
Gross Domestic Product and Welfare

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INTRODUCTION AND SUMMARY

The overall objective of political activities in democratic societies is to ensure the highest possible level of welfare for the country's citizens now and in the future. When politicians, macroeconomists and others discuss welfare and economic development in Denmark they often focus on the gross domestic product, GDP. For example, the overall goal of the government's 2020 plan is for Denmark to be among the 10 richest countries in the world in 2020 in terms of GDP per capita.

GDP is a measure of the economic prosperity of a country compiled as output or income. There is a strong correlation between the development in GDP and changes in several important social factors, including tax payments and unemployment and, to a lesser extent, health and education. It is therefore no mere coincidence that GDP plays a key role in the public debate.

However, GDP is regularly criticised for not presenting a fair view of welfare. If GDP is a poor measure of welfare, focusing one-sidedly on increasing GDP may lead to misguided political decisions. For example, Nobel laureate Joseph Stiglitz has argued that the objective of the highest possible GDP growth will result in reduced welfare. The criticism of GDP is not new, and over the last 30-40 years efforts have been made to put together alternative objectives. The debate has revived recently, partly as a result of the publication of a recent report concerning the limitations of GDP as a measure of economic performance and social progress. The report was written by the two Nobel laureates for economy, Joseph Stiglitz and Amartya Sen, among others.

The criticism of GDP as a measure of welfare is two-fold. Firstly, there are a number of compilation problems, including the breakdown by price and quantity changes and the calculation of public output. These problems can cause both the level of GDP and GDP growth to deviate from actual output. Furthermore, changes in the terms of trade may cause income to develop differently from output. As a result, applying

the level of GDP and GDP growth as measures of economic prosperity is not fully possible.

Secondly, a number of factors of major significance to welfare are not included in GDP. Accordingly, a number of alternative measures of welfare, so-called welfare indicators, have been proposed. Some welfare indicators are based on the national accounts. A number of other factors affecting welfare, e.g. leisure time, health condition and level of education, are subsequently included. These welfare indicators do not seem to provide a significantly better picture of welfare due to the strong correlation between e.g. health and education and GDP.

Instead, other welfare indicators attempt to measure welfare directly, including by means of questionnaires on the subjective feeling of happiness. The patterns of these indicators are different from that of GDP. There is a strong cross-country correlation between GDP and happiness, but measured over time, happiness seems to be independent of the development in GDP. One explanation of this apparent paradox is that happiness is related to the relative position in the income hierarchy rather than to the absolute level of income. Consequently, the feeling of happiness is not increased by higher income if everyone else has also become more affluent.

In addition to being a poor measure of welfare, GDP is also criticised of not including sustainability. Sustainability can be viewed as ongoing maintenance of necessary resources, e.g. the capital stock, the "natural capital" measured by the quantity of natural resources and environmental quality as well as the amount of human capital. Indicators illustrating sustainability should be analysed in parallel with welfare indicators, however, in order not to conflate current welfare with indicators of potential future output.

Despite a number of reservations, GDP as an indicator of prosperity should play a key role in the welfare debate. Increased prosperity can be used to improve areas that are deemed to be central to welfare. Furthermore, GDP is strongly correlated with a number of factors of importance to welfare, including unemployment, health and education. Aspects affecting welfare but not included in GDP should be part of the political debate, but they should not necessarily be comprised by a single welfare indicator.

This article has the following structure: a review of the strengths and weaknesses of GDP and other elements of the national accounts as a measure of economic prosperity is followed by an analysis of the correlation between prosperity and welfare, and various welfare indicators are discussed. The third section focuses on sustainability, and the last section provides a conclusion.

NATIONAL ACCOUNTS, GDP AND PROSPERITY

The national accounts provide an overall picture of the economy by showing how output generates income that is subsequently spent on consumption or savings. The savings can be invested in either real or financial assets. The national accounts describe all these transactions within a balanced account system.

GDP is the key element of the national accounts and can be compiled from three different perspectives: the output perspective, the application perspective and the income perspective. GDP compiled from the output perspective represents the market value, measured in kroner, of final output in a given period, i.e. the value of total output less the value of the commodities and intermediate goods consumed in the production process. Alternatively, GDP can be viewed from the application perspective where GDP is equal to the sum of consumption, investment and net exports. Finally, GDP can be viewed as the value of total income that is distributed among employees, companies and the government.

The monetary valuation makes it easy to add up a diversity of goods and services. Moreover, market prices are more than just an accounting instrument. According to economic theory, the relationship between the prices of different products reflects consumers' relative assessment of the utility of the products, so the market value is a good measure of the utility value of consumption.

The development in GDP adjusted for inflation is a well-established systematic way of compiling how the prosperity of a society develops over time, as consumption opportunities are ultimately determined by output.

Classic GDP issues

A number of factors complicate the use of GDP as an indicator of economic prosperity over time and across countries, however. This is due to inaccuracies in GDP compilation caused by insufficient data as well as differences in compilation methods across countries.

Statistical agencies regularly develop and standardise the compilation methods, thereby improving the concordance between measured and actual output and the opportunities to make international comparisons.

Breakdown by price and quantity changes

A number of national accounts terms, including GDP, may be perceived as values created as the product of prices and quantities. For national accounts purposes, enhanced quality is regarded as increasing quantities.

It is hard to identify exactly how quality change affects the price development, particularly for services, cf. Stiglitz, Sen and Fitoussi (2009, p. 87f.). Unless quality enhancements are identified, rising prices resulting from enhanced quality will be misregistered as inflation. As a consequence, real growth will be underestimated, while the rate of inflation will be overestimated.

Compilation of output in the public sector

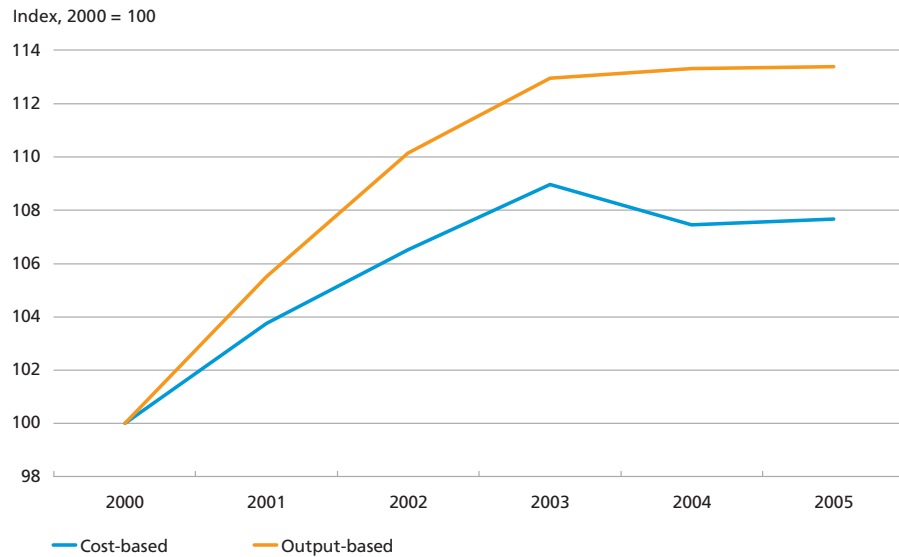
The value of public-sector output of goods and services is difficult to compile as this output is not sold in a market and market prices are consequently non-existent. Instead, the output value in Denmark is compiled based on costs. As a result, registered public output can only be increased by increasing costs. Thus productivity growth is by definition zero. For the healthcare sector, among others, this compilation method will underestimate true output, cf. Deveci, Heurlén and Sørensen (2008) and Chart 1. A large public sector therefore reduces registered growth and productivity in the economy overall.

Compilation of final output

Only the volume of goods and services that go into consumption, exports or investment is included in GDP. To avoid being counted twice, intermediate goods, on the other hand, are not included. The breakdown by consumption, intermediate goods and investment gives rise to

VOLUME OF HEALTHCARE SERVICES IN DENMARK

Chart 1



Note: Output is not adjusted for quality.

Source: Deveci, Heurlén and Sørensen (2008).

cross-country differences. Cases in point are the breakdown of financial-sector output by consumption and intermediate goods, the breakdown of software input by investment and intermediate goods and the volume of military investments included in GDP, cf. Ahmad et al. (2003).

Different compilation methods may cause variations in levels across countries. In the long term, GDP growth rates are not affected by consistent variations in levels. In the short term, however, different compilation methods of output levels may affect growth rates.

Delineation of the market

There is considerable output of mainly services that account for large labour and capital resources but are not sold in a market. Households cooking, cleaning and taking care of children at home maintain their homes and receive a return on owner-occupied housing (rents). The public sector provides free services such as the fire service, the police, education and healthcare. These services would all create substantial earnings if they were subject to market conditions.

In order to avoid that GDP is affected by who provides a particular product or service, this output must be included. This would also give a more complete picture of the economy. Some elements of non-market-related output, including services provided by the public sector and owner-occupied rents, are included in GDP. On the other hand, household production at home, e.g. cooking, cleaning and childcare, is not included.

As a consequence, if households purchase services previously produced by themselves, GDP will grow, while output will remain the same, cf. Stiglitz, Sen and Fitoussi (2009, p. 89f.). Furthermore, it will be difficult to compare GDP across countries with different participation rates. For example, in countries where elderly care and childcare to a large extent takes place at home, GDP will be lower than in countries where this production mainly takes place outside the home. A cross-country comparison of GDP may thus overestimate the difference in actual output.

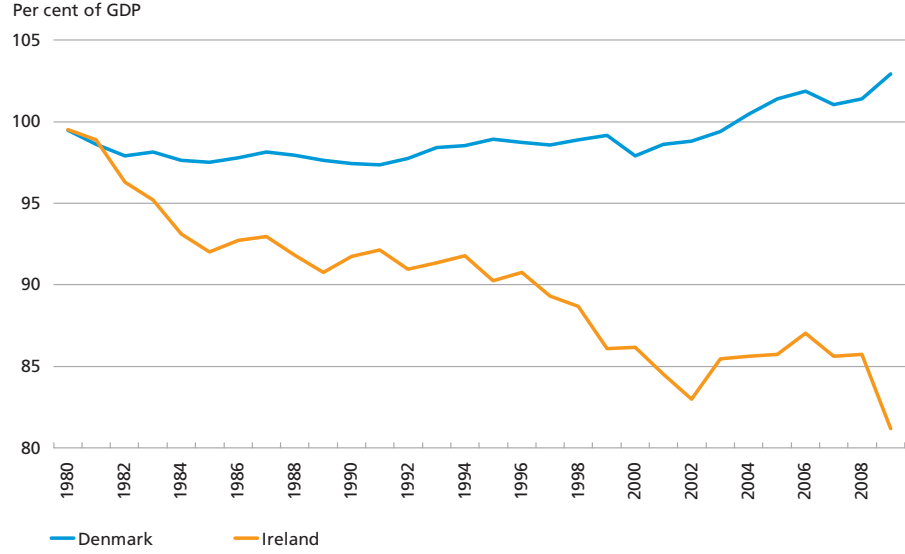
GDP and national income

In a globalised world there may be considerable differences between output development (GDP) and the income that accrues to the country's citizens (the gross national income, GNI). There are two significant reasons for this.

Firstly, part of the income created in a country is sent to owners abroad, and revenue from investment abroad is received. Adjustment of GDP for these flows results in GNI. Compared with GDP, GNI in Denmark has increased slightly since the early 1980s, cf. Chart 2, while the oppo-

GROSS NATIONAL INCOME

Chart 2



Note: GDP and GNI are both at current prices.
 Source: OECD, OECD.Stat.

site has been true in, say, Ireland. The development in Ireland is attributable to the fact that GDP growth has been driven by a large influx of foreign companies whose profits are in part sent out of the country. In the long term, transfers to and from abroad will mainly affect the level of GNI and not GNI growth.

Secondly, import and export prices may develop differently. For example, if import prices decline relative to export prices, it will be possible to purchase a larger volume of imported goods for the same volume of exported goods, resulting in improved terms of trade. This can be illustrated by comparing the development in volumes in GDP and GNI.

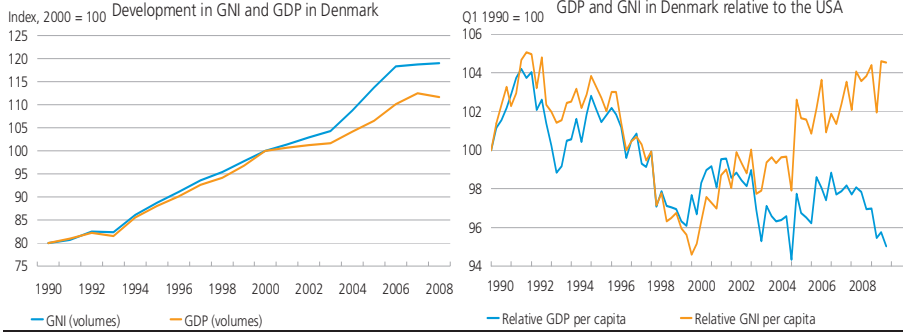
Since the millennium rollover, Denmark has seen a substantial improvement of the terms of trade, cf. Chart 3 (left-hand side). GNI growth exceeded GDP growth by just over 7 percentage points from 2000 to 2008. Thanks to the improvement of the Danish terms of trade, Denmark actually experienced slightly higher GNI growth than the USA from the 1st quarter of 1990 to the 4th quarter of 2009, despite the lower growth in GDP per capita in Denmark than in the USA, cf. Chart 3 (right-hand side).

Cross-country comparison

Adjusting for population growth is necessary when comparing both levels and growth rates across countries. All other things being equal, population growth results in more output and thus higher GDP growth.

GDP AND GNI IN DENMARK AND THE USA

Chart 3



Note: The calculation of GNI in volumes is adjusted for changes in the terms of trade. See e.g. Statistics Denmark (2008), p. 262f., for a more detailed description. Left-hand side: annual data; right-hand side: quarterly data. Source: Statistics Denmark and Reuters EcoWin.

Since the higher output is to be shared by a larger population, this does not necessarily lead to an increase in individual prosperity.

To compare GDP levels across countries it is also necessary to translate GDP into a single currency. Market exchange rates not only reflect the relative prices of goods and services, they are also affected by interest-rate spreads, financial flows, etc. Accordingly, the prices of identical goods and services will vary considerably from country to country if market exchange rates are applied. Instead, artificial exchange rates can be constructed to ensure that a basket of goods and services costs the same in all countries, thereby adjusting for differences in purchasing power. Comparing quality differences in related products across countries is notoriously difficult, cf. Stiglitz, Sen and Fitoussi (2009), and may therefore cause uncertainty in connection with international comparisons.

At the market rate in 2008, Danish GDP per capita amounted to approximately 130 per cent of US GDP. Allowing for the fact that kr. 1,000 buys fewer goods in Denmark than in the USA due to high Danish prices, Danish GDP per capita amounted to only just under 80 per cent of US GDP.

WELFARE INDICATORS

A number of different welfare indicators have been proposed over the last 30 years, see e.g. Jensen (1995). While some are based on economic prosperity as measured in the national accounts with a number of subsequent adjustments, others attempt to measure happiness outright.

Welfare indicators based on the national accounts

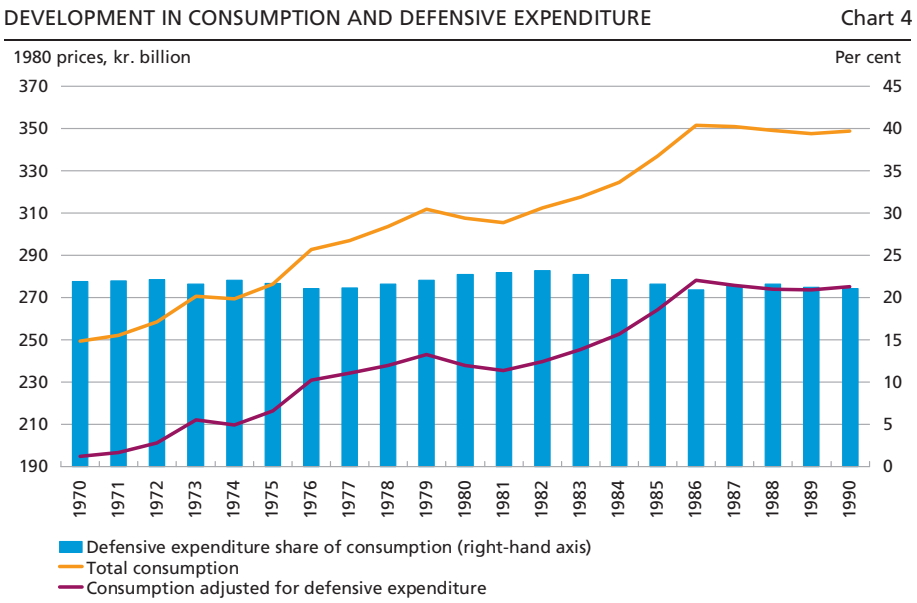
Indicators based on the national accounts typically use consumption as a starting point, including individual public consumption of day care, edu-

cation, healthcare and elderly care, etc., and adding the value of production at home. A number of adjustments are subsequently made so that the indicators reflect the development in welfare as accurately as possible.

Defensive expenditure

Defensive expenditure can be defined as expenditure incurred solely to offset negative external impacts. Typical examples are public consumption such as the provision of police services, military services and the prevention of pollution. Such expenditure has value only by virtue of countering decreases in welfare caused by the behaviour of others. It has been proposed that defensive expenditure should be regarded as intermediate products and hence excluded from GDP. Expenditure for police services should thus be regarded as a resource consumed in connection with other output. Others propose that defensive expenditure should be regarded as reinvestment, cf. Stiglitz, Sen and Fitoussi (2009), p. 103f.

Adjustment for defensive expenditure reduces the level of consumption, but seems to constitute a relatively constant share of consumption, cf. Chart 4. Consequently, growth in consumption is not affected significantly. Furthermore, adjustment will probably lead to a weaker correlation between GDP and unemployment, among other factors, as some economic activity is excluded.



Note: The series are at constant prices.
 Source: Jensen (1995).

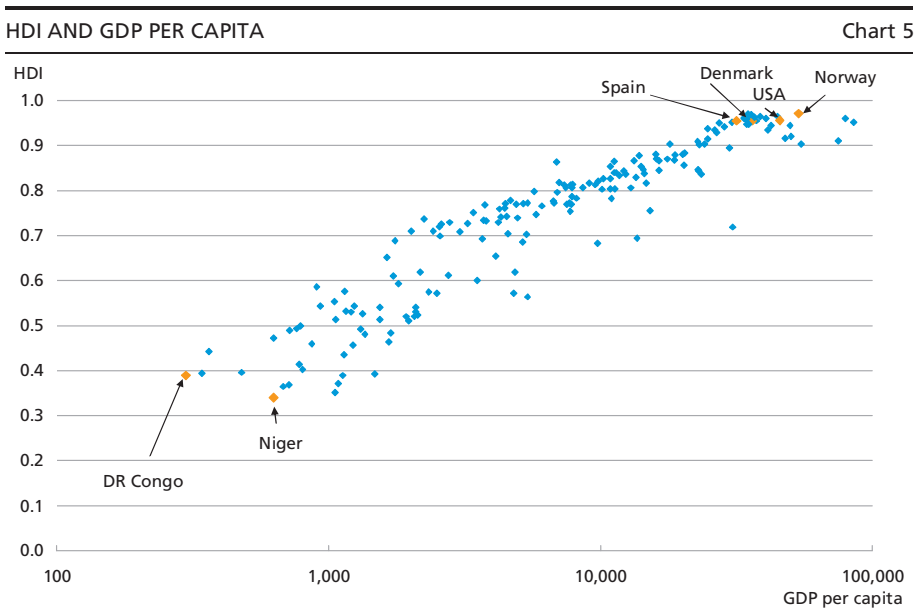
Leisure

Most people's welfare depends not only on consumption, but also on the amount of leisure time. Leisure can therefore be included in a welfare indicator.

Calculations of the value of leisure are subject to great uncertainty, and its development and level will to a great extent be determined by quantitative assumptions, cf. Jensen (1995). Firstly, time spent off work is not necessarily leisure time – for example, increased time spent on commuting will result in reduced welfare. Secondly, no unequivocal price of leisure is available. Presumably, leisure time due to unemployment increases welfare less than a voluntary reduction of working hours. It can therefore be argued that the price of leisure in connection with unemployment is lower than for those in employment.

Human Development Index

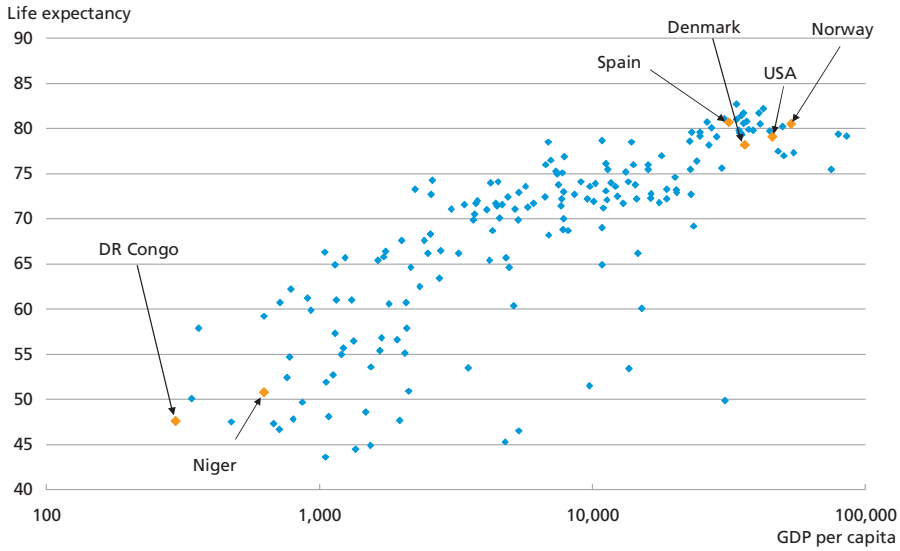
The UN computes a measure of welfare, the Human Development Index, HDI, which includes material goods (GDP per capita), health (including life expectancy) and education (including the average level of education). HDI and GDP per capita are very closely correlated, cf. Chart 5, as to a large extent life expectancy and the average level of education both fluctuate with material prosperity, cf. Chart 6. Accordingly, the HDI does not provide a significantly better picture of welfare across coun-



Note: The data is for 2007. GDP per capita is purchasing-power-parity adjusted and measured in dollars.
 Source: UN Development Programme (2009).

LIFE EXPECTANCY AND GDP PER CAPITA

Chart 6



Note: The data is for 2007. GDP per capita is purchasing-power-parity adjusted and measured in dollars.
Source: UN Development Programme (2009).

tries. Separate comparisons of each sub-component may contribute to a more faceted picture of welfare, however.

Prosperity and happiness

Traditional economic theory usually assumes that it is impossible to measure and compare the welfare or "happiness" of individual citizens. This means that making normative statements about distributional issues is not possible. Assuming instead that happiness can be compared across individuals, it is possible to construct welfare indicators based directly on happiness.

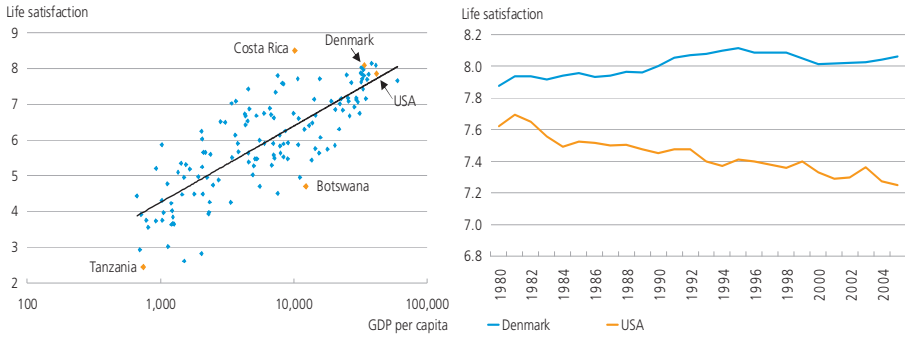
The welfare indicators are constructed by asking the citizens of various countries a number of questions about their happiness. The results are compiled into an indicator for each country. Happiness is compared across individuals where an increase in the "happiness index" of 1 for five individuals is better than an increase of 4 for one individual.

An analysis of the happiness indicators results in a paradox. Happiness and income are very closely correlated across countries, i.e. the richest countries are the happiest, cf. Chart 7 (left-hand side). At the same time, happiness and income are not correlated over time, cf. Chart 7 (right-hand side). Apparently, multiplication of income over time does not increase the feeling of happiness.

There does not seem to be a specific explanation of this paradox. The variance in happiness across countries is explained by differences in the

HAPPINESS AND WEALTH

Chart 7



Note: The data on the right-hand side is not directly comparable with the data on the left-hand side, as they are based on different data sources. Left-hand side: The data is for 2007. GDP per capita is purchasing-power-parity adjusted and measured in dollars.
 Source: Abdallah et al. (2009).

access to material goods (i.e. differences in income) and the health level. Two general explanations are put forward as to why the feeling of happiness does not increase over time, cf. Layard (2003). Firstly, consumption may be addictive. Increased consumption only leads to increased happiness for a short period of time after which people get used to the higher level of consumption and their feeling of happiness falls again.

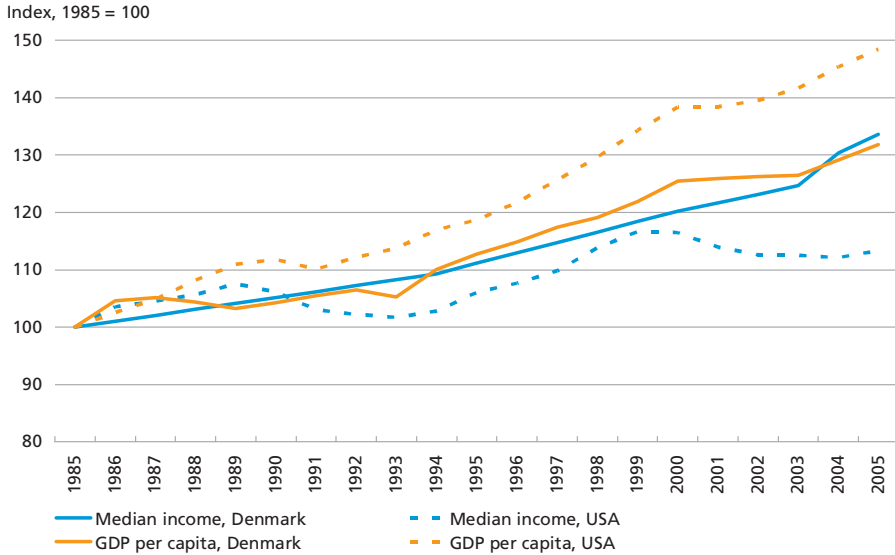
Secondly, the feeling of happiness is related to the relative position in the income hierarchy rather than to the absolute level of income. Citizens of rich countries are happy because they are richer than citizens of other countries, but their feeling of happiness does not increase over time. The same applies in countries where citizens compare themselves with a reference group, e.g. work colleagues, family or neighbours. Increased income for a few members of the reference group reduces the feeling of happiness of all other members. Accordingly, a high degree of income inequality will reduce the overall feeling of happiness.

The development in the average and median income in Denmark has been largely the same over the last 20-30 years, cf. Chart 8. This means that most income groups have experienced consistent increases in income. In the USA the most affluent part of the population has experienced the strongest income growth and the median income in the USA has consequently increased less than in Denmark. The higher degree of income inequality in the USA may help explain the registered fall in life satisfaction.

The happiness indicators enable a number of interesting analyses and can shed light on which factors may affect the subjective feeling of happiness the most at any given time. The indicators should not be used alone, however, as subjective assessments of happiness may hide objective inequalities, cf. e.g. Fleurbaey (2009).

DEVELOPMENT IN AVERAGE AND MEDIAN INCOME

Chart 8



Note: The series are at constant prices. Median income in the USA is compiled per household, whereas in Denmark it is compiled per capita. Data points for median income in Denmark are only available for 1983, 1994, 2000, 2003, 2004 and 2005. A linear trend between the data points is assumed.

Source: Statistics Denmark, Reuters EcoWin and Ministry of Finance (2008).

Pollution

Pollution can be viewed as a negative side effect of output. Welfare is reduced if pollution affects health, increases the extent of extreme weather conditions or prevents access to nature areas, etc. In the longer term, continued accumulation of pollution may reduce global welfare considerably, e.g. if global warming leads to increased drought, rising water levels and more extreme weather conditions.

In an analysis of the welfare level in any given year only the immediate negative effect of pollution should be included in the welfare indicators. Thus, the opportunities of maintaining output and welfare in the future should not be conflated with welfare today. Instead, sustainability should be treated separately.¹

SUSTAINABLE ECONOMIC DEVELOPMENT

A high GDP level now does not necessarily ensure that the living conditions of future generations will be as good as they are now, i.e. there is no guarantee of sustainable development. Standards of living can be sustained over time by maintaining the existing production facilities and

¹ Conflating welfare and sustainability corresponds to having a single indicator in a car for the current speed of the vehicle and the remaining amount of petrol.

by ensuring future access to the necessary commodities, environmental benefits and well-educated labour (human capital).

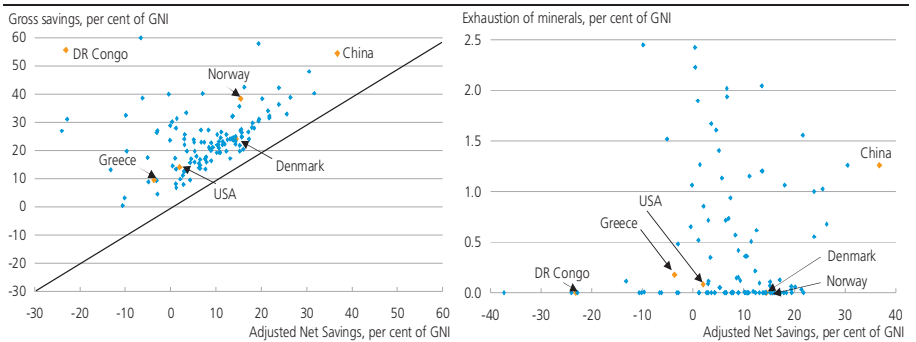
Accordingly, sustainable development can be measured through changes in a number of "stocks" such as the capital stock, the oil reserves, the accumulated amount of pollution and the amount of human capital.

The World Bank computes a sustainability indicator, Adjusted Net Savings, ANS, based on variations in stocks. The idea is to estimate the development in so-called extended wealth, which includes the capital stock as calculated in the national accounts, raw materials, human capital and "nature" (increased pollution reduces the value of nature), cf. Bolt, Matete and Clemens (2002). An ANS value above zero indicates sustainable development in as much as the value of extended wealth increases.

For all countries, depreciation on the capital stock, raw material reserves and "nature" exceeds savings in human capital. As a result, ANS falls below gross savings so that all observations are above the 45° line in Chart 9 (left-hand side). Furthermore, most of the variance in ANS across countries is caused by gross savings so that the observations are to a large extent parallel to the 45° line.

The development in low-income countries that strongly rely on oil exports is typically non-sustainable (ANS < 0). On the other hand, the development in most developed countries with high GDP per capita is sustainable. In 2007, ANS for the world as a whole was just under 9 per cent of GNI. ANS in Denmark was 14.5 per cent of GNI in 2007 – oil extraction reducing the figure by as much as 2.3 percentage points compared to the OECD average of 1.0 percentage point. Building up human capital increases ANS by 7.8 percentage points (OECD average: 4.6 percentage points).

ADJUSTED NET SAVINGS, GROSS SAVINGS AND GDP Chart 9



Note: GNI. The data on the left-hand side is for 2007.
 Source: The World Bank, <http://go.worldbank.org/3AWKN2ZOY0>.

A positive ANS value means an increase in the value of extended wealth but not necessarily in the value of all sub-components. It is thus an implied assumption that the various stocks are substitutes of each other so that e.g. increased pollution can be offset by a larger capital stock. As a result, the relative prices of the various stocks will be key determinants of sustainable development. For example, China has high ANS due to a high level of national savings. But at the same time, China is rapidly exhausting its natural resources, including minerals, cf. Chart 9 (right-hand side).

The level of and development in existing monetary indicators of sustainability, e.g. ANS, both depend entirely on the choice of relative prices which are, unfortunately, subject to extreme uncertainty. Consequently, it may be argued that it is better to review sustainability directly by monitoring the development in a number of key stocks individually, cf. Stiglitz, Sen and Fitoussi (2009), p. 77f., thereby avoiding having to determine relative prices.

CONCLUDING REMARKS

Welfare and utility are complex concepts that are difficult to measure. GDP, which is an indicator of economic activity and thus represents economic prosperity, is often used as a simple measure of welfare. Due to a number of factors, neither the GDP level nor GDP growth can be used unilaterally as a measure of economic prosperity; nor can they be used as measures of welfare.

That said, GDP should play a key role in the Danish welfare debate. Increased prosperity can be used to provide better healthcare, better support for the disadvantaged or better environmental protection. At the same time, GDP is strongly correlated with important social factors such as tax payments and unemployment. In addition, income inequality in Denmark has been relatively stable so that the vast majority of Danes have benefited from increasing prosperity.

Furthermore, international differences in life expectancy and levels of education can to a large degree be explained by differences in GDP, i.e. economic prosperity.

However, GDP is not the only factor to be taken into account in the welfare debate. Analyses of other indicators, e.g. of health, income inequality and sustainability, provides a much more faceted picture of the welfare situation and a far better understanding of which areas to prioritise.

The different factors that influence welfare should not necessarily be comprised by a single welfare indicator in as much as the various factors are implicitly ranked when weighted together. Political priorities may thus be determined by compilation methods and assumptions.

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