

van de Ven, Peter J.

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Measuring economic well-being and sustainability: a practical agenda for the present and the future

PETER VAN DE VEN ⁽¹⁾

Abstract: Gross domestic product (GDP) is the most widely used indicator from the system of national accounts. Although often interpreted as an indicator for (economic) well-being, it first and foremost monitors economic activity, and falls short of reflecting broader measures which try to capture well-being of people and sustainability. In 2009, the Stiglitz-Sen-Fitoussi Commission, in its *Report on the Measurement of Economic Performance and Social Progress*, put forward a number of recommendations to address this apparent disconnect. The report has been an important driver of the statistical agenda of the Organisation for Economic Cooperation and Development (OECD).

This paper provides an overview of the main initiatives at the OECD in the context of national accounts. First it discusses work *within* the current system of national accounts, by giving more prominence to households. Going beyond the current system of national accounts, the paper addresses issues related to the impact of unpaid household activities on traditional measures of economic activity and to sustainability, tackled by implementing the System of Environmental Economic Accounts (SEEA). The paper ultimately proposes a broader accounting framework that goes well beyond the traditional macroeconomic framework of national accounts and that tries to establish a link with well-known initiatives to monitor well-being at large via for example the OECD Better Life Index.

JEL codes: E01, E61, I30, I31, M41, Q50

Keywords: (economic) well-being, environmental-economic accounting, GDP, national accounts, sustainability

⁽¹⁾ Peter van de Ven is Head of National Accounts at the Organisation for Economic Cooperation and Development (OECD). The views expressed herein are those of the author and should not be attributed to the OECD. The author is accountable for any mistakes in this paper.

1. Introduction

*GDP is an indicator of a society's standard of living, but it is only a rough indicator because it does not directly account for leisure, environmental quality, levels of health and education, activities conducted outside the market, changes in inequality of income, increases in variety, increases in technology, or the — positive or negative — value that society may place on certain types of output⁽²⁾. Critics have long argued that GDP is a flawed metric of global development: (a) it fails to capture much of what we want to know about human well-being; (b) it registers as a positive achievement some economic activities that are detrimental to well-being; (c) it measures increases in economic activity that occurs within a nation but it fails to reflect how much of that economic gain stays within that country; and (d) in its emphasis on the maximization of per capita GDP it fails to take into account the distribution of the economic benefits within that country⁽³⁾. According to Philippsen (2015), GDP is quality-blind, people-blind, justice-blind, ecosystem-blind, complexity-blind, accountability-blind, and purpose-blind. Reading all of this literature, it is possible to get the feeling that was best reflected by someone — who shall remain anonymous — who stated, when discussing an article in the Financial Times on David Pilling's book *The Growth Delusion: Wealth, Poverty and the Well-Being of Nations* (Pilling (2018)): *In the article, the author forgets to mention that GDP does not measure the distance between the planet earth and the moon, nor the depth of the Atlantic ocean and the quality of water in it.**

The above quotes are some examples from a vast and growing literature on what could be referred to as 'GDP-bashing', or more neutrally formulated, GDP-criticism to dethrone economic growth as the ultimate objective for economic analysis and related government policy. It is not the goal of this paper to counter this GDP-criticism, but at the start I would like to shortly mention three basic flaws in this sometimes quite heated and outspoken debate.

First of all, although often used and also interpreted as such, economic growth cannot be put on a par with changes in (economic) well-being, or welfare, and sustainability⁽⁴⁾. This is also well recognised in paragraph 1.75 of the System of National Accounts 2008 (2008 SNA; United Nations et al. (2009)): *GDP is often taken as a measure of welfare, but the SNA makes no claim that this is so and indeed there are several conventions in the SNA that argue against the welfare interpretation of the accounts.* In this sense, David Pilling (2018), quoting Terry Ryan, the chairman of the National Bureau of Statistics in Kenya, hits the nail on the head: *(GDP) ... is not a meaningless indicator, but you have to understand what its meaning is.* As an indicator of (monetary) economic activity, GDP actually does a pretty good job, but when it comes to monitoring welfare or the well-being of people, it has many fallacies and caveats. Perhaps statistical offices should start to add a standard warning when publishing news releases on the latest growth numbers, stating that inappropriately interpreting economic growth can be damaging to your mental health.

⁽²⁾ Kahn Academy; see <https://www.khanacademy.org/economics-finance-domain/macroeconomics/gdp-topic/circular-econ-gdp-tutorial/a/how-well-gdp-measures-the-well-being-of-society-cnx>.

⁽³⁾ FEW Resources.org; see <https://www.fewresources.org/gdp--well-being.html>.

⁽⁴⁾ Various terms and definitions are used interchangeably for these broader measures of progress. In this paper, the term 'economic well-being' or 'well-being' is used to reflect material living conditions, which determine people's consumption possibilities and their command over resources. For more details, see Chapter 2 of OECD (2013).

Secondly, the system of national accounts is often put on a par with (the volume growth of) GDP. National accounts however provide a complete, consistent and systematic overview of all (monetary) transactions in an economy. As such, it is an extension of the double entry method of bookkeeping first developed and applied by 14th century merchants in Venice (Gleeson-White (2011)) ⁽⁵⁾. It actually is a beautiful and elegant system from which a variety of macroeconomic indicators can be derived, not only GDP but also, among many others, gross national income (GNI), household (adjusted) disposable income, household final consumption and saving, corporate profits and balance sheets. GDP may be the most widely used indicator, but that does not necessarily mean that it is the most important indicator from the system of national accounts when it comes, for example, to tracking household material well-being.

Thirdly, it may not be possible to find what is considered by some as the holy grail, one catch-all indicator that provides a perfect monitoring instrument for welfare or well-being, which also takes into account the present-day losses (or gains) in the possibilities to generate future well-being. The pursuit of such an indicator may lead to a dead end road. Well-being is a multi-faceted phenomenon that may only be captured by a dashboard of indicators. An attempt could be made to put a price tag on each aspect contributing to the overall goal of increasing well-being for all, but in a way this also means 'economising', and thereby devaluing, everything that is considered important in life. Taking care of a person's own children, for example, is much more than just providing services similar to day-care services provided by the market economy (although admittedly, for some, raising children is considered to be hard work, with an emphasis on the last word). Putting a considerable price tag on the lives of endangered species simply does not do justice to the importance of biodiversity and the morality of providing opportunities for all species to survive.

One of the most influential initiatives to have a better understanding of well-being is the *Report by the Commission on the Measurement of Economic Performance and Social Progress* by Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi (Stiglitz et al. (2009)). The report contains various recommendations, among which the first five are directly related to macroeconomic statistics, as follows:

- Recommendation 1: when evaluating material well-being, look at income and consumption rather than production.
- Recommendation 2: emphasise the household perspective.
- Recommendation 3: consider income and consumption jointly with wealth.
- Recommendation 4: give more prominence to the distribution of income, consumption and wealth.
- Recommendation 5: broaden income measures to non-market activities.

⁽⁵⁾ As both parties entering into an economic transaction are recorded in the system of national accounts, it is normal to refer to the quadruple entry method. Each transaction is recorded four times, in other words, two times, as in bookkeeping, for each party. This also gives multiple opportunities to check and validate the exhaustiveness of the estimates.

The main thrust of these five recommendations is not only to look at (developments in) GDP, but also at household disposable income, the distribution of income, consumption and wealth, and the free services provided by unpaid household activities (taking care of children and elderly people, cooking meals at home, cleaning, and so on). This requires, among other things, the linking of income and finance to the process of production and income generation and giving much more attention to other indicators than economic growth alone.

Importantly, the report does not contain a recommendation to capture well-being objectively in a single metric, by for example monetising all aspects that have a positive or negative impact on well-being. The same holds for trying to capture (environmental) sustainability, by monetising all negative externalities from economic activities on the environment. The report considers well-being as a multi-dimensional phenomenon, and preference is given, at least for the time being, to define the various aspects that affect well-being, and to then select indicators for monitoring developments for each of these aspects.

This paper first provides an overview of the main initiatives at the OECD to better represent (economic) well-being in the context of national accounts. First it discusses, in Section 2, work within the current production and asset boundary of national accounts, by giving more prominence to households. The analysis of the drivers of differences between developments in real GDP versus real household (adjusted) disposable income is part of this project. Furthermore, an on-line dashboard of households' economic well-being and a regular news release on differences between GDP and household disposable income have been introduced to inform the public at large as to the importance of looking at households, and also to make them (more) aware of the richness of the system of national accounts. Arriving at more granular distributional information on income, consumption, saving and wealth of households, consistent with the already available national accounts aggregates for households, is yet another important feature of this project.

Section 3 follows with initiatives that go beyond the current production and asset boundary of national accounts. Estimates have been made of the quantitative impact of including unpaid household activities on traditional measures of economic activity. Some of the practical problems in arriving at suitable estimates are addressed in this section as well. The issue of how to account for free goods and services, which has gained considerable attention in the recent discussions on the potential welfare implications of the digital transformation of the economy and the society at large, is discussed in a separate annex to this article. Section 3 also deals with the way in which sustainability issues can be tackled by implementing the System of Environmental Economic Accounts (SEEA), and thus arriving at a better monitoring of for example the negative externalities from the emission of pollutants, and an improved measurement of (the depletion of) natural resources.

Section 4 discusses a possible future agenda, by looking at the challenges of linking the macroeconomic framework of national accounts (including related satellite accounts ⁽⁶⁾) to well-known initiatives to monitor well-being at large via for example the OECD Better Life Index. Section 5 summarises and concludes.

⁽⁶⁾ The term 'satellite accounts' may lead to negative connotations, as being less important, certainly if used in combination with core accounts or the central framework. Several proposals for an alternative terminology have already been made. See also Section 4.

2. Measuring (material) well-being within the system of national accounts

UK economy posts worst quarterly GDP figures for five years (The Guardian). Disaster for Theresa May as economic growth slumps to tiny 0.1 % — the worst for five years (The Sun). US Economy continues to fly high amidst rising trade tensions (The Conference Board). The worst four years of GDP growth in history: Yes, we should be worried (Forbes).

These are only a few citations from news media on economic growth. For many decades, volume growth of GDP has received considerable media attention. It is also a primary focus of economic policy and economic research. Yet its meaning and its limitations are not particularly well understood, not only by the media and the public at large but also by quite a number of economic researchers. High levels of (growth in) GDP are simply put on a par with developments in the purchasing power of resident households or even broader concepts of welfare or well-being. This supposed linkage between economic growth and economic well-being may actually have held during certain periods of time. For example, in the decades after the Second World War, growth in GDP went hand in hand with growth in employment, increasing income levels for large parts of society, and the possibility to acquire new, well-being enhancing consumer goods like refrigerators, indoor toilets, heating, washing machines, telephones, cars and TVs. The additional income also provided government with the ability to improve education and health nationwide, and to establish financial support programmes for people temporarily unemployed, people having a disability, and retired people. In this sense, the welfare state can be considered as a child of high levels of sustained economic growth.

But it is also clear that this link between continuous increases of GDP and enhanced purchasing power or, more generally, improved (economic) well-being are more and more questioned, debated or considered totally flawed. Although closer aligned to GDP, even the former alignment between GDP and purchasing power does not hold. Take, for example, the Irish growth numbers in 2015, which were highly affected by reallocations of certain activities by multinational enterprises without having a concomitant increase in the incomes of Irish households. Several studies also show a disconnect between GDP growth and changes in median income of people. GDP is far too often pursued as a policy goal, also due to its misinterpretation as a measure of well-being, whereas it is a measure of economic activity. If anything, GDP growth can be interpreted as potentially contributing to the pursuit of increasing well-being, but, certainly in these times of increasing worries about the negative impact of climate change on the sustainability of current growth patterns, it is at best at odds with the goal of (environmental) sustainability and future possibilities to generate well-being. GDP may be instrumental to well-being, but it should not be regarded as a policy goal *per se*.

In this section, some initiatives are discussed which may address this problem of primarily focusing on economic growth. However, what is being discussed in this section is fully consistent with the current production and asset boundary of national accounts. The various initiatives included here do not question the main principles of the current international standards, the 2008 SNA. Other initiatives which go beyond the 2008 SNA are the subject of the next section. Very much in line with Stiglitz et al. (2009), the initiatives described below relate to giving more prominence to indicators on households, and compiling distributional data consistent with national accounts aggregates.

It's about households, stupid!

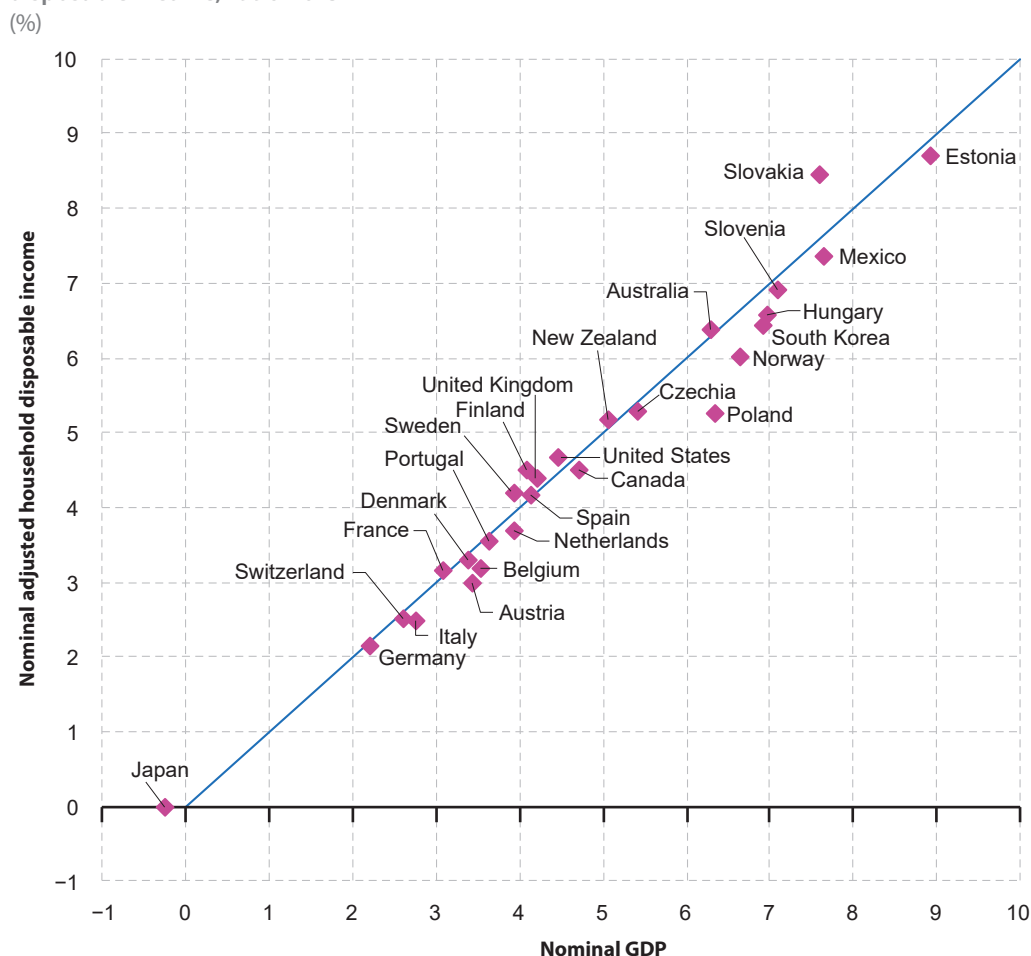
One small step in the right direction would be to emphasise household disposable income (either as an aggregate or as a ratio per capita or per household), instead of looking at GDP. This indicator, which can be derived from the very same system of national accounts, provides a much better indicator for monitoring the economic well-being of resident households. An even more appropriate indicator would be household *adjusted* disposable income, which also takes into account the (implicit) income related to individual services provided by government for free or at prices that are not economically significant, health and education being the most widespread examples. Alternatively, household final consumption expenditure, or — including the above mentioned individual services provided by government — household *actual* final consumption could be looked at.

The main drivers of differences between the developments of real GDP and real household disposable income are related to (i) the shares of compensation of employees and income from self-employed and unincorporated corporations in the value added generated through the production process; (ii) the redistribution of income by government policy; and, in some more exceptional cases, (iii) quite distinct movements between the price change of GDP and the price change of household final consumption. The latter has happened, for example, in resource-rich countries where increasing energy prices materialised into relatively high nominal changes of GDP and household income which were not matched by equivalent changes in consumption prices.

Figure 1 below presents a comparison between average nominal growth rates of GDP versus household adjusted disposable income for the period 1996-2013 for a selection of 27 countries, as derived from an OECD study (Ribarsky et al. (2016)). Although the deviations may seem small, a difference of 0.5 percentage points per year (for example in Australia) leads to an excess of growth of about 15 percentage points over a period of 17 years. Furthermore, within shorter periods of time, the differences may be much more substantial. Certainly in the case of economic shocks, such as the 2008-2010 financial and economic crisis, quite divergent patterns can be observed, where the sudden drop in economic activity did not affect household disposable income in the first years after the crisis, mainly because governments mitigated the adverse impacts of increased unemployment on income. Only later did austerity programmes have a negative impact on household income, thereby aligning long-term developments of GDP and household disposable income.

Analyses like the one above are useful to have, as they are important to understand the link between GDP and household disposable income. But if the attention of the media, policymakers, politicians and the public at large is to be redirected away from this almost exclusive focus on economic growth, policies with respect to dissemination and communication also need to change. Here, two changes have been introduced at the OECD. First of all, the OECD dashboard of households' economic well-being went live in 2015. Secondly, although economic growth still features most prominently in the OECD's news

Figure 1: Average annual rate of change of nominal GDP and nominal household adjusted disposable income, 1996-2013



Note: data are based on 1996-2013 with the following exceptions: 1996-2012 for Switzerland; 2000-2012 for New Zealand; 2000-2013 for Hungary, Spain, and the United Kingdom; Estonia and Poland 2001-2013; and 2004-2013 for Mexico. Japanese and Norwegian data are based on 93 SNA / ESA 95.

Source: OECD study (Ribarsky et al. (2016))

releases for national accounts aggregates (sorry, we are not there yet), it was decided to replace one of the standard releases on GDP growth (the one on contributions of expenditure categories to growth) by a news release on household disposable income. In addition, *OECD statistical insights* are being produced and disseminated on household economic conditions. These initiatives are shortly discussed below, after which some recent, more general data compilation initiatives are also presented.

The OECD dashboard of households' economic well-being ⁽⁷⁾ consists of four blocks of two or three indicators, which are updated quarterly, with a delay of approximately four months after the reference quarter. Each block of indicators presents a certain aspect of economic well-being, as follows:

- income — GDP per capita, household disposable income per capita, and net cash transfers (mainly from government) to households;
- final consumption — consumer confidence, household consumption expenditure per capita, and households' saving rate;
- wealth — households' indebtedness, and households' financial net worth;
- employment — the unemployment rate, and the labour underutilisation rate.

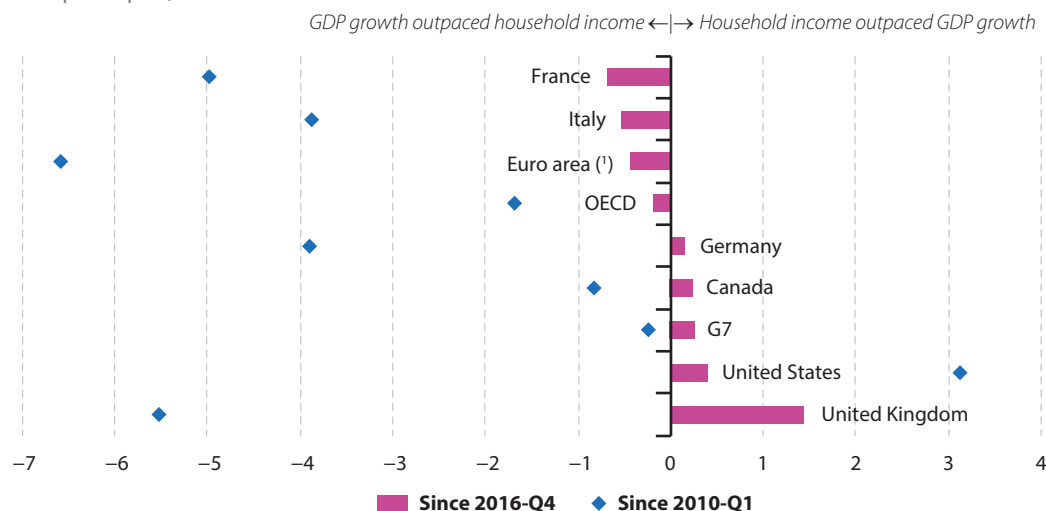
In some cases, the preferred indicator has been sacrificed on the altar of data availability. For example, as noted above, it would have been preferable to include household *adjusted* disposable income, instead of household disposable income, but this would seriously limit the (timely) country coverage. The same holds for households' financial net worth, where total net worth, in other words, including non-financial assets, would be the preferred measure.

Secondly, at the beginning of 2018, the OECD started to put further emphasis on household income developments, by disseminating quarterly news releases on *OECD growth and economic well-being*. The objective of this new series of news releases is to show whether economic growth has actually led to improvements in household income, both in the most recent quarters and over a longer period of time. Figure 2 shows, for example, that since the first quarter of 2010 economic growth has outpaced growth in real household disposable income in most OECD countries, the United States being the exception for those countries presented in the figure. In the euro area as a whole, the differences were most significant, with GDP growth outpacing the growth of household income by a total of 6.6 percentage points since the first quarter of 2010.

Another example of trying to promote alternative indicators to a larger public is the use of *Statistical Insights*, an OECD dissemination channel that resembles a blog. At the end of 2016, a *Statistical Insight* was published to show, among other things, level comparisons of GDP per capita versus household adjusted disposable income per capita across countries; see Figure 3. The latter indicator can have a significant impact on the ranking of some countries. For example, Ireland, Norway and Switzerland, and to a lesser extent Denmark and the Netherlands, have a relatively lower ranking for household income, as compared with GDP per capita. Other *Statistical Insights* have addressed issues like household debt and financial resilience, economic vulnerability of households, and so on.

(7) See <http://www.oecd.org/std/na/household-dashboard.htm>.

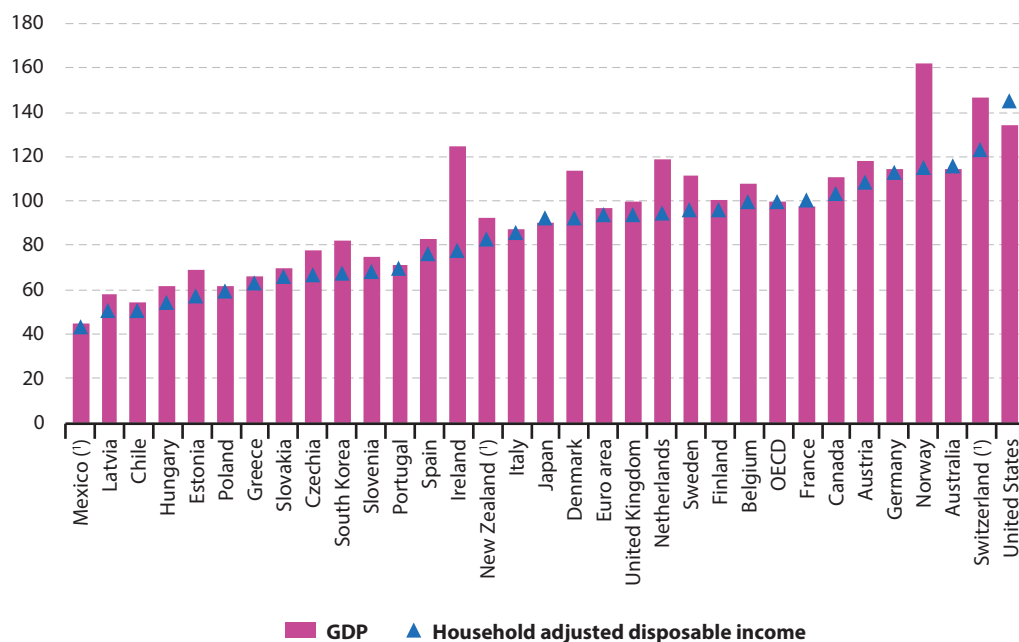
Figure 2: Comparison of growth in GDP and growth in household income, 2018-Q4
(percentage points difference in cumulative growth rates of real household income per capita and GDP per capita)



Note: the difference in cumulative growth rates of real household income per capita and GDP per capita since 2010-Q1 for the euro area is significantly impacted by the relocation to Ireland of economic activities of a limited number of multinationals over this time period (see for more information the following [link](#)). When excluding the results for Ireland, the gap in growth rates since 2010-Q1 for the euro area would have been -5.4.

Source: OECD news release (7 May 2019)

Figure 3: GDP per capita and household adjusted disposable income per capita, 2014
(current price US dollar PPPs, OECD = 100)



(¹) Household adjusted disposable income: 2013.

Source: OECD Statistical Insight (6 October 2016)

More generally, there is nowadays much more attention to compiling a fully-fledged system of national accounts, including institutional sector accounts, which provide an overview of all incomes and expenditures, financial transactions and balance sheets for the main institutional sectors of the economy: non-financial corporations, financial corporations, general government, households, non-profit institutions serving households (NPISHs), and transactions and positions with the rest of the world ⁽⁸⁾.

Three main developments have caused this gradual shift in focus from production to income and wealth. The first one concerns the well-being agenda, reinforced by Stiglitz et al. (2009), as mentioned above. The second longer term development having caused this shift relates to the increasing impact of developments in (financial) wealth on the real economy and *vice versa*. Developments in finance can affect economic growth and employment for longer periods of time. The most dramatic example of this increasing role of finance is what constitutes the third reason for the shift: the 2008-2010 financial and economic crisis. Although filling data gaps would probably not have prevented the crisis, the crisis did lead to a thorough reflection of data needs for policy and research: the G-20 Data Gaps Initiative (DGI) ⁽⁹⁾. This G-20 DGI has put forward 20 recommendations for improving statistics, grouped together into four main categories: (i) better capturing the build-up of risk in the financial sector; (ii) improving data on international financial network connections; (iii) monitoring the vulnerability of domestic economies to shocks; and (iv) improving the communication of official statistics. The core recommendation under the third category relates to having timelier, more detailed and high quality data on institutional sector accounts, including financial accounts and balance sheets. Apart from getting more and better data on households across countries, such data would also make it possible to have an improved analysis of the interactions between the real economy and the financial economy. They also provide the statistical backbone for the analysis of potential vulnerabilities at sector level, for example the build-up of unsustainable debt levels.

Distribution of income, consumption, saving and wealth

Every American should have above average income, and my Administration is going to see they get it is assumed to have been said by an American president on a campaign trail. That may be very hard to achieve, but it is clear that the distribution of income, consumption, saving and wealth is very high on the policy agenda, certainly after the best-seller *Capital in the Twenty-First Century* by Thomas Piketty (Piketty (2014)). Looking at it from an economic well-being perspective, (growth in) absolute levels of income and wealth may matter a lot, especially when starting from low levels, but it is also clear that income and wealth relative to others in the group affects the well-being, and most certainly the perceived well-being of people, to a significant degree. Distributional issues are important not only in terms of income and wealth, but also in other areas such as access to health and education. The current dissatisfaction of large parts of the population in developed countries may well be caused by a substantial part of the income growth generated by higher levels of production ending up in the pockets of the rich and advantaged and not trickling down into improvements of income for the median income earner and households in the lower income quintiles. The main policy question here is how to arrive at economic growth that benefits all people in society: how to arrive at a more inclusive growth.

⁽⁸⁾ In practice, households and NPISHs are often combined due to lack of source data, but this usually does not have a major impact on the monitoring and analysis of the household sector.

⁽⁹⁾ In the meantime, the G-20 DGI has entered into a second phase. For further information, see Bese Goksu and Van de Ven (2015) and Heath and Bese Goksu (2016).

Within the system of national accounts, it is relatively easy, from a conceptual point of view, to incorporate distributional information by disaggregating the households' sector into various subgroups, be it on the basis of relative income levels, household composition, or main type of income, and so on. Annex 1 of the 2008 SNA includes a substantial number of different subsectors for corporations and government (there are 97 different subgroupings for financial corporations), yet for households it only contains one sub-classification of seven subgroups according to the main type of income households receive. However, the word 'conceptual' should be emphasised here. In practice, major data inconsistencies occur, and it is not at all straightforward to get relevant distributional statistics containing information on the level of individual households aligned to the macro aggregates reported in the system of national accounts ⁽¹⁰⁾.

In national accounts, data on the households' sector, at least the level estimates for income, consumption and wealth, are often compiled as a residual of the transactions and positions of other sectors, whose source information is generally considered more reliable. For example, government data are used to estimate receipts of social benefits and payments of taxes and social contributions by households. Similarly, data from financial corporations are used to estimate interest payments and receipts of households. On the other hand, micro statistics containing granular information on the distribution of income, consumption and wealth across households are typically compiled using direct sources, either surveys or administrative data. As a consequence, aggregates from microdata on households diverge from the equivalent aggregates from national accounts, creating problems as to how to link and align the two datasets. The relevant gaps can be quite substantial, as shown in Figure 4 for the main income items across a number of countries. While in most countries the coverage rate for compensation of employees, taxes, social contributions and social benefits are generally acceptable, the same does not hold for mixed income ⁽¹¹⁾, distributed income of corporations (dividends) and interest. In the case of consumption and wealth, similar patterns in the coverage of micro statistics as compared with the relevant national accounts aggregates can be observed.

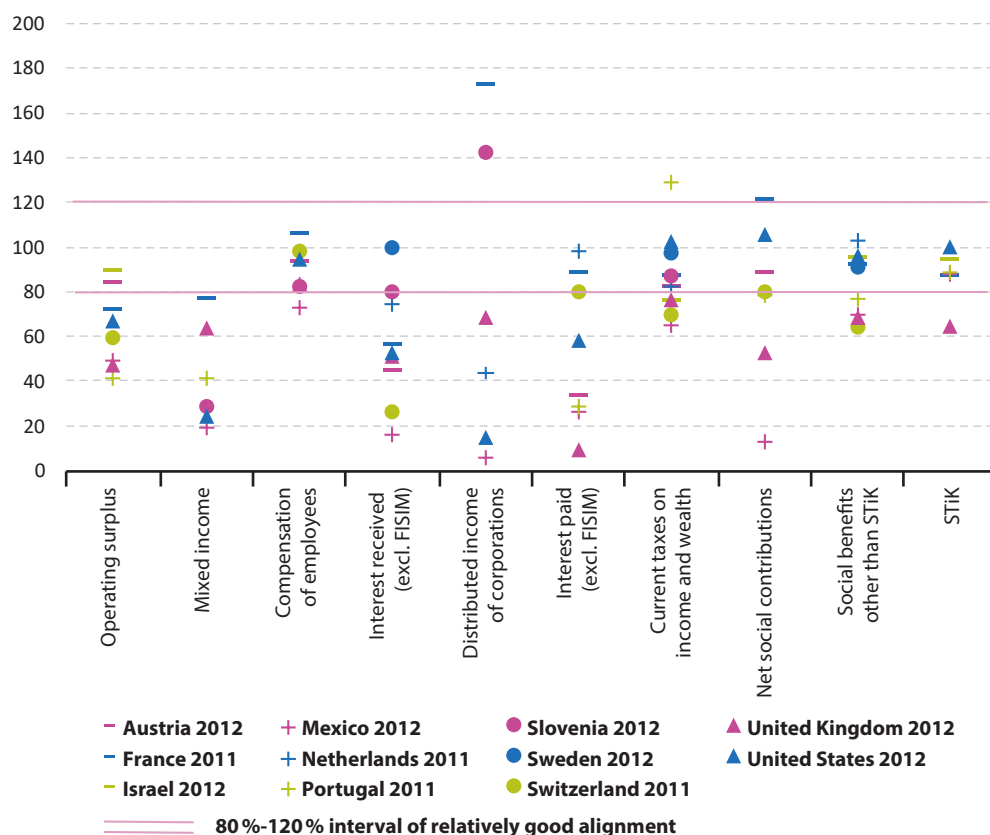
The main problems are thus how to match the relevant data and how to allocate the gaps between the two estimates to the various household subgroups ⁽¹²⁾. Considerable work has been done and is currently being done in this area, both nationally and in international organisations, such as the European Central Bank (ECB), Eurostat and the OECD. In the past, this type of work of trying to reconcile micro and macrodata on income, consumption and wealth was often done in the context of compiling social accounting matrices, not only for developed countries but even more so for developing countries; see for example (Kazemier et al. (1999)), (Keuning (1995)) and (Timmerman and Van de Ven (1994)). But only recently it received much more attention after the 2008-2010 financial and economic crisis, reinforced by the publication of the Stiglitz-Sen-Fitoussi Report and the best-seller by Thomas Piketty.

⁽¹⁰⁾ Note that in the statistics underlying the research and analysis in Piketty (2014), the whole of gross domestic product (GDP), instead of household disposable income and its components, is allocated to household groups. This means that in Piketty's methodology various (additional) imputations had to be made to allocate income that — in reality — has not been received by households, for example non-distributed profits of corporations, government surplus/deficit, and so on. For an evaluation of the methodology described in this paper and the methodology applied by the Piketty research team, reference is made to Zwijnenburg (2018).

⁽¹¹⁾ Mixed income refers to the income of self-employed persons and the income from owning and running an unincorporated enterprise. In addition to the operating surplus of these enterprises, mixed income also includes an implicit compensation for the labour input of the owner and/or family members.

⁽¹²⁾ Alternatively, a decision to revise the macro estimates from national accounts may be needed.

Figure 4: Coverage rates for the main income components
(micro aggregates divided by the adjusted national account totals)



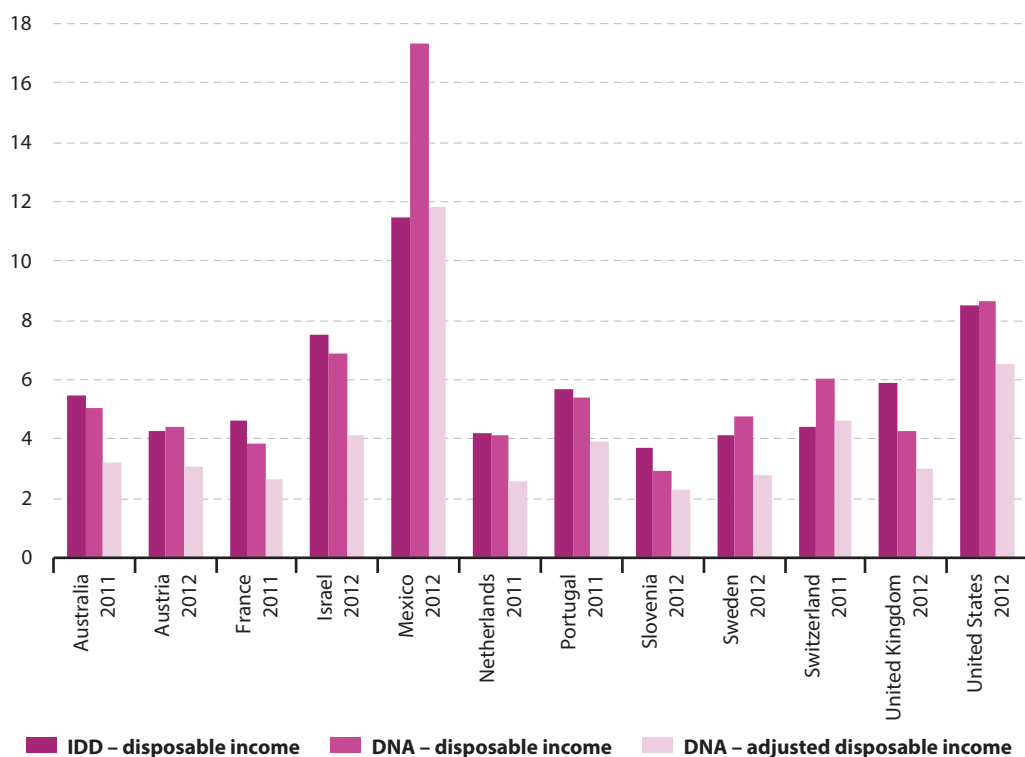
Source: Zwijnenburg et al. (2017)

In 2011, Eurostat and the OECD launched an expert group, with the goal to carry out a feasibility study on the compilation of distributional measures of income, consumption, saving and wealth across household groups consistent with national accounts data. A first round of estimates on the distribution of income, consumption and saving by income quintile was published in 2013, followed by a second round in 2015 ⁽¹³⁾; see Zwijnenburg et al. (2017) for a more detailed description of the sources, methods and results of the second exercise. Apart from discussing ways to allocate the gaps to different household groups, the group also agreed on the allocation of social transfers in kind, in other words the goods and services provided for free or at significantly reduced prices by government, predominantly consisting of health and education. While education can be allocated on the basis of actual use, such a procedure leads to very counterintuitive results in the case of health. Disposable income and final consumption would explode in a period that someone becomes very ill. Therefore, preference is usually given to an allocation based on the insurance cost method, in other words what would a person with certain characteristics typically pay for a health insurance.

⁽¹³⁾ At the time of drafting this paper, a new round has just been finalised.

One of the problems related to the above exercises is that the distributional results will differ from the numbers that have been disseminated up to now using only micro statistics. Figure 5 presents the impact of aligning microdata to the system of national accounts for a number of countries, by looking at the relative position of the top 20 % of households with the highest incomes to the bottom 20 % of households with the lowest incomes. It shows that the impact differs across countries, with some countries showing higher disparities using data aligned to national accounts (DNA — disposable income), as compared with the original microdata (IDD — disposable income). More substantial differences, with aligned data showing higher disparities, can be found for Switzerland and especially Mexico. In Mexico, the underrepresentation of the rich and wealthy in micro surveys is considered a major issue, as a consequence of which it has been decided to allocate the very substantial gaps in mixed income and property income in a disproportional way to the highest income quintile. On the other hand, the results for the United Kingdom show a smaller disparity for national accounts data. Looking at the results after adjusting disposable income for social transfers in kind, the lowering impact of these transfers on income disparities can be easily seen. In absolute terms, the relevant transfers are often relatively equally distributed across households, thus having a much more substantial impact in relative terms on the income levels of the lower income quintiles.

Figure 5: Relative position of the 20 % highest to the 20 % lowest income households, by equivalised disposable income quintile (S80/S20 disposable income quintile share)



Source: Zwijnenburg et al. (2017)

As these alignment procedures call into question, if only implicitly, the quality of the distributional statistics disseminated up to now, the whole exercise is looked upon with some scepticism by parts of the statistical community. Apart from arriving at two alternative estimates for the distribution of income, consumption, saving and wealth, some argue that it is simply impossible to allocate the gaps to the various household groups adequately, especially when it concerns transactions and positions for which the differences between micro and macro data are relatively large. This is a red herring. It may be argued that these issues cannot be solved and that they have to be endured, but it is also clear that statistical offices momentarily publish two diverging and sometimes contradicting datasets on household disposable income and household final consumption, indicators which relate to one of the most important policy issues. In this respect, it should also be realised that not only can levels be quite different, but that developments in income and consumption may also diverge substantially. In Pinkovskiy and Sala-i-Martin (2015), for example, it is mentioned that in some developing countries growth of consumption per capita according to national accounts was over 100 % between 1994 and 2010, while micro surveys showed an increase of only 29 % in this period. Obviously, this has massive implications for policy and research. Current official statistics also tend to ignore the discrepancies between often quite independently conducted micro surveys on income, consumption and wealth, leading to implausible results for savings, and/or inconsistencies between savings and changes in balance sheet positions.

On the positive side, it has to be acknowledged that more and more countries are doing in-depth research into bridging the gaps between micro data and macro aggregates, also leading to improvements in the system of national accounts. At the time of drafting this paper, several countries have already started to publish the results of their research on compiling distributional information consistent with the national accounts aggregates for income, consumption and wealth (Australia, Canada, France, and the Netherlands), for income and consumption (New Zealand, Slovenia and the United Kingdom), and for financial wealth (the United States), while others have more or less advanced plans to disseminate (extended) results (Sweden and the United States).

The next steps in the project are fourfold. First of all, the goal is to further improve the methodology, and to arrive at improved distributional results. In addition to further exploring the potential for applying more sophisticated methodologies to allocate the gaps between micro and macro data, this also concerns a more in-depth analysis of the results for saving, in other words the difference between disposable income and final consumption expenditure, by household group. The relevant numbers are sometimes remarkable, to say the least. Most countries show substantial negative saving rates for the lowest income quintile, with one country having negative rates up to the fourth income quintile. The question is whether this is economic reality or a statistical artefact. Here, having longer time series would allow for a more structural analysis of the saving rates.

Secondly, current exercises were 'limited' to income, consumption and saving. To have this extended to cover wealth would be a highly desired objective, as it would not only significantly enrich the dataset, but it would also enhance the possibilities to cross-check the results on saving and the data on changes in wealth.

Thirdly, the more general target of the exercise is to have distributional data for as many countries as possible and that these data are as timely as possible. In the case that countries — for a variety of reasons — do not yet wish to participate in the exercise, research will be done into the development of standardised methodologies to extend the dataset by making own estimates, either from Eurostat or from the OECD, which could subsequently be put to the relevant countries for validation.

Finally, methodologies to produce more timely estimates will be explored by combining less timely structural information from micro surveys and the latest available information from macro statistics such as national accounts, labour force surveys, and so on.

3. Going beyond the current system of national accounts

In the near future it is unlikely that there will be a major update of the international standards for compiling national accounts and as a consequence the definition of GDP is also unlikely to be substantially revised to include, for example, unpaid household activities and/or degradation of ecosystem assets. It has to be accepted that for the time being official GDP numbers are first and foremost to be considered as indicators of income or economic activity, which may be instrumental to the greater good of well-being but should not be put on a par with (economic) well-being. That is not to say that nothing can or should be done. There is a great need to establish a much closer link between the SNA and the work on well-being and sustainability. Ways to get away from perceiving and analysing the economy as a self-contained and isolated system should be investigated, to try to embed it into the broader framework of ecosystems and societal developments with which the economy interacts and on which it fully depends. Without being able to arrive at a path of environmental sustainability and without using the opportunities to establish a stable and just social environment, there simply is no future for the economy.

In my opinion, the most promising avenue, certainly with enhanced technical capabilities nowadays, is to create a suite of interrelated accounts (and related aggregates and indicators), thereby linking the central framework of national accounts with a number of aspects which are considered important for monitoring progress in environmental sustainability and societal well-being. If it would also be possible to create enhanced linkages between this broader meso–macro information base and various micro datasets, such a system would provide excellent opportunities for analysing trade-offs and win–wins between various aspects of well-being. It could also be instrumental for enhancing sustainability and well-being functions. All of this may take some time, but it would be a perfect starting point for guiding developments and redesigning official statistics.

In this section, two specific examples are described that pertain to recent work carried out at the OECD and also by countries and other international organisations. The point of departure is the current framework of national accounts and the way in which the most substantial and

consistent criticism could be addressed. The vision for the future, which would encompass a broader framework of accounts in which the economy will only reflect part of an overall set of indicators as alluded to above, is the subject of Section 4. The two issues discussed here relate to the recording and measurement of unpaid household activities and accounting for environmental issues. Some of the issues that are currently being debated when it comes to the digital transformation and its potential impact on well-being are addressed in a separate annex in order to avoid a disruption of the main storyline.

Unpaid household activities

One of the most fundamental criticisms when it comes to current international standards for compiling national accounts concerns the non-recognition of unpaid services provided within households as being part of the production boundary. The latter boundary defines which productive activities should (not) be accounted for, and the production of which goods and services do (not) add to output, value added and GDP. By excluding unpaid household activities, the level of GDP is supposedly underestimated, while GDP growth is overestimated in times of increasing labour market participation (which often coincides with a substitution of unpaid household activities, such as preparing meals and taking care of children, with purchasing the relevant services on the market).

When it comes to the production boundary, the 2008 SNA defines a general production boundary, and a more specific boundary to be applied in the actual compilation of national accounts. The general boundary is defined as follows (paragraph 6.24 of the 2008 SNA): *Economic production may be defined as an activity carried out under the control and responsibility of an institutional unit that uses inputs of labour, capital, and goods and services to produce outputs of goods or services. ... A purely natural process without any human involvement or direction is not production in an economic sense. For example, the unmanaged growth of fish stocks in international waters is not production, whereas the activity of fish farming is production.*

According to the general production boundary, it is clear that unpaid household activities, such as preparing meals, taking care of children and/or the elderly, as well as cleaning, are part of production. However, the 2008 SNA standards prescribe a more restrictive boundary, specifically in relation to these unpaid services produced within and between households. The production of goods within households, the main example of which relates to subsistence farming ⁽¹⁴⁾, should always be included, while the production of unpaid services is excluded with the exception of owner-occupied housing and the production of domestic and personal services by employing paid domestic staff. The main reasons for the exclusion of the main part of unpaid household services produced within households are summarised in paragraph 6.30 of the 2008 SNA: *..., the reluctance of national accountants to impute values for the outputs, incomes and expenditures associated with the production and consumption of services within households is explained by a combination of factors, namely the relative isolation and independence of these activities from markets, the extreme difficulty of making economically meaningful estimates of their values, and the adverse effects it would have on the usefulness of the accounts for policy purposes and the analysis of markets and market disequilibria.*

It could be added that the inclusion of unpaid household activities may also hamper the interpretability of some headline indicators that can be derived from the framework of national

⁽¹⁴⁾ For other examples of goods production for own final use, see paragraph 6.32 of the 2008 SNA.

accounts. It would lead, for example, to an equivalent increase of household disposable income, which would thus deviate substantially from the common perception of income, including income definitions that are being used in micro surveys and administrative data on households. Some would argue against this point by stating that the SNA already includes various imputations, among which goods produced within households and services of owner-occupied dwellings, but on the other hand it could be stated that there is a substantial difference in terms of consensus on the *economic* relevance of these items, their exact delineation and valuation, and the reliability of estimates ⁽¹⁵⁾. Moreover, the sheer magnitude of the adjustments needed to include unpaid household services is much larger. Whereas services of owner-occupied dwellings typically stay (well) below 10 % of GDP in OECD countries, the addition of other unpaid household services would lead to a change in the level of GDP in the range of 15-70 %, depending on the country and the methodology applied.

Whatever the case, the above arguments underlying the current production boundary in the central framework of national accounts seem to be more related to practical considerations than motivated by conceptual arguments. On the other hand, when addressing ... *the extreme difficulty of making economically meaningful estimates of their values* ... , this also concerns problems of appropriately delineating unpaid services produced within households that are to be included. Stiglitz et al. (2009) list a number of these issues, for example the allocation of travelling time and the allocation of eating and drinking time, or the delineation with leisure time more generally. Some will consider gardening as a chore, while others will view this activity as a way to spend their leisure time. As noted by Stiglitz et al. (2009), *many view cooking — and then eating — as a most enjoyable leisure activity, not a chore that is easily substitutable with a meal in a fast food restaurant*. A similar line of reasoning could be applied to taking care of children. Yet another issue concerns the proper allocation of simultaneous activities, such as taking care of children while cooking or cleaning.

Apart from the above more conceptual and theoretical considerations, an important aspect that cannot be overlooked has to do with possible data concerns in relation to the underlying statistics needed to compile estimates of unpaid household services, certainly when taking into account the magnitude of the estimates in comparison with traditional national accounts aggregates. Having high quality data on time use, the typical starting point for compiling estimates for unpaid household activities, is a *sine qua non* to arrive at good estimates of unpaid household services, both in physical and in monetary terms. Looking at the current situation, it would definitely be preferable to have time use data with more granularity in terms of the types of activities and various groups of respondents, for example to further analyse the impact of digitalisation, or to monitor the impact of policies related to an ageing society on the demand for people's time spent on informal care. Furthermore, surveys are conducted quite irregularly, with intervals between consecutive surveys often of five years or longer and with no alignment across countries, as a consequence of which an international comparison for a given benchmark year is not without its complications. They often also lack consistency over time, as a consequence of which developments over time may be compromised to a significant degree. Furthermore, the timeliness of the data is rather poor, with time lags of several years not being exceptional, whereas the first national accounts estimates are typically produced within 30-45 days after the end of the quarter.

⁽¹⁵⁾ In this respect, purchasing a house usually involves an outright comparison between paying rent and the costs related to taking out a mortgage loan and/or investing own funds. In some countries, the imputed value of the income generated through occupying an own dwelling can be observed as part of taxable income.

All in all, it may be possible to derive some long-term structural developments on the use of time for producing unpaid household services, although with some caveats given the discontinuities of the surveys over time, but most certainly, it is not possible to get more insights on the short-term, cyclical changes over time. For example, there may be great interest in the impact of the 2008-2010 financial and economic crisis, with quickly increasing levels of unemployment, which in most countries is nearly impossible with the current state of affairs.

When integrating data on unpaid household activities into the system of national accounts, it is important firstly to link the number of hours spent on these activities as well as those on leisure time, to the (already available) number of hours spent on paid employment. Such integrated physical measures have a value added in their own right, by providing the ability to monitor shifts between paid employment and various other activities better. To arrive at estimates for the *value* of unpaid household activities, attempts are typically made to establish market-equivalent prices for the relevant services. Two basic options can be distinguished: (i) taking the market price of equivalent services transacted on the market; and (ii) using a cost-based approach. In practice, almost all available studies apply the second approach, as it may be quite difficult to put unpaid household services on a par with similar marketed services (for example cooking meals) and/or to arrive at a proper appreciation of the exact services provided under the various time use categories, while also taking into account differences in quality. In this approach, the level estimates of unpaid household activities are based on the costs of labour input and the capital services derived from consumer durables ⁽¹⁶⁾.

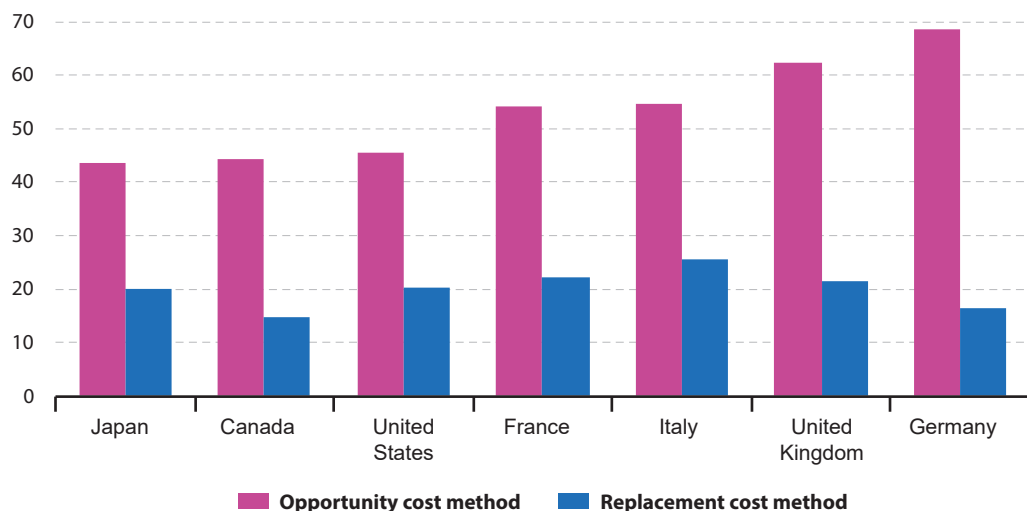
In applying the cost-based approach, the use of either the replacement costs or the opportunity costs for valuing labour input has a substantial impact. In the replacement cost approach — which tries to replicate the costs of the services if they were to be purchased on the market — an average post-tax, hourly wage, representative of the broad range of activities covered in the production of unpaid household services, is constructed. In the opportunity cost approach, the average post-tax, hourly wage across the whole economy is used to try to estimate the market income foregone as a result of spending time on unpaid household activities. The opportunity cost method tends to result in significantly higher numbers for the value added generated by unpaid household activities. Usually the replacement cost method is preferred, as it tries to approximate a market-equivalent price. However, if for some reason a household does not have a choice between purchasing the service on the market and producing the services themselves, the opportunity cost method may be appropriate as well. Another method which uses information on ‘experienced well-being during various activities’ gives results somewhat in between replacement costs and opportunity costs ⁽¹⁷⁾.

⁽¹⁶⁾ To arrive at full output estimates, intermediate goods and services should also be included, such as the ingredients for cooking meals. Often, these are ignored, not only because it is difficult to capture them, but also because it does not affect value added generated by these activities. This also holds for the estimates from Van de Ven et al. (2018).

⁽¹⁷⁾ For more information, reference is made to Box 2 in Van de Ven et al. (2018). For the countries for which data are available to construct estimates according to this alternative method, the United States exceptionally shows results which are very close to replacements costs.

Figure 6 shows the latest results on the impact of including unpaid household activities for G7 countries, as derived from Van de Ven et al. (2018). When applying the replacement cost approach, it shows that the imputed monetary value ranges from 14.7 % of GDP for Canada to 25.6 % for Italy. The results for the opportunity cost method are substantially higher, and range from 43.7 % for Japan to 68.6 % for Germany.

Figure 6: Own-account production of unpaid household services, 2015
(% of GDP)



Note: data on time use are based on the latest available time use surveys. Canada (2015); France (2009-2010); Germany (2012-2013); Italy (2013-2014); Japan (2016); the United Kingdom (2014-2015); and the United States (2016). Data refer to the population aged 10 years and over for Germany and Japan; to the population aged 11 years and over for France, Italy and the United Kingdom; and to the population aged 15 years and over for Canada and the United States.

Source: OECD Time Use Database (http://stats.oecd.org/Index.aspx?DataSetCode=TIME_USE), OECD SNA tables (http://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE1 and http://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE5) and OECD, *Taxing Wages*.

Estimating the impact on real growth rates of GDP is seriously affected by the scarce availability of sufficiently long and consistent time series of time use data. However, for a couple of countries, this analysis can be performed, although the results should be interpreted with some care. Including unpaid household activities generally leads to a lowering of the official growth numbers ⁽¹⁸⁾. Since the 1970s, in quite a number of countries female labour participation has (significantly) increased, as a consequence of which time spent on unpaid household activities has decreased compared with the time spent on paid activities, and unpaid household services

⁽¹⁸⁾ Note that no allowance has been made to changes in labour productivity in compiling results on the production of unpaid household services over time. For example, a productivity change equivalent to the developments in relevant market activities could be assumed. This would then lower the divergence between economic growth numbers including and excluding unpaid household activities, at least for the periods in which official economic growth is higher than the adjusted one.

have been substituted by services provided by the market. For Canada ⁽¹⁹⁾, for example, official annual average growth rates between 1981 and 2015 are lowered, on average, by 0.14 percentage points when applying the replacement cost approach. The decrease is 0.43 percentage points for the opportunity cost method, ranging from 0.26 to 1.03 percentage points for the various periods distinguished before 2005 ⁽²⁰⁾. Interestingly, adjusted growth rates are higher than official growth rates in the period 2005-2010, the impact ranging from 0.21 to 0.43 percentage points, depending on the valuation methodology. It may be assumed that this is, at least partly, related to the effects of the financial and economic crisis. The picture for the United States ⁽²¹⁾ between 1975 and 2016 is similar to that for Canada, as the inclusion of unpaid household activities on the basis of the replacement cost method lowers annual GDP growth by 0.34 percentage points on average, while the impact using the opportunity cost method decreases official growth rates by 0.65 percentage points on average. Here too, a positive impact of the adjustments on official growth rates for the period 2008 to 2010, during the financial and economic crisis, can be observed. In the period 2010 to 2014, the impact returns to its normal pattern of lowering official growth rates, although in the latest period, 2014 to 2016, growth rates including unpaid household activities are again higher.

Taking the environment into account

It is clear that the 2008 SNA deals poorly with issues relating to environmental sustainability. There may be some accounting for the stocks and flows of natural resources, but this is limited to those assets that fall within the SNA asset boundary. From an environmental perspective, this is a serious limitation. In the 2008 SNA, assets are only recognised and recorded if they concern *...a store of value representing a benefit or series of benefits accruing to the economic owner by holding or using the entity over a period of time* (paragraph 3.5 of the 2008 SNA). Ownership and generating benefits to the owner are core characteristics to this delineation. Mineral and energy reserves will normally qualify as assets. Also biological resources yielding repeat products in the future, such as dairy cows and forests, are included as assets if the natural growth and regeneration are under the direct control, responsibility and management of people. Some non-cultivated biological resources may be recognised as assets as well, but only those *... that are currently, or are likely soon to be, exploitable for economic purposes* (paragraph 10.182 of the 2008 SNA). Water resources are again only taken into account when it concerns *...surface and groundwater resources used for extraction to the extent that their scarcity leads to the enforcement of ownership or use rights, market valuation and some measure of economic control* (paragraph 10.184 of the 2008 SNA). In this respect, it should be noted that, although the 2008 SNA clearly includes the accounting of stocks and flows for these assets, not that many countries actually compile data for them.

Thus it can be concluded that stocks and flows relevant for monitoring environmental sustainability are simply not accounted for in the system of national accounts. Instead, a separate accounting framework has been developed and endorsed as an international statistical standard: the System of Environmental-Economic Accounting (SEEA) 2012 — Central Framework (United Nations et al. (2014a)), with the objective of providing a *multipurpose*

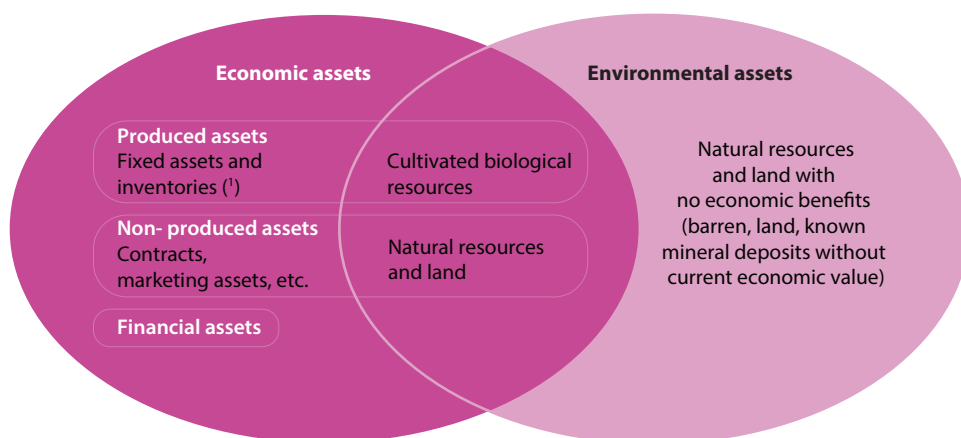
⁽¹⁹⁾ The intertemporal developments of time use data may be affected by changes in the reference population. For the countries mentioned in this paper, this holds for the developments in Canada between 1971 and 1981, and the developments in the United States before 2003.

⁽²⁰⁾ Note that the impact on growth rates also depends on the valuation method applied, with the impact on growth rates being larger when the applied wage rate and therefore the weight of the imputed unpaid household services is higher.

⁽²¹⁾ See footnote 15.

conceptual framework that describes the interactions between the economy and the environment, and the stocks and changes in stocks of environmental assets (paragraph 1.1 of SEEA 2012). SEEA 2012 has a broader definition of assets, at least in physical terms. It also includes natural assets which do not have a monetary value, such as uncultivated land, forests and water resources which are not exploitable for economic purposes. Figure 7 provides a simple overview of the differences between the asset boundaries of the 2008 SNA and the SEEA 2012.

Figure 7: Relationship between environmental and economic assets



(¹) Other than cultivated biological resources.

Source: SEEA 2012 Central Framework, pp. 139

In addition to an extended accounting for natural assets, and perhaps more importantly from a monitoring perspective, the central framework of SEEA 2012 includes a set of physical flow accounts in which natural inputs, products and residuals are linked to economic activities. Physical supply and use tables are included for energy, water, and various material flows (emissions to air, emissions to water, and solid waste). Another part of the framework concerns more prominent accounting for environmental activity, by identifying economic transactions within the system of national accounts which mainly relate to ... *economic activities whose primary purpose is to reduce or eliminate pressures on the environment or to make more efficient use of natural resources* (paragraph 1.30 of SEEA 2012). Another set of accounts details environmental taxes, subsidies and similar transfers.

The uptake of implementing SEEA-consistent accounts has been relatively good, with currently 69 countries having programmes on environmental-economic accounting. The goal for 2020 is to have at least 100 countries with ongoing, well-resourced programmes in line with SEEA 2012 – Central Framework. Within the European Union (EU), the compilation of a number of SEEA-based accounts is even mandatory through a set of regulations. Furthermore, global databases are being developed, with priority given to accounts for air emissions, energy, material flows, land, and possibly water. At the OECD, a programme has started to build up databases for emissions to air, mineral and energy reserves, and, in the near future, environmental taxes. These accounts will gradually be extended, by collecting national data and by including own estimates for missing countries.

The endorsement and implementation the SEEA 2012 – Central Framework can be considered as a major step forward. It will make it possible to monitor and analyse better the externalities of production and consumption activities in the form of emissions; it will also enable an improved monitoring of, for example, the uptake of environment-friendly activities. Furthermore, enhanced accounting for mineral and energy resources would make it possible to calculate a value for net domestic product (NDP) which is not only adjusted for the depreciation of produced assets, but also adjusted for the depletion of natural resources.

However, much more needs to be done. The economy and the society at large are embedded in and depending on the limitations provided by the planet Earth. From a sustainability perspective, the most important assets are ecosystem assets. Paragraph 2.31 of SEEA 2012 — Experimental Ecosystem Accounting (SEEA-EEA; United Nations et al. (2014b)) defines ecosystems as ... *spatial areas comprising a combination of biotic and abiotic components and other characteristics that function together*. These assets provide ecosystem services and benefits used in economic and other human activity, a rather euphemistic formulation for services on which human and other life depends. In SEEA-EEA, three main types of services are distinguished: (i) provisioning services (for example timber from forests); (ii) regulating services (for example forests proving carbon sinks); and (iii) cultural services (for example the pleasure of visiting a national park).

To arrive at a statistical framework for ecosystem accounting, SEEA-EEA contains a set of experimental guidelines, as an important first step for their further development. As noted on page v of SEEA-EEA, it ... *offers a synthesis of the current knowledge in this area and serves as a platform for the development of ecosystem accounting at national and subnational levels. It provides a set of terms, concepts, accounting principles and classifications; and an integrated accounting structure of ecosystem services and ecosystem condition in both physical and monetary terms. In SEEA Experimental Ecosystem Accounting, it is recognized that spatial areas must form the basic focus for measurement*.

Accounting for ecosystems is not straightforward at all. In physical terms, consensus has more or less been achieved on the way forward, although how to capture the condition and capacity of ecosystem assets has not yet been completely solved. Accounting for the monetary value of the stocks of ecosystem assets and their degradation over time is another story. Notwithstanding the complexity, much progress has been made in recent years, and work is ongoing to further improve methodologies. In the future, all this work will hopefully lead to the compilation of physical and monetary estimates for stocks and degradation of ecosystems.

It should be noted, however, that from a conceptual point of view there is a significant difference between ecosystem assets and other natural resources. Whereas in the case of, for example, mineral and energy reserves, a clear ownership of these assets can be observed, with an economic agent receiving the resource rents and bearing the depletion

costs of exploiting the assets, ecosystem assets often do not have such a clear structure of ownership. The allocation of the benefits derived from ecosystem assets and the use of these benefits either for the production of goods and services or for direct final consumption can be quite problematic. It is often not possible to allocate ecosystem assets to industries and sectors, or even to countries. Furthermore, the loss of future ecosystem services, or the costs of degradation of ecosystem assets, often goes without any monetary costs for the relevant producers and consumers, as a consequence of which the recording of these costs raises concerns about consistency in accounting terms. It is therefore not possible to simply deduct the loss of ecosystem services from value added and GDP in order to arrive at macroeconomic indicators of economic activity that are adjusted for depreciation, depletion *as well as degradation of ecosystems*. If economic agents actually had to bear these costs, a completely different combination of economic activities would have been observed, and thus a completely different level of GDP.

As an alternative to fully integrating ecosystem assets, including the recording of the costs of degradation as a result of economic activities and other human and non-human interventions, the proposal put forward by Vanoli (2017) could be considered. He proposes to add the monetary value of (net) degradation of ecosystems as 'unpaid ecological costs' to the final expenditures, thus arriving at final consumption and gross fixed capital formation at 'total costs'. The unpaid costs would feed as a negative into saving, which would subsequently add to a new liability category, 'ecological debt of the economy'. It may not be feasible to allocate these costs to sectors or industries, in some cases it may actually be non-trivial to allocate such costs to countries, but certainly recording the degradation of ecosystems in such a way would make the accounts much more transparent in showing the externalities caused by economic activities.

4. A vision for the future

Kenneth Boulding once remarked that *anyone who believes exponential growth can go on forever in a finite world is either a madman or an economist* ⁽²²⁾. Among others, Philipsen (2015) shows the ridiculousness of continuously pushing for a 3 % growth rate per annum for world GDP, which would result in a doubling of the world economy every quarter of a century and lead to a world economy which by the end of the 21st century would be eight times larger than today. Adding another century would lead to a 128-fold multiplication of the current level of economic activity. All of this is not to say that compiling national accounts is pretty much useless. Clearly, monitoring and analysing economic activities are important in their own right, for example to support policies for designing a financially sustainable economy. But that should not lead to policies that continuously and exclusively beat the drum for

⁽²²⁾ United States Congress, House (1973) Energy reorganization act of 1973: Hearings, Ninety-third Congress, first session, on H.R. 11510, pp. 248.

unconditionally higher GDP. For what purpose? For whom? Economic growth cannot be the ultimate objective of a society. As many have said, a better navigation system is needed that guides policy towards the enhancement of the well-being of people, without jeopardising the sustainability of well-being for future generations to come. But often voices become much softer, or even silent, when it comes to specific alternatives which could provide clearer guidance for the future direction of societal developments, have a rigorous and conceptually sound underlying measurement framework, and — last but not certainly least — are easy to communicate.

It is therefore important to develop metrics that cast a wider net on the monitoring of well-being of people, which go well beyond traditional economic indicators. As (sustainable) well-being is a multidimensional phenomenon, it may not be possible to capture it in one all-encompassing indicator, and thus there has to be agreement and reliance on a set of indicators which monitor the most relevant aspects of well-being. An important example of this way of capturing well-being is the OECD Better Life Index (see <http://www.oecdbetterlifeindex.org/>), in which 11 areas are monitored by a dashboard of indicators. The following areas and indicators are distinguished:

- housing — housing expenditure, dwellings with basic facilities, rooms per person;
- income — household financial wealth, household net adjusted income;
- jobs — job security, personal earnings, long-term unemployment rate, employment rate;
- community — quality of support network;
- education — years in education, student skills, educational attainment;
- environment — water quality, air pollution;
- civic engagement — stakeholder engagement for developing regulations, voter turnout;
- health — self-reported health, life expectancy;
- life satisfaction — self-reported life satisfaction;
- safety — homicide rate, feeling safe walking home at night;
- work-life balance — time devoted to leisure and personal care, employees working very long hours.

In each of these aspects, regional and interpersonal distributions are considered to be of the utmost importance. Clearly, if inequalities of say income, wealth, health, education, and so on coincide, the impact on well-being for the people at the bottom of the distribution can be very detrimental.

However, to take it a step further and to make it even more useful and relevant for policy purposes, in my opinion it would be a very welcome addition to design and populate an underlying framework which links the various aspects of well-being and sustainability. Such a framework would make it possible to monitor, analyse and understand better the interrelations between the various aspects of well-being, and to understand better the trade-offs and the win–wins between the various domains. For example, what is the relationship between, on the one hand, the output of human health and social work industries and unpaid household activities on care for (non-)household members, and, on the other hand, the health outcomes of people, and how does this affect, for example, employment and government finance. How to improve health outcomes? Should more money be spent on prevention, on development of pharmaceuticals, on improving medical techniques, and how much money should be spent? In efforts to answer these types of questions, a very promising

way forward could be to link business statistics on human health and social work industries, very granular administrative data on treatments, data on relevant time use categories, government finance, national accounts and, last but certainly not least, relevant outcome indicators.

As shown before, this way of thinking and analysing is actually very well developed in the area of environmental sustainability. But there are also other promising initiatives. For example, quite a number of countries have done work on health satellite accounts, while more and more work is being done on making use of administrative data for medical treatments, for example to arrive at better volume measures for health services. Furthermore, in the area of education and training, a conceptual framework for compiling satellite accounts for education, training and human capital has been developed; see United Nations Economic Commission for Europe (2016). The same is true for satellite accounts on unpaid household activities; see United Nations Economic Commission for Europe (2017).

In the latter case, as shown in Section 3 of this paper, various attempts have been made to value the unpaid services, although for many types of analysis, a monetary valuation is not strictly necessary. Having a complete set of data on time use, which are integrated and combined with data on paid employment (and related income), as included in the SNA, major shifts in how people spent their time could be derived as well as evaluating how this affects the paid economy, as currently represented by output, value added and GDP. Actually, having more granular and more timely data on time use would provide a magnificent tool for monitoring and analysing shifts in time spent on various activities, including shifts from paid to unpaid activities and *vice versa*, which are considered highly relevant for the measurement of people's well-being, whether this may concern activities benefiting people's own well-being (for example, work-life balance, leisure), other people's well-being (for example, childcare, care of the elderly, volunteering), or both (for example, socialising). It could be considered, for example, how government policy on long-term care affects people's labour input in paid and unpaid care activities. Furthermore, it would be good to have additional information on, for example, digital activities, such as time spent on social media, search activities, and so on, thus allowing an alternative way of measuring consumer surplus that may arise from the digitalisation of society. However, the requested granularity and timeliness cannot be achieved by applying traditional survey methods. The potential of big data to compile time use data, or at least to supplement current data collection methods, needs to be thought about.

As a point on the horizon, it would be desirable to develop an overarching accounting framework in which statistics on economic, societal and environmental issues are integrated (not necessarily monetised) and in which it is possible to drill easily down into micro datasets. It is clear that this would definitely be a long-term goal, also requiring the development of a suitable conceptual framework. As a more realistic goal for the nearer future, the regular compilation of certain satellite accounts could be envisaged, such as those mentioned above. Having satellite accounts for the environment, health, education and unpaid household activities, or time use more generally, on a regular basis for a substantial number of countries would definitely support the monitoring and analysis of quite a number of well-being aspects included in the OECD Better Life Index and in other dashboards nationally and internationally.

In developing such a broad framework, the importance of communication should be acknowledged. Referring to the traditional set of national accounts as being the 'central framework' or the 'core' set of national accounts and referring to the measurement frameworks for other areas as being satellite accounts, is not particularly helpful. In line with Vanoli (2017), the terminology and the content of what is currently being referred to as the central framework needs to be rethought. Vanoli proposes to refer to the current set of national accounts as the system of national economic accounts (SNEA) and to include a much broader set of accounts in the central framework of national accounts. Perhaps it might be desirable to go a step further when it comes to the term for the current set of national accounts and refer to it as the system of national monetary accounts, to make clear that an economic account is more than a consistent set of monetary transactions and positions. Furthermore, Vanoli also presents a concise conceptual foundation for the broader set of accounts, with reference to four spheres and their related information systems: economy, people, nature and society. A similar plea for a new and comprehensive 'system of global and national accounts', including an in-depth analysis and description of how such a system should look, can be found in Hoekstra (2019). Hoekstra argues for a distinction of four sets of interrelated accounts, three describing the environment (global environmental accounts), the society (global societal accounts) and the economy (global economic accounts), and one describing distributional aspects (global distribution accounts). A separate set of global quality accounts is distinguished for the definition and recording of key indicators that can be derived from the other accounts, to provide a summary as to whether things are moving in the right direction.

Here, a more pragmatic approach is being proposed ⁽²³⁾, to get things moving forward relatively quickly, as it may still take some time to define the exact conceptual framework, including the templates, discuss these proposals and have them endorsed at an international level, and — last but certainly not least — to get all of this implemented by countries. Instead of embarking on a full-scale update of the 2008 SNA, the United Nations Statistical Commission, in its 49th meeting held on 6-9 March 2018, agreed to develop guidance notes on three areas for which further clarifications and guidance are needed in the context of the system of national accounts: (i) digitalisation, (ii) globalisation, and (iii) sustainability and well-being. A starting point for pushing the above ideas could be the compilation of a guidance note on the latter. However, it should not come as a surprise that the whole process may take another 5-10 years. In moving forward, it is considered of the utmost importance to involve specialists from other areas of expertise (environment, social issues, education, health, time use, and so on) as well. It should be avoided that all of this is looked upon as a form of economic imperialism. The objective is to arrive at a consistent framework which covers much more than the economy alone.

⁽²³⁾ The approach here is similar to, but also much broader than, the SESAME-approach in which the social accounting matrix was combined with environmental-economic accounts; see for example Kazemier et al. (1999).

5. Summary and conclusions

So it has come to this. The global diversity crisis is so severe that brilliant scientists, political leaders, eco-warriors, and religious gurus can no longer save us from ourselves. The military are powerless, but there may be one last hope for life on earth: accountants. (Jonathan Watts, The Guardian, 28 October 2010).

The above quote may look slightly satirical, but the author is not trying to be. Instead, he wants to emphasise the importance of quantifying, in this case, the stocks and flows of ecosystems. According to him, environmental issues are not truly taken into account in designing policy unless there is a (monetary) quantification of the costs related to degradation. It is related to the argument that economic growth — as measured by GDP — has, during certain periods of time, been the most successful macro indicator, basically defining what is considered to be a successful economy, or even more broadly whether societal developments are going in the right or wrong direction; this is why GDP still largely drives the policy agenda, despite its lack of accounting for well-being and environmental and societal sustainability. Philipsen (2015) looks upon GDP as the devil in disguise, seeing conspiracies all over the place to show the importance, or ‘value added’, of industries. I do not think that this is a fair assessment, but — as Gleeson-White (2011) argues — methods to summarise developments can have an impact on the goals we pursue. As an example, in addition to the success story of GDP, she mentions the concept of ‘profit’ that could for the first time be explicitly derived from the double entry bookkeeping system developed in the golden years of Venetian trade in the 14th century. Or, as Stiglitz et al. (2009) puts it: *What we measure affects what we do; and if our measurements are flawed, decisions may be distorted.*

The above does not alleviate the task of statisticians and accountants. On the contrary! It puts a major responsibility on the shoulders of the statistical community, to develop metrics that can guide policy to a better and more sustainable future. Metrics which are well-founded, based on an underlying conceptual and statistical framework, agreed across various areas of expertise, convincing, and easy to communicate.

Since the Second World War, national accounts have become very ‘successful’, GDP and economic growth often being put on a par with success or failure of economic developments, and even more broadly, societal developments. Nowadays, a large part of the economic research community seems to have turned their back to the intricacies of defining and measuring macroeconomic data. National accounts have increasingly become the object of criticism in the media and academic research, the most notable recent examples being the measurement of financial services, the inclusion of illegal activities, and the way in which the digitalisation of the economy is being represented. Sometimes these critiques are justified and call for further investigation. In other instances, the comments and remarks simply show a certain level of ignorance concerning accounting standards and what they intend to measure, and call for enhanced communication between the research community and national accountants.

A more substantive body of criticism relates to the measurement of (economic) well-being and sustainability. Indeed, GDP does not take into account various aspects of well-being and does not account for environmental externalities. As such, navigating on GDP alone is the shortest route to disaster. There is an increasing demand from users for better metrics that provide a more encompassing measure of developments in (sustainable) well-being. However, it has to be recognised that the latter is a multi-faceted phenomenon, which is not easy to capture in one single headline indicator. Instead of having endless discussions on how such a single metric could be defined and developed, from a statistical perspective it seems preferable to apply a dashboard type of approach, such as the OECD Better Life Index, and to try to define and populate an underlying conceptual and statistical framework. To include all these aspects into one consistent (monetary) accounting framework, similar to the system of national accounts, thus arriving at one single measure, is, in my opinion, 'mission impossible'.

A more feasible approach is to arrive at a consensus on the further enrichment of the central framework of national (monetary) accounts by including and combining a standard range of accounts for the environment, health, education and time use. All of these additions need not necessarily be defined in monetary terms, although monetising (the degradation of) ecosystems could further support the urgency of dealing with environmental sustainability. More generally however, having more and better data in physical units will already provide an enhanced monitoring framework for further analysis and can be considered as a pre-condition for developing more refined summary indicators. In the meantime, the use of alternative indicators within the system of national accounts, the most obvious being household disposable income and household final consumption, should be further emphasised and explicitly communicated. Also the compilation of consistent distributional information on income, consumption, saving and wealth should be pursued with quite some urgency. So, yes, there is a role to play for accounting as well as for statistics more generally, and it is by far not a small task and responsibility.

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Annex: Digitalisation and households' (economic) well-being

In the main article, reference was made to the digital transformation of the economy. This transformation has major consequences for the way things are done within the economy and society at large. Internet access by households has led, for example, to a blurring between market production, unpaid household activities, and leisure. For instance: households -booking their own hotels or flights, instead of arranging this via a travel agency; self-service checkouts in supermarkets; on-line banking; and so on. What these changes have in common is a movement from purchasing services delivered by dedicated market producers towards out-of-market solutions. In a similar manner to unpaid household activities in general, none of these new activities are captured within GDP. As such, these changes can be looked upon as yet another layer in the problem of capturing unpaid household activities and related (economic) well-being in the system of national accounts. This development is not new, as the displacement of market activities by unpaid household activities, and *vice versa*, has always taken place, but digitalisation has certainly raised the issue to a higher and more prominent level.

Another, slightly different, issue concerns the 'free' provision to households of apps, search facilities from the likes of Google, social networking through Facebook, Tencent, and so on. In these cases, the financing of these services is often arranged via revenues from advertisements or through the provision of data ⁽²⁴⁾ which are subsequently used as a business model for generating revenues (including the advertising mentioned before). The provision of these 'free' services is frequently cited as output that goes unnoticed despite their contribution to consumer well-being, and there is indeed quite some debate going on as to how additional output, value added and household final consumption might be imputed for information services which are financed through advertising ⁽²⁵⁾. The rationale usually put forward is that households actually derive substantial economic well-being from consuming free apps or social media, which should be accounted for. However, it may be considered whether the recording of this additional consumption does not lead to a double-counting, as households implicitly pay more for the products of the advertising firms. Whatever the case, it is also clear that — again — this is not a new problem. Broadcast television, radio, newspapers and the like have also been provided for free or at significantly reduced prices because of advertising revenues. Similarly, sports clubs may provide free entry to executive boxes for their sponsors. When looking in more detail at estimates for media services, the impact on economic growth of changing the recording of free services financed through advertising revenues is minimal. Nakamura and Soloveichik (2015), for example, impute a value of production by unincorporated household enterprises equal to the value of advertising receipts and use data on advertising expenditure for different media. Although these imputed services grew considerably faster (at 6.7 % per year) than overall GDP, their impact on economic growth across 80 countries amounted to 0.018 %.

⁽²⁴⁾ In this age of digitalisation, it is possible to observe an ever-increasing role of personal data in the economy. It calls into question the current recording, or better to say non-recording, of data exchanges without a monetary counterpart transaction, and of data as an asset category; this issue is discussed in more depth in Ahmad and Van de Ven (2018).

⁽²⁵⁾ For more details on the various options to include these services in the system of national accounts, reference is made to Ahmad and Schreyer (2016) and Ravets (2016).

Yet another phenomenon relates to the growing activities of communities of people together creating freely available assets like Wikipedia, R, Linux, and so on. Although it is clear that the relevant assets generate benefits for their users, their use is free of charge and thus not accounted for in the current system of national accounts. Of note is that the users are not restricted to households, as enterprises and governments can also make use of such free software or resources, thereby replacing the use of purchased software or information. Accounting for this phenomenon of free assets is not that straightforward: it actually gives rise to major complexities, both from a measurement perspective and from a conceptual point of view. For example, this phenomenon could be considered as people providing input to the creation of a commonly produced asset, which would lead to an extension of the current production and asset boundaries of the 2008 SNA. People in the community contributing to the asset would be regarded as being producers of services, the value of which could be based on the time spent multiplied by a measure of their hourly compensation. The annual services provided would then be recorded as annual additions to, or investments in, the assets, while the sum of these additions, adequately adjusted for the decline in value as a result of normal obsolescence ⁽²⁶⁾, would lead to a monetary estimate of the capital stock.

However, the recording and valuation of free assets like this would still leave open the question as to how to account for the ownership and the use of these assets. The assets are typically worldwide assets that are made available across the internet, so even an allocation of the ownership to countries might prove to be quite challenging. The community of producers could be considered as a kind of virtual non-profit institution serving households (NPISH), and this NPISH could be considered as the creator and the owner of the assets. The services delivered by this NPISH — equal to the sum of costs of operating the relevant asset, including the decline in value of the assets due to normal obsolescence — could then be regarded as final consumption of NPISHs. In the 2008 SNA, the final consumption of NPISHs (and the individual part of government final consumption) is subsequently re-allocated to benefiting households, with a concomitant (social) transfer in kind. A similar recording could be envisaged for the NPISHs providing services from free assets, however with the added complication of having to figure out who actually benefits from these assets, which not only consists of households but also includes enterprises ⁽²⁷⁾. Finally, it should also be taken into consideration that, in the process of recording the production of these assets, additional income is being allocated to the community of people contributing to the build-up of the assets. To balance the accounts, the free delivery of these services would need to be counterbalanced by an equivalent current transfer of some kind. All in all, a considerable amount of imputations, not to mention the complexities in valuing the relevant transactions and positions, and allocating them to countries and sectors. An example of all accounting entries is provided in Table A.1.

⁽²⁶⁾ Here, the term 'consumption of fixed capital', or depreciation, has been avoided, as in the current system of national accounts the former terms are limited to physical deterioration, normal obsolescence and normal accidental damage of produced assets.

⁽²⁷⁾ Not to mention the additional complication of allocating social transfers in kind (whose receipts are currently restricted to households) to enterprises. In the case of enterprises, it is perhaps also necessary to consider a reclassification of final consumption to intermediate consumption.

A completely different approach to measuring economic gains linked to increased well-being from free services is taken by Brynjolfsson et al. (2018). In their research, consumer surplus from digital services is derived from surveys on measures of willingness to pay or willingness to accept. In the main experiment, a single binary discrete choice (SBDC) experiment, consumers are asked ... *to make a choice between keeping a digital good or taking a monetary equivalent compensation when foregoing it*. As a benchmark to check the results, an alternative lottery procedure has been implemented on Facebook. The results are striking, to say the least. The median willingness to pay, which is assumed to be equivalent to the consumer surplus attached to digital services, adds up to more than USD 32 000 per year in 2017, with 'all search engines' and 'all e-mail' ranking highest (USD 17 539 and USD 8 414, respectively), and 'all music' and 'all messaging' ranking lowest (USD 168 and USD 155, respectively). Brynjolfsson et al. (2018) also show the results of choices between digital services, non-digital products, and giving up a certain amount of income, through a Google consumer survey. The results confirm the outcomes of other experiments. For example, no access to the internet for one year is ranked just below giving up an income of USD 5 000 for one year. Using massive internet surveys, Brynjolfsson et al. (2018) claim that it would be relatively easy to make estimates for the consumer surplus derived from the complete basket of goods and services consumed by households. Such a measure could then supplement the traditional measures of household final consumption.

The above estimates of consumer surplus related to digital services may be questioned. One problem is that the estimates do not (adequately) reflect budget constraints which households are facing in real life. Although the authors' goal is to arrive at a measure of consumer surplus, it might be considered what consumers would actually be willing to pay, given budget constraints, thus trying to capture some measure of the shadow prices of free digital services. Such a measure would be more consistent with the current valuation methodologies based on market prices or exchange values, as applied within the system of national accounts.

More generally, it would be desirable to have a more holistic approach to free goods and services, which also includes, for example, all other unpaid household activities. Perhaps this could be done through massive internet surveys, like the one done for the extended Google survey on choices between digital services, non-digital products and income. It would be very useful to be able to make a comparison of the results for unpaid household activities with methodologies using a cost-based approach, like the one explained above.

Furthermore, as it stands now, the methodology will only be able to provide some kind of supplementary measure for consumer surplus, thus making it possible, for example, to compare the results with monetary estimates of household final consumption. However, it would be a standalone measure, not embedded in a system of accounts, and would therefore also be unable to provide any possibility to improve the rigour of estimates, by using the consistency rules of output, expenditure and income, or to provide ample opportunities for policy analysis in a broader context.

Last but not least, the methodology applied by Brynjolfsson et al. (2018) may indeed be considered as a viable way forward to estimate total consumer surplus. But, if the intention is to arrive at a broader measure of (economic) well-being, the problem remains of not taking on board certain aspects that also directly affect well-being, such as health, social relationships, environmental conditions, and so on. Returning closer to the topic of free digital services, it may also be considered whether negative externalities from free digital services on for example trust, work-life balance, and so on are adequately reflected in the estimates, and whether consumers take these types of issues into account when entering into the choice experiments. Whatever the case, the point to be made here is that the methodology remains a consumption-oriented approach, although — as said — it could perhaps be extended to include the whole range of unpaid household activities and to include alternative valuations for the whole consumption basket of households which better reflect the economic well-being households derive from them.

Looking at the current system of national accounts, more specifically the supply and use tables which describe the production process and transactions in goods and services, it is clear that the classification systems for industries and products do not appropriately reflect newly developing digital activities/technologies. It is therefore very hard, if not impossible, to track the extent and growth of digital activities and products, as they are usually an implicit part of broader categories such as trade, transport, housing, and so on. To meet this user demand, a satellite account on the digital economy is in the process of being developed and subsequently populated. This satellite account separately distinguishes transactions that are electronically ordered and/or electronically delivered, in addition to covering more traditional activities that are considered enablers of the digital economy (information and communication technology, software development, and so on). The framework also enables an extension of the production boundary, by including estimates of free digital services ⁽²⁸⁾. With respect to the latter, estimates made by Brynjolfsson et al. (2018) could indeed provide a valuable addition, although it is preferable to have estimates which try to capture a valuation of free services which is more consistent with the traditional valuation methodologies of national accounts. From the perspective of trying to capture well-being more broadly, having fully-fledged estimates of the consumer surplus derived from the whole basket of household final consumption, including free digital services and, more broadly, all unpaid household activities, could feature as an excellent supplementary measure, adding to our understanding of what drives household (economic) well-being.

⁽²⁸⁾ For more details, see Ahmad and Ribarsky (2018).

Table A.1. Example of recording of free asset created by a community of people (USD)

Contributors			Non-profit institutions serving households			Users	
Production account			Production account			Production account	
Intermediate consumption	0	Output (¹)	400	Output (²)	700		
Value added (net)	400		300				
			Value added (net)	0			
Distribution of income account			Distribution of income account			Distribution of income account	
Current transfers	400	Value added (net)		Value added (net)	0		
Disposable income (net)	0			Current transfers	400		
			Disposable income (net)	400			
Use of disposable income account			Use of disposable income account			Use of disposable income account	
				Disposable income (net)	400		
			Final consumption	300			
			Saving (net)	100			
Redistribution of income in kind account			Redistribution of income in kind account			Redistribution of income in kind account	
				Disposable income (net)	400	Disposable income (net)	0
			Transfers in kind	300		Transfers in kind	300
			Adjusted disposable income	100		Adjusted disposable income	300
Use of adjusted disposable income account			Use of adjusted disposable income account			Use of adjusted disposable income account	
				Adjusted disposable income	100	Adjusted disposable income	300
			Actual final consumption	0		Actual final consumption	300
			Saving (net)	100		Saving (net)	0
Capital account			Capital account			Capital account	
				Saving (net)	100		
			Investments	400	Depreciation	300	
			Net lending	0			
			Capital stock at the beginning of period <i>t</i>		1 600		
			Investments		400		
			Depreciation		-300		
			Capital stock at the end of period <i>t</i>		1 700		

(¹) Services delivered to NPISH, consisting of an imputed value of 20 hours * USD 20.

(²) Sum of costs, consisting of USD 400 of investment produced on own account (= deliveries of services by contributors) and depreciation of the free asset created (= final consumption of NPISH).

