

Umweltforschungsplan des  
Bundesministeriums für Umwelt,  
Naturschutz, Bau und Reaktorsicherheit

Forschungskennzahl FKZ 3711 12 101

## **Update and methodological revision of the National Welfare Index 2.0 for Germany – 1991 to 2012 – Final report – Summary**

by

Hans Diefenbacher

Protestant Institute for Interdisciplinary Research/Forschungsstätte der Evangelischen Studiengemeinschaft/Institut für interdisziplinäre Forschung, Heidelberg

Benjamin Held

Protestant Institute for Interdisciplinary Research/Forschungsstätte der Evangelischen Studiengemeinschaft/Institut für interdisziplinäre Forschung, Heidelberg

Dorothee Rodenhäuser

Protestant Institute for Interdisciplinary Research/Forschungsstätte der Evangelischen Studiengemeinschaft/Institut für interdisziplinäre Forschung, Heidelberg

Roland Zieschank

Forschungszentrum für Umweltpolitik der Freien Universität Berlin, Berlin

Protestant Institute for Interdisciplinary Research

Forschungsstätte der Evangelischen Studiengemeinschaft

Institut für interdisziplinäre Forschung (FEST)

Schmeilweg 5

69118 Heidelberg

Forschungszentrum für Umweltpolitik (FFU)

Fachbereich Politik- und Sozialwissenschaften

Freie Universität Berlin

Ihnestr. 22

14195 Berlin

On behalf of the Federal Environment Agency (Germany)

April 2016

## **Note**

This text is a summary of the final report of the research project “Update and methodological revision of the National Welfare Index 2.0 for Germany – 1991 to 2012” which was funded by the Federal Environment Agency (Germany). The complete final report (which also contains this english summary) is available only in German language. It can be downloaded here:

<https://www.umweltbundesamt.de/publikationen/aktualisierung-methodische-ueberarbeitung-des>

## **Abstract of the complete final report**

In the first chapter of the complete final report an overview on the actual discussion on the measurement of growth and welfare and on the current critique on the applicability of GDP as a measure of welfare is given. The development of the methodology of NWI since 2009 is described, together with the response among scientists, the political sphere and the broader public. The main part of the study deals with the update of the NWI time series until the year 2012, including a detailed discussion of the twenty different components of the NWI. The latest development of the NWI time series is discussed in detail, the influence of the components is assessed. In a next step, improvements of the methods of NWI calculation are described in detail; first ideas of further improving these methods are presented. The study ends with a conclusion to appraise the possibilities to establish the NWI as an alternative measure of welfare.

## Summary

### I Welfare in society and its measurement

Beginning with the world economic and financial crisis, there is increasing doubt whether the prevailing model of economic growth really can cope with the requirements of a development that is sustainable in an ecological, social and economic perspective. In such a context, the objective of welfare in society gets more important – instead of purely quantitative economic growth that in many cases is triggered only by public debts. We understand the notion of “welfare” as the total of material and non-material components of “prosperity” and “well-being” obtained from the available wealth of a country: economic, natural and social capital.<sup>1</sup>

The OECD conferences on “Measuring the Progress of Societies” and the EU congress “Beyond GDP” in 2007 revitalised an existing international discussion, which, unlike earlier decades, transcended scientific communities. On the one hand, the focus is on the negative external effects of economic growth. On the other hand, it is increasingly recognised that the traditional measurement of the economic development of a country by GDP can indicate an illusionary wealth, because GDP is unconcerned about social developments, and nature is buried in oblivion. Therefore, GDP needs a correlate. Otherwise, it is very often ignored that economic growth is to a large extent dependant on intermediate free inputs from the social and the natural system. In Germany, the reports of the parliamentary Enquete Commission on Growth, Prosperity and Quality of Life considerably increased the acceptance of a critical discussion of the traditional model of economic growth.

The contribution of the National Welfare Index (NWI) to this discussion is twofold. It is a contribution to the scientific development of new reporting systems focusing strongly on social and ecological implications of current production and consumption patterns, and it is a contribution to the enhancement of a social market economy to an ecologically sustainable economy.

Already the first project to develop the NWI was initiated and supported by the Federal Environment Agency (UBA) and the federal Ministry of Environment (BMU), which wanted to find out to what extent a new concept of welfare measurement could be developed to supplement GDP. The adoption of the indicator “price adjusted GDP per capita” into the sustainability reporting of the federal government was assessed heterogeneously because there is no consensus in respect to the evaluation of primarily quantitative economic growth. In 2013, a second study led to a methodological improvement of the NWI, the so-called „NWI 2.0“, and to an update of the time series.<sup>2</sup> The Environmental Protection Agency also supported the third study published here; this happened in the framework of a larger project on alternative measurements of sustainable welfare.<sup>3</sup>

---

<sup>1</sup> The aim is the preservation and augmentation not only of the economic and financial capital but also of ecosystems, landscapes, biodiversity, quality of air, water and soil and of ecosystem services, as well as human and social capital: education, cultural inheritance, social justice, health and the quality of social systems.

<sup>2</sup> For the regional level, the German states, the regional welfare index has been developed.

<sup>3</sup> Lutz, Christian/Zieschank, Roland/Drosdowski, Thomas (2015): „Green Economy: Nachhaltige Wohlfahrt messbar machen unter Nutzung der Umweltökonomischen Gesamtrechnungs-(UGR)Daten.“ Final report of the research project FKZ 3711 12 101. Osnabrück/Berlin URL: <http://www.umweltbundesamt.de/publikationen/green-economy-nachhaltige-wohlfahrt-messbar-machen>

## II Construction principles and components of NWI 2.0

The national welfare index is based on a so-called accounting method to correct the most important deficits of GDP as a measure of welfare. To achieve this, the NWI incorporates components to cover aspects such as social justice, unpaid labour, environmental damages and the use of resources that are relevant in regard to welfare.<sup>4</sup> All components must be available as a monetized variable or – at least – it must be theoretically possible to monetize them.<sup>5</sup> In addition, as for GDP, all components are measuring flows that refer to a specific year. Stocks like natural capital thus cannot be considered directly but only by their change in a given year. Like GDP, the NWI is a *domestic* index: it contains only costs and benefits that are related to the territory of the country for which the index is calculated. Environmental costs caused by the production of consumer goods abroad that are consumed within the country are not included.

The NWI 2.0 currently consists of 20 components (see table next side) that are aggregated in order to obtain a single index. The components and the methodology of their calculation will be substantiated and discussed in detail in chapter 2.4; what is following here is just an overview:

- The basic component of the calculation is private consumption weighted by the Gini index of the income distribution;<sup>6</sup>
- the creation of economic value by unpaid household and voluntary work is added;
- part of public expenditure for health and education is regarded as welfare creating;
- the time gap between costs and benefits from consumer durables is corrected; i. e. expenditures for consumer durables that are longer in use than one year are subtracted, the benefits they provide in a given year are added.
- components that represent welfare diminishing social and ecological aspects must be subtracted. Among other items, this category comprises environmental damage costs such as costs of air pollution and greenhouse gas emissions. In addition to that, replacement costs for the use of non-renewable energy resources and costs for the use of nuclear energy are taken into account.

As shown in chapters 2.3 and 2.4, the availability and quality of the data for the 20 components differ considerably. Data quality for many components is already good or at least satisfactory. Others, however, are currently only accounted for in a symbolic way. These “reminder values” stand for aspects that are relevant for welfare calculations but can only be included symbolically because of the data situation, without having an influence on the development of the NWI that would be important in any quantitative respect.

---

<sup>4</sup> For the criteria of the selection of components for the NWI, see Diefenbacher/Zieschabk (2009)

<sup>5</sup> The calculation and further development of the NWI is linked to the discussion on the monetization of items that are not or not fully represented by market prices. See already Beirat „Umweltökonomische Gesamtrechnungen“ beim Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (Hrsg.) (2002): Umweltökonomische Gesamtrechnungen – Vierte und abschließende Stellungnahme zu den Umsetzungskonzepten des Statistischen Bundesamtes. Wiesbaden: Statistisches Bundesamt, dort Kap. 4.2.3, 84ff.; URL:

[https://www.destatis.de/DE/Publikationen/Thematisch/UmweltökonomischeGesamtrechnungen/VierteStellungnahmeBeiratUGR.pdf;jsessionid=5DEC44EFDC0ACC827F6A0C2399A95DA4.cae3?\\_blob=publicationFile](https://www.destatis.de/DE/Publikationen/Thematisch/UmweltökonomischeGesamtrechnungen/VierteStellungnahmeBeiratUGR.pdf;jsessionid=5DEC44EFDC0ACC827F6A0C2399A95DA4.cae3?_blob=publicationFile)

<sup>6</sup> Starting from the assumption that the consumption of goods and services is welfare creating in general. Furthermore, considering welfare theory it can be assumed that an additional Euro of income will increase the welfare of a poor household more than the utility of a rich household. Therefore, welfare from private consumption expenditures will be higher if the income distribution in the society is more equal (see chapter 3.1).

### The components of the NWI 2.0

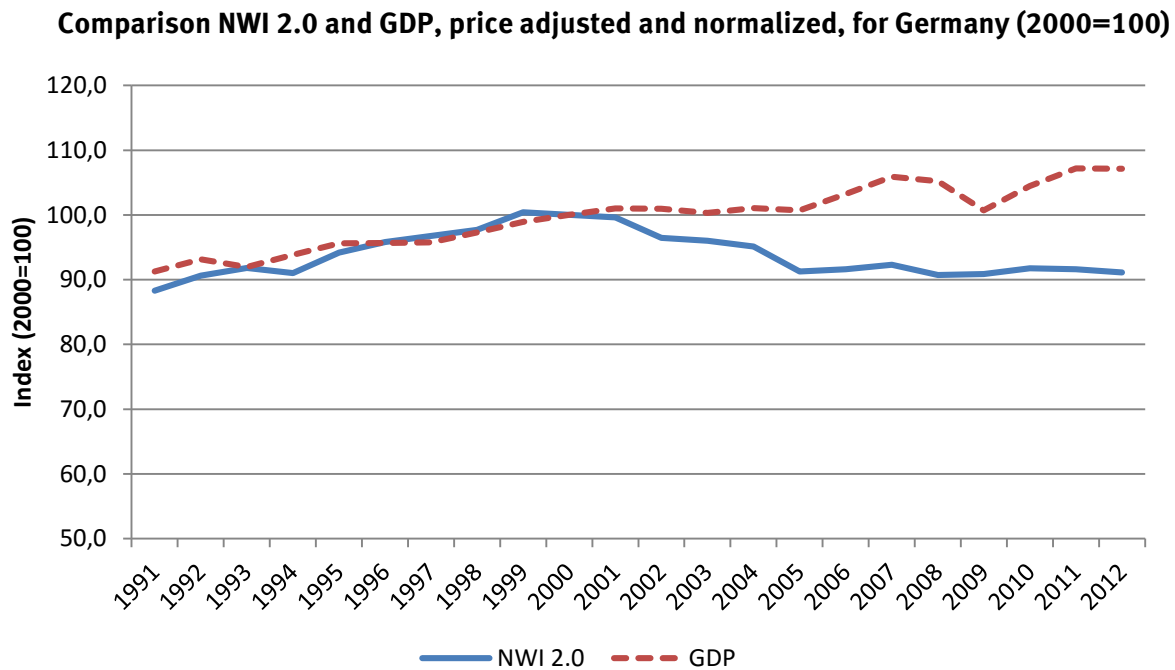
No.	Component	+ / -
1	Index of income distribution	
2	Weighted private consumption	+
3	Value of housework	+
4	Value of voluntary work	+
5	Public expenditure on health care and education	+
6	Costs and benefits of durable consumer goods	+ / -
7	Costs of travel between home and workplace	-
8	Costs of traffic accidents	-
9	Costs of crime	-
10	Costs of alcohol, tobacco and drug abuse	-
11	Compensatory social expenditures due to environmental impact	-
12	Damage costs of water pollution ("reminder value")	-
13	Damage costs of soil degradation ("reminder value")	-
14	Damage costs of air pollution	-
15	Damage costs of noise	-
16	Net value of loss/increase of ecosystems (biotope area) ("reminder value")	+ / -
17	Net value of loss/increase of agricultural areas	+ / -
18	Replacement costs due to the consumption of non-renewable energy resources	-
19	Damage costs of GHG emissions	-
20	Costs of the use of nuclear energy	-

Quelle: FEST/FFU; eigene Darstellung FEST/FFU

### III Updated results of the NWI 2.0

#### Development of the NWI 2.0

Currently, results of the National Welfare Index are available for the years 1991 to 2012. For Germany, the development of NWI can thus be compared to GDP for a time span of 22 years.<sup>7</sup> To facilitate the comparison, the values of NWI as well as price adjusted GDP were normalized (index values 100 for the year 2000). To improve comparability, the price adjustment of both NWI and GDP was carried out using the consumer price index. The values of GDP may differ from official GDP values because the official statistics use a different method for price adjustment.



Although NWI and GDP are partially going into opposite directions in the years 1992 and 1993, their development is quite similar until 1999, with the NWI developing slightly more positively. Starting from an index value of 88, it is increasing to a value of about 100 (GDP: from 91 to 99). However, after 1999 the indices depart from each other – a trend that is continuing until 2012. Starting in 1999 with an index value of 100, NWI declines to 91 in the year 2012, while GDP is increasing to an index value of 107. Different phases can be distinguished: Between 2000 and 2005, GDP is more or less stagnant, while in the same time NWI is decreasing considerably to an index value of only 91. Afterwards, NWI shows only slight fluctuations and remains at the same level; with the exception of 2007, where it reaches an index value of 92. GDP, in contrast, rises until 2007 to 106 before slightly going down in 2008 and then collapsing to 101 during the economic crisis in 2009. This is a remarkable difference to the small increase of NWI in the year 2009. Yet, already in 2010, GDP is going up again to reach its maximum in the period analyzed here (107).

The most important factor for the development of NWI is private consumption, weighted by the Gini coefficient (component no. 2). The changes of weighted consumption are in part determined by the development of real consumption expenditures, quantitatively the largest factor within NWI. In addition, changes in the income distribution have a big influence as well, because it is used as the

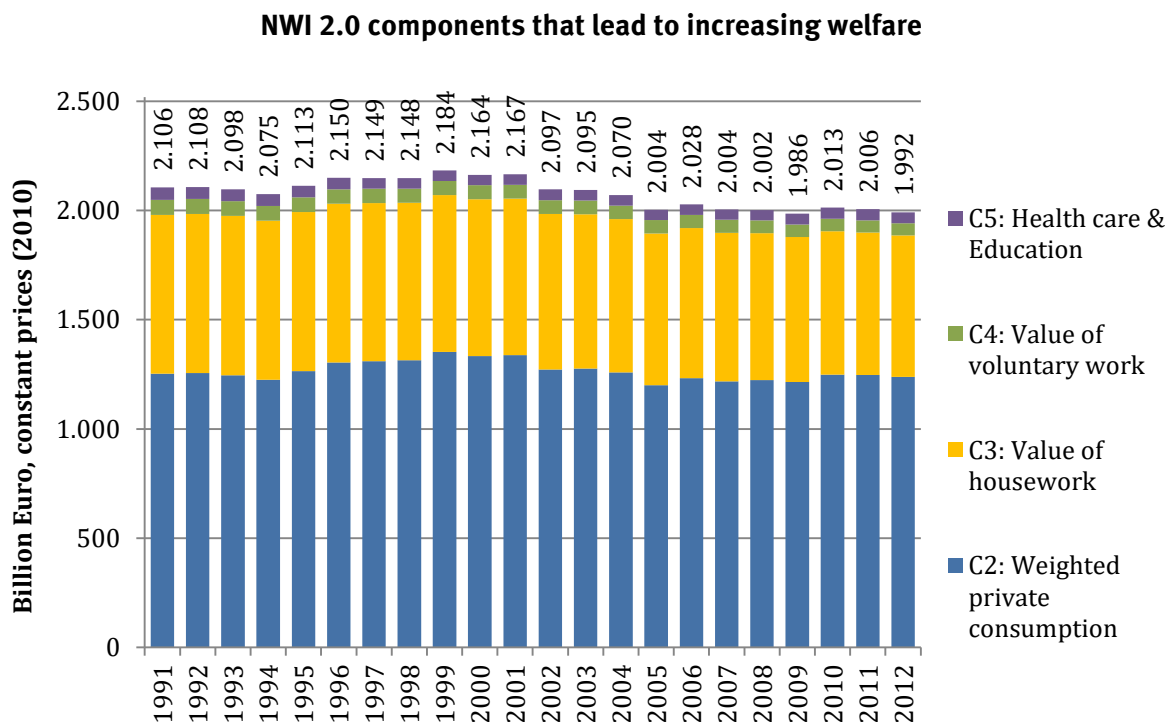
<sup>7</sup> Data for the nominal value of GDP in Germany are taken from the publication „Inlandsproduktberechnung – Detaillierte Jahresergebnisse – 2013“ (Fachserie 18, Reihe 1.4, Berechnungsstand 15.9.2014), Statistisches Bundesamt.

weighting factor for private consumption. In the time span analysed here, both components develop inconsistently: between 1991 and 2000, income distribution does not change much, but it gets considerably more unequal between 2000 and 2005. After small improvements until 2010, the Gini index approaches its maximum value in 2012 (0.288 to compare with 0.248 in 1991, see section 2.4.1). In the same time, price adjusted private consumption shows an overall increasing trend, but with fluctuations such as an interim decline between 2006 and 2009. As a combined result, weighted private consumption increases until 1999, declines considerably until 2005, and recovers slightly afterwards, with remarkable ups and downs.

The development of the welfare index, however, is not always dominated by the changes of weighted private consumption. In twelve years, the decrease of the monetary value of household labour accounts for more than 20 % – and up to 38 % – of the negative changes of the NWI. Within five of these years, the component is strengthening the total development of the NWI. During the remaining seven years, the decrease of the value of household labour is compensated by the positive development of other components. Environmental costs can have a decisive influence on the NWI, too. In eight years, decreases or increases of environmental damages or replacement costs account for more than 50 percent of the changes that determine the overall development of NWI; in another five years, they account for 10 % to 30 %.

### Development of the NWI 2.0 components that lead to increasing or decreasing welfare

The NWI contains components that are increasing, and others that are diminishing welfare. In the following sections these components are illustrated separately, and their development will be discussed.<sup>8</sup>

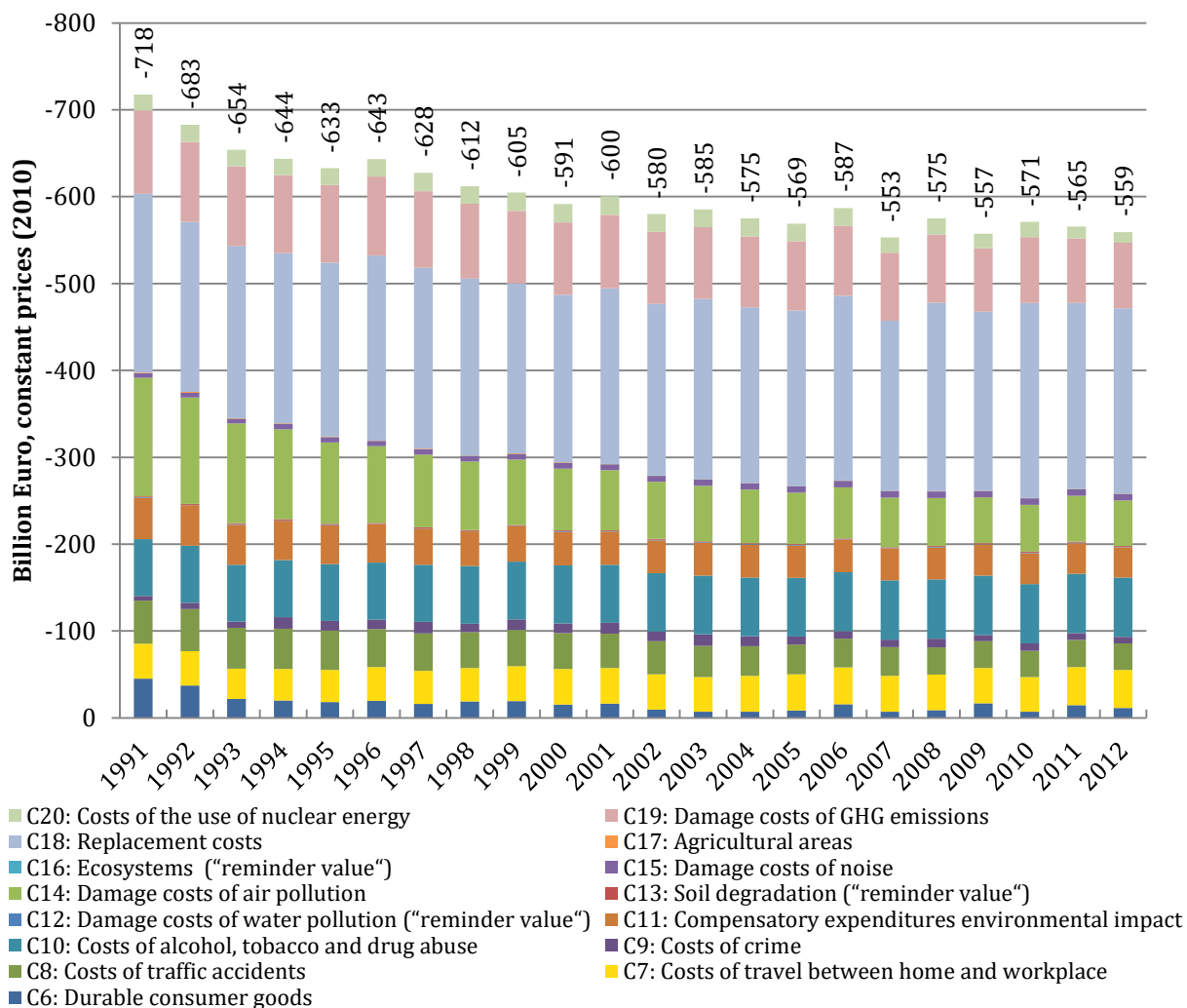


<sup>8</sup> It is important to remember that this data is on an ordinal scale, not on a cardinal one. As a consequence, a higher value is definitely better than a lower value; but one cannot say to *which extent* the higher value is better than the lower one. Only a cardinal scale would allow to say that a value that is twice as high as another one represents a level of welfare twice as high as the welfare connected to the lower value.

In the period of 1991 to 2012, four components had a welfare increasing impact on NWI. Together, they scored a maximum value of 2.184 billion Euro in the year 1999. Between 1994 and 1999, this total value is increasing. Thereafter, the total value of welfare increasing components is decreasing until the year 2009, where it comes to a minimum value of 1.986 billion Euro. Between the year 2009 and 2012, there is no clear trend. In 2012, the sum of the welfare increasing components is 1.992 billion Euro, around 5 % less than in 1991, the beginning of the analysed period.

Component no. 2, the weighted private consumption, has the largest share of about 60 % of the welfare increasing components, followed by component no. 3, value of housework, with about 30 %, component. No. 4, value of voluntary work, and component no. 5, public expenditure on health and education each account for about 3 %. Within the reporting period, there are no major shifts of the proportions of these components.

### NWI 2.0 components that lead to decreasing welfare



Between 1991 and 2012, a total of 15 components contributed to decreasing welfare. They reach their maximum of 718 billion Euro right in the beginning of the reporting period, i.e. in the year 1991. The minimum of 553 billion Euro was reached in 2007. Between 1991 and 2007, there is continuous trend of a diminishing influence of the welfare decreasing components, which declined by a total of 23 %. After 2007, there is no further clear trend. In 2012, the total value of these components is 559 billion Euro. Altogether, the decline since 1991 is 22 %, without further improvements since 2007.



In 2012, the biggest share of the welfare decreasing components fell upon component no. 18, the replacement costs due to the consumption of non-renewable energy resources; its share amounted to 38 %. This represents a considerable increase compared to 1991, when the share was only 29 %. The damage from CO<sub>2</sub> emissions, component no. 19, has the second largest share totalling 19 %. It remained rather constant during the whole reporting period. Third position has to be allotted to component no. 10, costs of alcohol, tobacco and drug abuse. Its share increased from 9 % in 1991 to 12 % in 2012. Position 4 is assigned to component no. 14, damage from air pollution, showing a substantial decrease from 19 % in 1991 to 9 % in 2012. Component no. 7, travelling between home and workplace, amounts to 8 % of the welfare decreasing components, whereas components no. 8, costs of traffic accidents, and component no. 11, compensatory social expenditures due to environmental impacts, are responsible each for 6 % of the total value of welfare decreasing components. The shares of the other components are lower than 5 %.

The development of the *relative* share of a single components does not have to coincide with the development of its value in billion Euro: Replacement costs for the consumption of non-renewable energy resources increased – in billion Euro – from 1991 to 2012 only by 4 %. Responsible for the larger increase of its *share* of the welfare decreasing components is the decline of the total value of these components. The damage from CO<sub>2</sub> emissions – in billion Euro – declined considerably, but its relative share stayed more or less the same. A detailed description of the development of every component can be found in chapter 2.4.

### **Public attention and response to the national and the regional welfare index**

On the whole, there are manifold responses to the publication of NWI and RWI, ranging from the media and the general public, including quotations in educational books, to discussions in some parts of politics and public administration. Experts for statistics took the concept of NWI up in their – in part very controversial – debate.<sup>9</sup> This process was documented in detail in the second NWI report from 2013. Since then, some research projects on alternatives to socio-economic reporting dealt with the NWI – this was a new development.<sup>10</sup>

The work and the final report of the Enquete Commission “Growth, Prosperity, Quality of life” of the German parliament<sup>11</sup> contributed considerably to the fact that a critical examination of the traditional growth model is increasingly accepted. For some time, the commission dealt with the NWI; even more, a comparative study commissioned by the Enquete Commission evaluated the NWI positively compared to other indicator-based reporting systems because it can be easily communicated.<sup>12</sup> However, the Enquete Commission decided to promote its own indicator system, which can be seen in some respects as a contradiction to its mandate that demanded to develop a welfare measure to complement GDP. The commission did not include the NWI, which could have been a potential module of

---

<sup>9</sup> For example in the German journal „Wirtschaftsdienst“, provoked by Diefenbacher, Hans/Zieschank, Roland (2010): „Der Nationale Wohlfahrtsindex und die Diskussion um eine Ergänzung des BIP“, in: Wirtschaftsdienst, 90. Jg., Heft 7, 451–454.

<sup>10</sup> See Seaford, Charles (2013): Report on results on action research – barriers to the use of alternative (‘beyond GDP’) indicators in policy making and how they are being overcome and can be overcome. BRAINPOOL deliverable 3.1, A collaborative project funded by the European Commission under the FP7 programme (Contract no. 283024). London: the new economics foundation, 15.11.2013.

<sup>11</sup> Enquête-Kommission „Wachstum, Wohlstand, Lebensqualität – Wege zu nachhaltigem Wirtschaften und gesellschaftlichem Fortschritt in der Sozialen Marktwirtschaft“ (Hrsg.) (2013): Schlussbericht. Deutscher Bundestag, Drucksache 17/13300. Berlin.

<sup>12</sup> Brode, Tatjana (2011): Anforderungen an einen ganzheitlichen Wohlstands- bzw. Fortschrittsindikator oder einen Indikatorenansatz im Hinblick auf seine mediale Kommunizierbarkeit (Kurzexpertise im Auftrag der Enquête-Kommission „Wachstum, Wohlstand, Lebensqualität“/Projektgruppe 2), Kommissionsmaterialie M-17(26)10. Berlin: Deutscher Bundestag, URL: <http://www.bundestag.de/bundestag/ausschuesse17/gremien/enquete/wachstum/gutachten/m17-26-10.pdf>

the indicator system. A number of reasons seems to be responsible for this decision: political considerations, the rejection of the NWI by some experts from large economic research institutes and statistical offices and even certain misunderstandings concerning the NWI methods of monetization and aggregation.<sup>13</sup> Against this background, there is some need to improve the calculation methods of some of the NWI components, to enhance the quality of data and to shorten the intervals of surveys.

In 2011, the variety of people dealing with the NWI and RWI widened, it extended beyond the circle of scientists. A request from the green party parliamentary group in the parliament of Schleswig-Holstein led to the development of a regional application of the NWI, the so-called regional welfare index for Schleswig-Holstein (RWI-SH). Other studies for German states followed and have been published – Bavaria, Saxonia, Thuringia, Hamburg and Rhineland-Palatinate. More calculations of the welfare index for German states will follow: a study on North Rhine-Westphalia will be published in January 2016, other German states show interest. An international comparison was completed as PhD-thesis in autumn 2015 and NWI-calculations for Belgium, Ireland and Finland are under way.

In an expertise of the year 2012, the German Advisory Council on the Environment has suggested to develop a robust and standardized method for an aggregated welfare index.<sup>14</sup> The national welfare index has been evaluated as a promising concept. It is remarkable that the Advisory Council adopted the terminology of a new comprehensive understanding of welfare, together with the thesis that welfare has to be discussed as a goal for the society instead of the traditional goal of economic growth.<sup>15</sup>

As a second consulting institution of the German federal republic, the Council for Sustainable Development dealt with the national welfare index as part of an expertise on the fifth indicator report of the federal statistical office.<sup>16</sup> It is noted that the NWI ties in with the international discussion on well-being and prosperity beyond growth. The Council recommends investigations into data that is still lacking but necessary for the calculation of the NWI, and suggest to link the NWI with the monitoring of sustainability indicators in Germany.<sup>17</sup>

## **V Developments in the surrounding of NWI**

### **New trends and risks**

Although the debate on a more sustainable orientation of production and consumption goes on now for decades, involving scientific discussions but also civil society<sup>18</sup> and parts of politics,<sup>19</sup> decisions in this fields that are taken on a high political level and in the economic field seem to develop in a rather traditional way. It seems like parallel worlds exist: there are still new political programs in all

---

<sup>13</sup> The NWI is not a composite indicator, which would combine different dimensions and indicators with different units of measurement.

<sup>14</sup> Sachverständigenrat für Umweltfragen (Hrsg.) (2012): Verantwortung in einer begrenzten Welt. Berlin: SRU, 68.

<sup>15</sup> See *ibid.*, *ibid.*, 76: „Was ist das Ziel von Wirtschaft? Ist es die Steigerung des verfügbaren Einkommens oder die eines neuen Maßes von Wohlfahrt?“

<sup>16</sup> Statistisches Bundesamt (2014): Indikatorenbericht 2014. URL:

<https://www.destatis.de/DE/ZahlenFakten/Indikatoren/Nachhaltigkeitsindikatoren/Nachhaltigkeitsindikatoren.html>

<sup>17</sup> Rat für Nachhaltige Entwicklung (2014): Mehr Nachhaltigkeitspolitik. Stellungnahme des Nachhaltigkeitsrates zum Bericht über Nachhaltigkeitsindikatoren 2014. Berlin. URL:

[http://www.nachhaltigkeitsrat.de/uploads/media/RNE\\_Stellungnahme\\_Mehr\\_Nachhaltigkeitspolitik\\_texte\\_Nr\\_46\\_Oktobe\\_r\\_2014\\_01.pdf](http://www.nachhaltigkeitsrat.de/uploads/media/RNE_Stellungnahme_Mehr_Nachhaltigkeitspolitik_texte_Nr_46_Oktobe_r_2014_01.pdf)

<sup>18</sup> For example, in 2014, the international conference on degrowth took place in Leipzig. Many contributions to the conference are available under URL: <http://www.degrowth.de/de/programm/> – the Literatur on GDP critique would require a separate review project; as an example, see Fioramonti, Lorenzo (2013)

<sup>19</sup> The final report of the enquête-commission from may 2013 contains important material.

parts of the world, whether Japan, China or the European Union of the Juncker-commission, for stimulation economic growth.

At the same it can be argued that alternative reporting systems beyond the traditional methods of national accounting are supported by an overriding trend. The awareness level is rising continuously, also because the positive effects of the former economic growth are declining. Even more: From a perspective of societal welfare, the risks of a strategy that is primarily focused on economic growth are increasing.

The trend is not linear and does not occur in every country at the same speed: the traditional basic assumptions of the economic system seem to get creepingly delegitimized. This affects the paradigm of economic growth and the expectations that are linked to it – in several respects:

1. Economic growth is changing historically: The lower growth rates are, the more the attempts to hold on to this concept transmute into ideology.
2. Already now, the expected positive effects for the economy and the society are obtained at a smaller and smaller degree.
3. If the externalized ecological costs of resource extraction and the environmental damages of production and consumption would be included into the reporting systems, the total effect of economic growth might get even negative, because natural capital is eroding. The barrier is reached where growth turn into illusionary wealth.
4. Programs to promote or push economic growth are in danger to allocate state finance in a non-optimal way, if qualitative aspects aren't given an increasing importance – for example, supporting structures of a „green“ economy, or investments into education or public infrastructure.
5. Given the economic and social risks, especially those related to the financial sector, it is a fragile task to increase societal welfare. Given the fact that in some regions or even for the planet as such<sup>20</sup> some ecological boundaries are already overrun, it is nearly inevitable to promote a different understanding of economic development and its measurement „beyond GDP“.

### **The enlargement of the discussion: varieties of capital and indicators**

On this background it can be stated that the international discussion intensified: on a different concept on economic development, on the relationship between welfare and growth and on the integration of the ecological and social dimension.

In the meantime, there is variety of initiatives to measure natural capital and ecosystem services. Regarding the development of scientific concepts, the progress was at a tearing pace: the suggestions to describe and measure the functions of ecosystems and their services have reached a new level; the suggestions are at the same time detailed and complex. For example, for some years now the World Bank is coping with an enlarged notion of welfare including natural and social capital, and the Bank is supporting the international initiative „Wealth Accounting and Evaluation of Ecosystem Services“.<sup>21</sup> Starting from the system of economic and ecological accounting (SEEA), the United Nations enlarged this concept with an experimental approach under the technical name „System of Environ-

---

<sup>20</sup> Steffen, Will/Richardson, Katherine/Rockström, Johan/Cornell, Sarah. E. et al. (2015): Planetary boundaries: Guiding human development on a changing planet, in: Science Vol. 347 no. 6223 DOI: 10.1126/science.1259855; URL: <http://www.sciencemag.org/content/347/6223/1259855.full> ; vgl. auch Global Footprint Network (Hrsg.) (2015): Footprint der Welt: URL: [http://www.footprintnetwork.org/de/index.php/GFN/page/world\\_footprint/](http://www.footprintnetwork.org/de/index.php/GFN/page/world_footprint/)

<sup>21</sup> For more information, see URL: <https://www.wavespartnership.org/>

mental Economic Accounting – Experimental Ecosystem Accounts“ (SEEA-EA).<sup>22</sup> There are other efforts in the international field aiming at the same direction, like the OECD that plans to support the idea of its „Better-Life-Index“ by including different categories of natural capital, at least for some countries. On the basis of the TEEB-approach there are first reports for Germany, like the one on the relation of natural capital and climate policy<sup>23</sup> – for 2016, more reports are to come.

## Indicator systems

By now, there is quite a large number of alternative concepts of growth and welfare, not only from Europe, but also from Asia, North- and Latin America and Africa. There seems to be no complete documentation, but some collections of material with short characterisations of the approaches;<sup>24</sup> they differ according to the cognitive interests of the authors. In 2014 and under the general principle of the Austrian initiative „change of growth“, Hutterer and Hinterberger published a comprehensive documentation of concepts of sustainable growth and sustainable societies.<sup>25</sup> The compilation contains – on the one hand – concepts aiming at economic growth without negative external effects for the ecology, like the „Green New Deal“, or a „Blue Economy“ focusing on procedures and solutions deduced from nature, or the „Factor X“-concepts pursuing an absolute reduction of the use of resources. On the other hand, new alternatives of economic and social development are discussed, ranking from Steady-State-Economy to concepts of de-growth and post-growth.

In October 2014, the European Commission – DG Employment, Social Affairs and Inclusion – invited for an international conference under the headline „Moving beyond GDP in the European Economic Governance“. The conference took inventory of social, institutional and environmental measurement systems focusing well-being, and – in the second part of the conference – dealt with the question whether the „beyond GDP“-agenda can be helpful for improving political processes and decisions.

A well-grounded answer to this question might be possible only in the course of political analysis yet to come. But at least it can be said, that in Germany the empirical results of the NWI had some sort of pioneering function regarding the context of the discussion on welfare indicators

## VI First considerations concerning future improvements of the NWI methodology

### Alternatives to the Gini Index

A very important component of the NWI is the factor used for the representation of income distribution to weight private consumption. In the current NWI methodology, the Gini Index of net equivalent income of households is used.<sup>26</sup> The basis is the yearly income, the time series is harmonized with the

---

<sup>22</sup> United Nations (Hrsg.) (2014): The System of Environmental-Economic Accounting – Experimental Ecosystem Accounting. Briefing Note; URL: [http://unstats.un.org/unsd/envaccounting/workshops/int\\_seminar/note.pdf](http://unstats.un.org/unsd/envaccounting/workshops/int_seminar/note.pdf)

<sup>23</sup> Hartje, Volkmar/Wüstemann, Henry/Bonn, Aletta (Hrsg.) (2015): Naturkapital und Klimapolitik – Synergien und Konflikte (TEEB Deutschland). Berlin/Leipzig: Technische Universität Berlin/Helmholtz-Zentrum für Umweltforschung.

<sup>24</sup> Pennekamp, Johannes (2011): Wohlstand ohne Wachstum. Ein Literaturüberblick, in: MPIfG Working Paper 11/1. Max-Planck-Institut für Gesellschaftsforschung. Köln; sowie Meyer, Bernd/Ahlert, Gert/Diefenbacher, Hans/Zieschank, Roland/Nutzinger, Hans (2012): Synopse aktuell diskutierter Wohlfahrtsansätze und grüner Wachstumskonzepte. Eckpunkte eines ökologisch tragfähigen Wohlfahrtskonzeptes. Studie III im Rahmen des Projektes „Eckpunkte eines ökologisch tragfähigen Wohlfahrtskonzeptes als Grundlage für umweltpolitische Innovations- und Transformationsprozesse“ für das Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU), FFU-Report 03-2012, Forschungszentrum für Umweltpolitik, FU Berlin.

<sup>25</sup> Hutterer, Peter/Hinterberger, Franz (2014): International Stakeholder Dialogue – Growth in Transition. Sustainable Economic and Social Concepts. Background Paper, ESDN-Workshop 2014, Wien: SERI.

<sup>26</sup> For computation methods, see Deckl, Silvia (2010): „Leben in Europa 2007 und 2008 – Bundesergebnisse für Sozialindikatoren über Einkommen, Armut und Lebensbedingungen“, in: Wirtschaft und Statistik, Heft 1/2010, 74 – 84.

base year 2000 = 100.<sup>27</sup> But the Gini-Index distributional measure that could be applied; the statistical theory offers quite a number of methods that could be used to represent inequalities of distributions. Within this study the question was pursued whether another distributional measure should be preferred to the Gini index.

To summarize this discussion it can be said that for the time being the Gini index should be kept to represent income distribution in the NWI.

- Distributional measures that concentrate more on the extreme segments – very poor and very rich – do not catch changes of the distribution affecting the middle segments – in other words: changes in the second, third and fourth quintile. For the income distribution in general, they are not likewise representative as the Gini Index.
- A similar critique applies to distributional measures concentrating on the segment of the poor. They might accentuate the necessity for political action a bit better, but they do not give an adequate picture of the distribution altogether.
- It would be very desirable to use an index that would represent the observed justice of distribution. But it is not possible to design such an index on the basis of the data available.

### **Further development of component no. 3, value of housework**

Component no. 3, the value of housework, is the second most important component of the NWI, after the weighted private consumption. Its total value is around 600 billion Euro. In order to be able to calculate the value of the component, data for the time use is necessary, more precisely: the time used privately for housework by the inhabitants of Germany. From official statistics, data is available from time use surveys, but only for two years: 1991/92 and 2001/02.<sup>28</sup>

To improve data availability, for the report published here it was analyzed whether there are other sources of data that could be used to evaluate time use for housework in Germany. Most promising seemed to be the questions to detect time use in the socio-economic panel (SOEP) of the DIW Berlin.<sup>29</sup> Whether and how these data could be used to improve the data base of component no. 3, value of housework, was part of the study published here.

However, after evaluating and comparing the two different data sources it became clear that it is not reasonable to use both data sources at the same time; their results are too different. Therefore, the use of SOEP data for this component was excluded also for further developments of the NWI.

Another possibility to use both data sources is to take one data source as basis and estimate the development of the time series by using the second data source – after relating it to the basis. The data of the official statistics is much more detailed; therefore it will be continued to use it as data base for the component no. 3, value of housework. The data from the SOEP then would be used to estimate the further development of the time series from the official statistics for the time interval where there is no data from this source. This procedure could attenuate the problem that the official data survey is carried out only every ten years. A precondition would be that the change of the time use indicated by official statistics and by SOEP at least go in the same direction. The fact that until now there are only two surveys from the official statistics does not allow a reliable answer to that question; at least

---

<sup>27</sup> See the description to component no. 1; the base year was chosen roughly in the middle of the time series, the same year was chosen also by the Federal Statistical office.

<sup>28</sup> Shortly before this report here was completed, first results of the time use survey 2012/13 have been published; it was too late to be included here, unlike the results for components no. 3 and 4. The analysis of the new time use survey for housework will be incorporated into the next NWI update.

<sup>29</sup> For more information concerning SOEP, see Wagner (2007).

another official survey is needed to substantiate the cautious estimation that the procedure indicated here can be used.

## **VII Conclusion and outlook**

The time series of GDP and NWI differ considerably. This reinforced the doubts that GDP could be used as an appropriate measure of societal welfare, what makes it even more urgent to find and establish an alternative welfare measure. In order that the NWI can continue to play an important role in this process, it has to be updated regularly, and it has to win more recognition as an instrument for information and communication in the broader public and in parts of the political sphere and the economy.

Especially on the background of an increasing attention it seems to be important to further develop the concept of the NWI and to analyze better the possibilities and the limits of its informational value, particularly compared to the GDP. Further improvements of the NWI are possible on different levels:

- improvements of the availability and quality of the data needed for some of the components of the NWI, that even could change the calculation methods;
- inclusion of additional sources of data to improve the informational value of some of the components; for example, time use data of the socio economic panel concerning housework and voluntary work shall be examined;
- Methodological improvements of some of the components; ecological components like damage from water pollution and soil degradation might possibly be treated in cooperation with the Federal Agency for Nature Conservation or the State Initiative Core Indicators of Ecological and Economic Accounting. Special attention shall be given to the improvement of the component-compensatory social expenditures due to environmental impacts;
- finally, new components could be considered that might be integrated into the NWI because they are important in their influence on societal welfare: costs of involuntary unemployment or additional health costs, for example for the treatment of work-related illnesses. Furthermore the question of debt could be discussed, particularly foreign debt and budget deficits, because debt has implications for the understanding of material wealth and welfare. Another topic would be the significance of import-export-relations. An „extended NWI“ might open the concept for external effects abroad.

If the NWI would be maintained in the years to come, especially updated on the actual level of statistical developments, there is a chance to consolidate its influence within the discussion on alternative welfare measures. A reasonable aim would be – while methodologically improving some of the components – to integrate the NWI into the progress reports of the national strategy for sustainable development, maybe as a complementary index to GDP. The study presented here can be seen as one step on this way.

In September 2015, the global community decided to adopt the sustainable development goals – for the first time, and after an intensive process of discussion. If the 17 goals and the 169 sub-goals shall be realized, big efforts are necessary to develop indicators and collect and use the necessary data. There will be new chances for the NWI in this context.

## NWI 2.0 component overview (1991-2012)

+/-	x	+	+	+	+	+	-	-	-	-	-
Jahr	Index of income distribution	Weighted private consumption	Value of housework	Value of voluntary work	Public expenditure on health care and education	Costs and benefits of durable consumer goods	Costs of travel between home and workplace	Costs of traffic accidents	Costs of crime	Costs of alcohol, tobacco and drug abuse	Compensatory expenditures due to environmental impact
	Kom 1	Kom 2	Kom 3	Kom 4	Kom 5	Kom 6	Kom 7	Kom 8	Kom 9	Kom 10	Kom 11
1991	97,4	1.253	728	68	58	-45	40	50	5	66	47
1992	99,0	1.256	729	68	55	-37	39	48	7	66	47
1993	99,4	1.246	730	68	54	-22	35	47	7	66	46
1994	102,1	1.225	729	67	54	-20	36	46	14	66	45
1995	100,2	1.265	728	67	53	-18	37	45	11	66	45
1996	98,2	1.305	727	66	52	-20	39	44	11	66	44
1997	97,8	1.310	724	66	48	-16	38	43	13	66	41
1998	98,2	1.314	721	65	48	-19	38	41	10	66	40
1999	97,4	1.352	719	65	48	-19	40	42	12	66	40
2000	100,0	1.334	717	64	48	-15	41	42	11	67	39
2001	101,1	1.338	716	64	48	-17	41	39	13	67	38
2002	105,3	1.272	712	63	50	-10	41	38	11	67	38
2003	105,6	1.276	707	63	49	-7	40	36	13	67	38
2004	107,5	1.259	701	62	48	-7	41	34	11	68	38
2005	113,3	1.201	695	61	48	-9	42	34	9	68	37
2006	111,9	1.232	688	60	48	-16	42	33	9	68	37
2007	112,3	1.218	680	59	47	-7	41	33	8	68	37
2008	111,2	1.224	673	58	47	-9	41	31	10	68	37
2009	111,3	1.214	665	57	50	-17	41	31	7	68	36
2010	110,0	1.248	658	56	51	-7	40	30	8	68	36
2011	112,4	1.247	652	56	52	-15	44	31	8	68	35
2012	113,2	1.239	647	55	51	-11	44	31	7	68	35

+/-	-	-	-	-	+	+	-	-	-	=	2000=100
Jahr	Damage costs of water pollution ("reminder value")	Damage costs of soil degradation ("reminder value")	Damage costs of air pollution	Damage costs of noise	Net value of ecosystems (biotope area) ("reminder value")	Net value of loss/increase of agricultural areas	Replacement costs of non-renewable energy resources	Damage costs of GHG emissions	Costs of the use of nuclear energy	Gesamt	Gesamt
	Kom 12	Kom 13	Kom 14	Kom 15	Kom 16	Kom 17	Kom 18	Kom 19	Kom 20	NWI	NWI norm.
1991	1	1	137	5	0	-1	206	96	18	1388	88,3
1992	1	1	122	5	0	-1	196	92	20	1425	90,6
1993	1	1	115	5	0	-1	198	91	19	1444	91,8
1994	1	1	104	6	0	-1	196	90	19	1431	91,0
1995	1	1	94	6	0	-1	200	89	19	1480	94,2
1996	1	1	88	6	0	-1	213	91	20	1507	95,8
1997	1	1	83	6	0	-1	208	88	21	1521	96,8
1998	1	1	79	6	0	-1	204	86	20	1536	97,7
1999	1	1	75	7	0	-1	196	83	21	1579	100,4
2000	1	1	71	7	0	-1	193	83	21	1572	100,0
2001	1	1	69	7	0	0	202	84	21	1566	99,6
2002	1	1	66	7	0	0	198	83	20	1517	96,5
2003	1	1	64	7	0	0	208	83	21	1510	96,0
2004	1	1	62	7	0	0	202	82	21	1496	95,1
2005	1	1	59	7	0	0	202	80	20	1435	91,3
2006	1	1	59	7	0	0	213	80	21	1441	91,6
2007	1	1	57	8	0	0	196	78	17	1452	92,3
2008	1	1	55	8	0	0	217	78	18	1427	90,7
2009	1	1	53	7	0	0	206	73	17	1429	90,9
2010	1	1	54	8	0	0	225	76	17	1442	91,7
2011	1	1	53	8	0	0	214	74	13	1440	91,6
2012	1	1	52	8	0	0	213	75	12	1433	91,1