive use of nuclear or hydroelectric power to produce electricity: Switzerland, Sweden, Norway and France are the main winners from this point of view (table 2c). On the other hand, the United States,

Table 2 – Main corrections for three aspects of the standard of living
in % of GDP relative to the OECD average, 2004

a - Work Time		b - Inequalities		c - Sustainability	
France	+9.3	Japan	+10.5	Switzerland	+2.1
Norway	+6.5	Finland	+7.7	Sweden	+1.8
Netherlands	+6.1	Norway	+6.3	Norway	+1.3
Iceland	+5.2	Sweden	+6.0	France	+1.3
Belgium	+5.0	Luxemburg	+5.6	Iceland,	+0,9
Italy	+4.8	Australia	-5.5	Netherlands	-0.9
Japan	-4.9	Italy	-6.1	South Korea	-1.6
Luxemburg, Switzerland	-5.3	New Zealand	-6.5	United States	-1.7
United States	-5.4	United Kingdo	-9.7	New Zealand	-1.8
South Korea	-5.8	Portugal	-12.5	Australia	-2.0
South Korea	-10.3	United States	-12.6	Canada	-3.4

Source: The authors' calculations.

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3. The correction we make amounts to giving a weight of 50% to the communal consumptions in the utility function of each individual. With such a parameter, we can reuse the correction proposed by the OECD (2005), Alternative measures of well-being, delsa/elsa 10.
4. M.L. Weitzman (1999), "Pricing the Limits to Growth from Minerals Depletion", *Quarterly Journal of Economics* 114 (2).
5. World Bank (2006), *What is the Wealth of Nations?*.
6. Such a correction is in the spirit of the Kyoto protocol which sets reduction targets according to the countries' contributions to emissions. It is a moral judgement rather than an evaluation of the consequences for the population's standard of living because the costs of global warming will affect the countries independently of their contribution to the accumulation of greenhouse gases in the atmosphere.

Canada, Australia and the Netherlands suffer a reduction in their income of between 1,700 and 2,400 dollars per inhabitant. Table 3 brings together all the corrections and gives the classification of countries according to GDP per inhabitant and according to our standard of living indicator. Luxemburg loses 36 points relative to the average of the 24 OECD countries but keeps its first place. The United States, 3rd in the classification of GDP per head, loses 17 points and finds itself only 9 points above the average. Australia and Finland lose around 10 points and find themselves near the bottom of the classification. Conversely, the main beneficiaries of the corrections made to the GDP per head are Japan (+20 points) and France (+15 points), followed by Spain, Austria, Italy and Norway, which each gain around 10 points.

Table 3 – Classification according to GDP per head and the standard of living *as % of the average of the countries, 2004*

GDP per head		Standard of living	
Luxemburg	218	Luxemburg	182
Ireland	127	Norvège	130
United States	126	Ireland	130
Norway	121	Japan	114
Switzerland	106	Austria	113
Iceland	105	Switzerland	110
Austria	102	United States	109
Netherlands	102	France	107
Denmark	101	Iceland	104
Canada	99	Netherlands	102
Belgium	98	Italy	99
United Kingdo	98	Denmark	97
Australia	95	United Kingdo	95
Finland	95	Canada	93
Japan	94	Belgium	93
Sweden	94	Spain	92
France	92	Sweden	91
Italy	89	Germany	89
Germany	89	Australia	87
Spain	80	Finland	85
New Zealand	73	Greece	74
Greece	70	South Korea	71
South Korea	65	New Zealand	70
Portugal	62	Portugal	63

Source: The authors' calculations.

■ Further remarks

The corrections we have introduced are based on willingness to pay parameters that are difficult to estimate and for which we have made hypotheses that may be disputed. The sensitivity of our results to these hypotheses can be illustrated by the example of United States and France. Remember that the American GDP per head is 37% greater than that of France, whereas, according to our indicator, the two countries' standards of living are practically identical (table 3). But if we choose a set of parameters a priori more favourable to United States (low preference for leisure time and high tolerance of inequalities), we then find an American standard of living greater than that of France, with nevertheless a gap reduced by half in relation to that of GDP per head; with a set of parameters favourable to France (marked preference for leisure time and health and high aversion to inequalities), the country will come well ahead of United States. We must however insist on the difference between those parameters whose empirical meaning is well defined and the weighting coefficients used in the social indicators like HDI. These latter cannot be linked to an empirical content and therefore reflect the arbitrary preferences of the person who constructed the index. On the other hand, the estimation of willingness to pay can certainly be improved and give more robustness to our indicator.

The components of the standard of living that we have included are not the only ones that can be imagined. For example, we could look for a way of taking differences in geopolitical conditions into account: the risks of conflict and the consequent expenses reduce the standard of living, whereas, on the contrary, the countries benefiting from the protection of military alliances are at an advantage. Another example: we implicitly make the assumption that the public property-private property division in each country corresponds to the wishes of the population. This assumption can be disputed. We would have to be able to evaluate the cost to the population of the fact that public property is not at the optimal level, in terms of equivalent income. A last example: apart from its impact on productivity (included in the GDP), education also has a direct affect on personal satisfaction that could be taken into account by an equivalent correction to income.

Finally, our approach could be adapted to comparisons over time for a given country. This type of work would help us to escape from the obsession with the growth of GDP, which can be inadequate for the guidance of public policies.

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