



Federal Ministry  
for Economic Affairs  
and Energy



---

# National Health Account for Germany

---

*Summary of the research project of the Federal Ministry for  
Economic Affairs and Energy*

*April 2015*

## Imprint

### Publisher

The Federal Ministry for Economic Affairs and Energy (BMWi)  
Public Relations  
D-11019 Berlin, Germany  
www.bmwi.de

### Authors of the report

BASYS Beratungsgesellschaft für angewandte  
Systemforschung mbH, Reisingerstraße 25, D-86159 Augsburg  
Markus Schneider (project leader)  
Thomas Krauss  
Uwe Hofmann  
Aynur Köse

WifOR, Rheinstraße 22, D-64283 Darmstadt  
Dennis A. Ostwald  
Afschin Gandjour  
Jan Gerlach  
Sarah Hofmann  
Benedikt Karmann  
Benno Legler  
Marion Cornelia Schwärzler

Gesundheitsökonomisches Zentrum der TU Dresden (GÖZ),  
Helmholtzstraße 10, D-01069 Dresden  
Alexander Karmann  
Cornelius Plaul

TU Berlin, Steinplatz 2, D-10623 Berlin  
Klaus-Dirk Henke  
Sabine Troppens

IEGUS – Institut für Europäische Gesundheits- und  
Sozialwirtschaft GmbH, Reinhardtstraße 31, D-10117 Berlin  
Grit Braeseke  
Tobias Richter

### Design and production

PRpetuum GmbH, Munich

### Status

April 2015

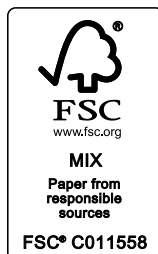
### Print

Bonifatius GmbH, Paderborn

This brochure is published as part of the public relations work of the Federal Ministry for Economic Affairs and Energy. It is distributed free of charge and is not intended for sale. The distribution of this brochure at campaign events or at information stands run by political parties is prohibited, and political party-related information or advertising shall not be inserted in, printed on, or affixed to this publication.



The Federal Ministry for Economic Affairs and Energy was awarded the audit berufundfamilie® for its family-friendly staff policy. The certificate is conferred by the berufundfamilie gGmbH, an initiative of the non-profit Hertie Foundation.



This publication as well as further publications can be obtained from:

Federal Ministry for Economic Affairs and Energy (BMWi)  
Public Relations  
E-Mail: publikationen@bundesregierung.de  
www.bmwi.de

**Central procurement service:**

Tel.: +49 30 182722721  
Fax: +49 30 18102722721



Federal Ministry  
for Economic Affairs  
and Energy



---

# National Health Account for Germany

---

*Summary of the research project of the Federal Ministry for  
Economic Affairs and Energy*

*April 2015*

# Table of contents

1. Background and aim of the study .....	4
2. The health economy as a driver of growth and employment in the German economy .....	7
2.1 Key figures of the health economy .....	7
2.2 Data and facts of the industrial health economy .....	9
2.3 Financing agencies and distribution of income .....	13
3. Potential use of NHA .....	16
3.1 Economic footprint of the health economy .....	16
3.2 Financial support from the complementary health care market .....	18
3.3 Foreign trade impulses of the health economy on financing agencies .....	20
3.4 Innovations and efficiency .....	20
3.5 Stagnant growth of health capital .....	21
4. Contribution of voluntary work and households to the health economy .....	24
5. Intersections of the NHA with other satellite accounts .....	26
5.1 Intersections with German SHA .....	26
5.2 Intersections of the NHA with other satellite accounts .....	27
6. Excursus: Impact of health economy on outcome, economic growth and prosperity .....	28
7. Conclusions and outlook of the research report .....	30
8. Appendix of Tables .....	31
9. Literature and selected references .....	33

## List of figures

Figure 1: Health economic accounting approach of the extended NHA .....	4
Figure 2: Gross value added of health economy, at current prices, 2000–2014 .....	7
Figure 3: Growth of gross value added by sector, in volume terms, 2000–2014 .....	8
Figure 4: Employment in the health economy, 2000–2014 .....	9
Figure 5: Classification of value added in the health economy in goods, trade, and services, 2014 .....	10
Figure 6: Gross value added of industrial health activities of the core health economy, in bn EUR, and the share of industrial and trade activities on the core health economy, at current prices, 2000–2014 .....	11
Figure 7: Development of gross value added in the industrial health economy, health-related services, and the total CHE, at current prices, 2001–2014 .....	11
Figure 8: Export- and foreign trade surpluses of the industrial health economy, at current prices, 2000–2014 .....	12
Figure 9: Social accounting matrix as extension of input-output-table .....	13
Figure 10: Change in final consumption expenditure according to the four quadrant market model, 2008–2014 .....	15
Figure 11: Effects of gross value added and employment of the industrial and service-oriented health economy, 2010 .....	16
Figure 12: Net lending/net borrowing of the social insurance in the core area of the health economy (in bn Euro), 2002–2013 .....	17
Figure 13: Multipliers of the social insurance matrix .....	19
Figure 14: Development of multifactor productivity, 2000–2012 .....	21
Figure 15: Health capital pyramid of the population and the labour force in Germany in thousands of years by age-group, 2002 and 2012 .....	22
Figure 16: Growth of final consumption expenditures within CHE by disease and services, 2002–2012 .....	23
Figure 17: Correspondence between health expenditure by SHA and final consumption expenditure of health commodities by NHA in Euro bn, 2010 .....	26
Figure 18: Intersections of the satellite accounts .....	27
Figure 19: Course of functional capacity by age .....	28

# List of abbreviations

AAL	Ambient Assisted Living
BASYS	Beratungsgesellschaft für angewandte Systemforschung mbH Applied Systems Research Consulting Corporation Ltd.
BMFSFJ	Federal Ministry of Family, Senior Citizens, Women and Youth
BMWi	Federal Ministry for Economic Affairs and Energy
CEM	Compensation of employees
CGT	Core health economy – Goods and Trade
CHE	Core health economy
CHS	Core health economy – Services
COI	Cost of Illness
COR	Corporations
EGT	Extended health economy – Goods and Trade
EHE	Extended health economy
EHS	Extended health economy – Services
ESA	European System of Accounts
Eurostat	Statistical Office of the European Union
FTE	Full-time equivalents
GDP	Gross domestic product
GNP	Gross national product
GÖZ	Gesundheitsökonomisches Zentrum der TU Dresden Health Economics Centre of TU Dresden
GT	Goods and Trade
GVA	Gross value added
HH	Households
HLA	Health Labour Accounts
HSA	Health Satellite Account
ICD	International Classification of Diseases
IEGUS	Institut für Europäische Gesundheits- und Sozialwirtschaft GmbH
IOT	Input-Output-Table
JHE	Journal of Health Economics
LTC	Long-term care
NACE	Nomenclature statistique des Activités économiques dans la Communauté Européenne
NES	Non-health economy – Services
NGT	Non-health economy – Goods and Trade
NHA	National Health Account
NHE	Non-health economy
NHS	National Health Service
NOS	Net operating surplus
OECD	Organisation for Economic Co-operation and Development
PHI	Private health insurance
ROW	Rest of World
S	Services
SAM	Social accounting matrix
SHA	System of Health Accounts
SHI	Social health insurance
SI	Social insurance
SLTCI	Statutory long-term care insurance
SNA	System of National Accounts
SSA	Sport Satellite Account
SUT	Supply-Use-Table
TSA	Tourism Satellite Account
TU	Technical University
UK	United Kingdom
US	United States
WHO	World Health Organisation
WZ	Classification of economic activities (Klassifikation der Wirtschaftszweige)

# 1. Background and aim of the study

Within the scope of this research project commissioned by the Federal Ministry for Economic Affairs and Energy<sup>1</sup>, the health industries in Germany are identified as an economic sector with its contribution to value added and labour force, as well as to foreign trade. By linking together all previously created compilations for the German health economy, commissioned by the Federal Ministry for Economic Affairs<sup>2</sup> a comprehensive tool of National Health Accounts (NHA) has been developed which is increasingly used to answer health and economic policy issues. Furthermore, data structures of NHA now use the new classification of economic activities (NACE Rev. 2) and are adjusted to the updated compilation methods of the System of National Accounts (SNA).<sup>3</sup>

These adjustments of the existing accounting system include the following elements and methodological steps:

- Present the health economy in real terms,
- Add the construction services in health industries and e-health,
- Take on capital formation within the revision of the basic accounting tables to allow the analysis of investment behaviour of health care producers,
- Compile the Input-Output Table (IOT) based on the supply and use tables,

**Figure 1: Health economic accounting approach of the extended NHA**



Source: Own Illustration.

- 1 Development of a Health Satellite Account (HSA) “Erstellung eines Gesundheitssatellitenkontos (GSK)” (Roland Berger, TU Berlin, BASYS 2009), Innovation impacts of the health economy “Innovationsimpulse der Gesundheitswirtschaft” (Henke, Troppens, Braeseke, Dreher, Merda 2011), The use and further development of the German Health Satellite Account to form a National Health Account (NHA) “Weiterentwicklung zu einer Gesundheitswirtschaftlichen Gesamtrechnung (GGR)” (WifOR, TU Berlin, Roland Berger Strategy Consultants 2013), Measurement of the productivity growth of the health economy “Messung der Produktivitätsentwicklung in der Gesundheitswirtschaft” (Schneider, Karmann, Braeseke 2013).
- 2 Hereafter we always use the abbreviation “Ministry of Economy”.
- 3 Not only the format of the supply and use tables and the input-output tables of the Federal Statistical Office, but also the production statistics and tables of industries of the System of National Accounts (SNA) have been changed with the implementation of the WZ 2008 (NACE Rev 2.0). New forms of production and emerging industries such as information and communication were considered within the revision, and as a result the classification was expanded.

- Use the SUT-RAS algorithm<sup>4</sup> as an innovative method for forward and backward compilation of basic parameters of the National Accounts,
- Integrate and update the cost of illness accounts (COI),
- Develop a health capital account, and
- Extend the input-output systems of the health economy to a social accounting matrix (SAM) by including distribution and redistribution transactions.

It has been announced that further comprehensive modifications of the compilation of the input-output tables according to the European System of Accounts – ESA 2010 will be available by mid-2015.<sup>5</sup>

For the first time, as part of this research project, the focus was on building a fully integrated NHA, linking both the existing healthcare accounts and economic accounts, as well as updating the structures based on recent methodological developments. The NHA (see Figure 1) fully incorporates the existing health economic accounting approach of the Federal Statistical Office, while including the health expenditure accounts, the health labour accounts, and the cost-of illness accounts, into the System of National Accounts (SNA).

The Manuals of the European System of National Accounts (see also European Commission et al. 2009) and of the System of Health Accounts (SHA) (see OECD, Eurostat, WHO 2011) guide the methodological integration of the flows of the health economy into the NHA, combining on the one hand health care and financial flows, and on the other hand modelling health care developments in the framework of the social accounting matrix, input-output accounts, and health capital accounts. The great advantage of this integrated system as a whole, is the consistency of the different viewpoints on the health system, and their links to each other.

This does imply that almost every gear-wheel of the health system can be moved to investigate impacts on sub-divi-

sions, and also, that a broad range of policy questions can be analysed. This report is focusing on the following research questions:

- What is the economic footprint of the German health economy?
- To what extent does the health economy influence the distribution of wages and surpluses of companies, as well as the transfer of income?
- Does the complementary health commodity market reduce the burden of public health care financing?
- What is the foreign trade impact of the health economy on the income of financing agents?
- Which innovations and efficiency gains in the health economy can be identified?
- How is health capital growing?
- What benefits does the health economy provide for the society?
- To what extent does voluntary work reduce shortages of health care professions?

This research project is merging data and methods from various areas. As a result a new database has emerged, which comprehensively represents the structure and numerous interrelations within the health economy among the population, providers, insurers, and the general government. In addition to descriptive statistics, the accounts offer a base for economic impact analysis of the health economy as a whole, as well as for investigating economic policy issues of single programmes.

The health economy in Germany – especially the core health economy – is subject to regulation to a higher extent than other industries. Moreover, in order to cap public health expenditures, the health economy is subject to increasing economic constraints. But, medical-technical

4 Supply-Use-Table-RAS for the consistent updating of the supply and use tables (see *Temurshoev, Timmer 2010*).

5 Latest status of national accounts data of the Federal Statistical Office is May 2014 (see *Statistisches Bundesamt 2014b* and *Statistisches Bundesamt 2014c*). In some cases, more recent publications were used and the figures were updated accordingly.

progress and the improvement of quality of care steadily drive the health economy. The study is also approaching this dimension by analysing the impact of the health economy on outcomes and prosperity. Every decision in the health economy will affect people and their future. Medicines, medical research, and health industries aim to save lives, and the methods for doing this have always been the subject of medical ethical debate. Thus, ethical aspects as well as economic information, should be included in the decision-making process. While the NHA, in a health economic accounting approach, focuses largely on economic aspects of the health economy, it also takes into account the impact on outcomes and the stock of population health.

The communication strategy, which is part of this project, has been separately drawn up in a brochure.



## 2. The health economy as a driver of growth and employment in the German economy

### 2.1 Key figures of the health economy

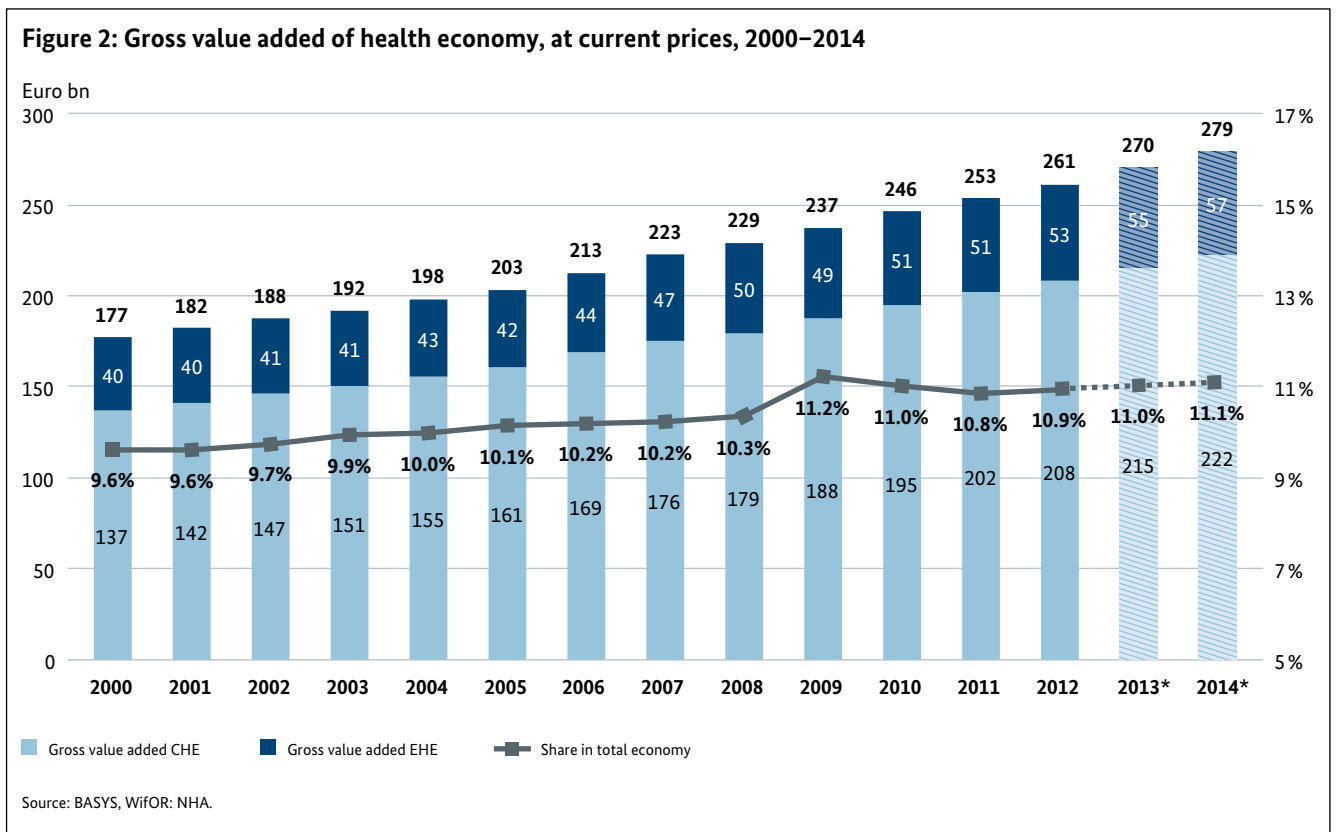
For the period 2000–2014, this project presents important key figures for the German health economy<sup>6</sup>. These include:

- Gross value added at current prices,
- Growth rates of gross value added in real terms,
- Labour force, and
- Exports and foreign trade surplus.

#### Gross value added of the health economy increased to €279 bn in 2014

In 2014, almost every ninth euro of the total economic gross value added (GVA) in the health care industry, as well as a share of the total economic GVA of 11.1 percent, is generated with an absolute gross value of €79 bn.

Since 2000, the GVA of the total health economy of €177 bn has increased by about €102 bn to €279 bn or 57.6 percent. Consequently the share of gross value added of the health economy in the total economy has increased from 9.6 percent to 11.1 percent since 2000. This implies that almost one out of nine euros of gross value added was produced in the health economy.



<sup>6</sup> The figures of the years 2000 to 2007 and 2011 to 2012 are compiled backward and forward on the basis of SNA of the German Federal Statistical Office. The years 2013 and 2014 are based totally or partly (2013) on projected figures.

### The health economy as stabiliser in times of crisis

For the year 2014, the health economy recorded a positive real growth of gross value added of about 0.9 percent throughout the whole observation period. Even in the years of cost containment (2004) and during the economic and financial crisis (2008–2009), the GVA of the health economy increased in real terms, while in both the economy as a whole, and especially in the manufacturing sector of the economy, GVA growth declined significantly in 2009.

Since 2000, the health economy has proven to be a growth driver and has exceeded the growth rate of the economy as a whole in most years. Exceptions are the year of cost containment in 2004, as well as the post-crisis years in 2010 and 2011. Particularly in the year 2009, these figures emphasise the stabilising impact of the health economy, whose positive growth rates are able to mitigate the economic recession (see Hesse 2013).

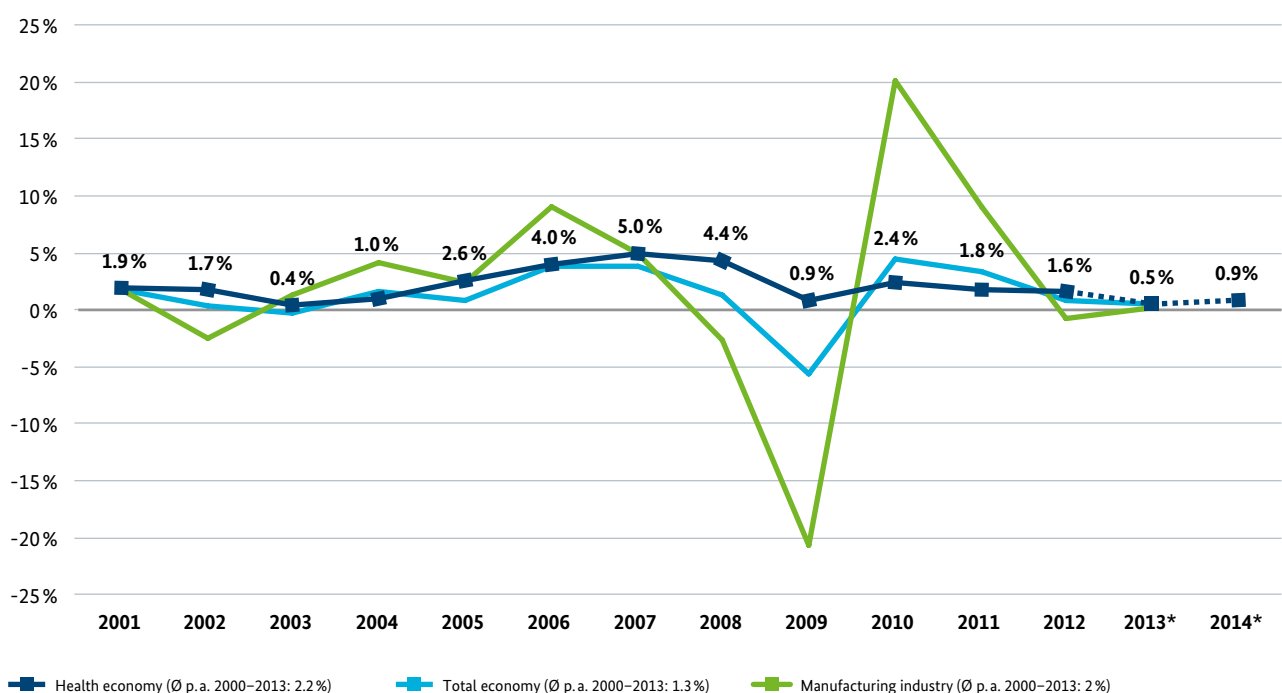
### The health economy is an employer for more than 6 million people

In 2014, around 6.2 million people were working in the health economy. With an increase of 4.9 to 6.2 million working people, the health economy provided approximately 1.3 million more jobs than in the year 2000. The share of the workforce in the health economy as a share of the German working population rose from 12.3 percent in 2000 to 14.8 percent in 2014. As a result, in 2014, about one in seven of the working population in Germany worked in the health economy.

It is remarkable that during and also after the economic and financial crisis, the number of jobs in the health economy has grown continuously. A significant factor here is the growth of long-term care.

The health economy thus proves to be an above-average motor of employment growth. The health economy has always had a higher growth rate than the German labour market as a whole, or the labour market in manufacturing industry. In addition, the average annual growth rate of the

Figure 3: Growth of gross value added by sector, in volume terms, 2000–2014



Source: BASYS, WifOR: NHA.

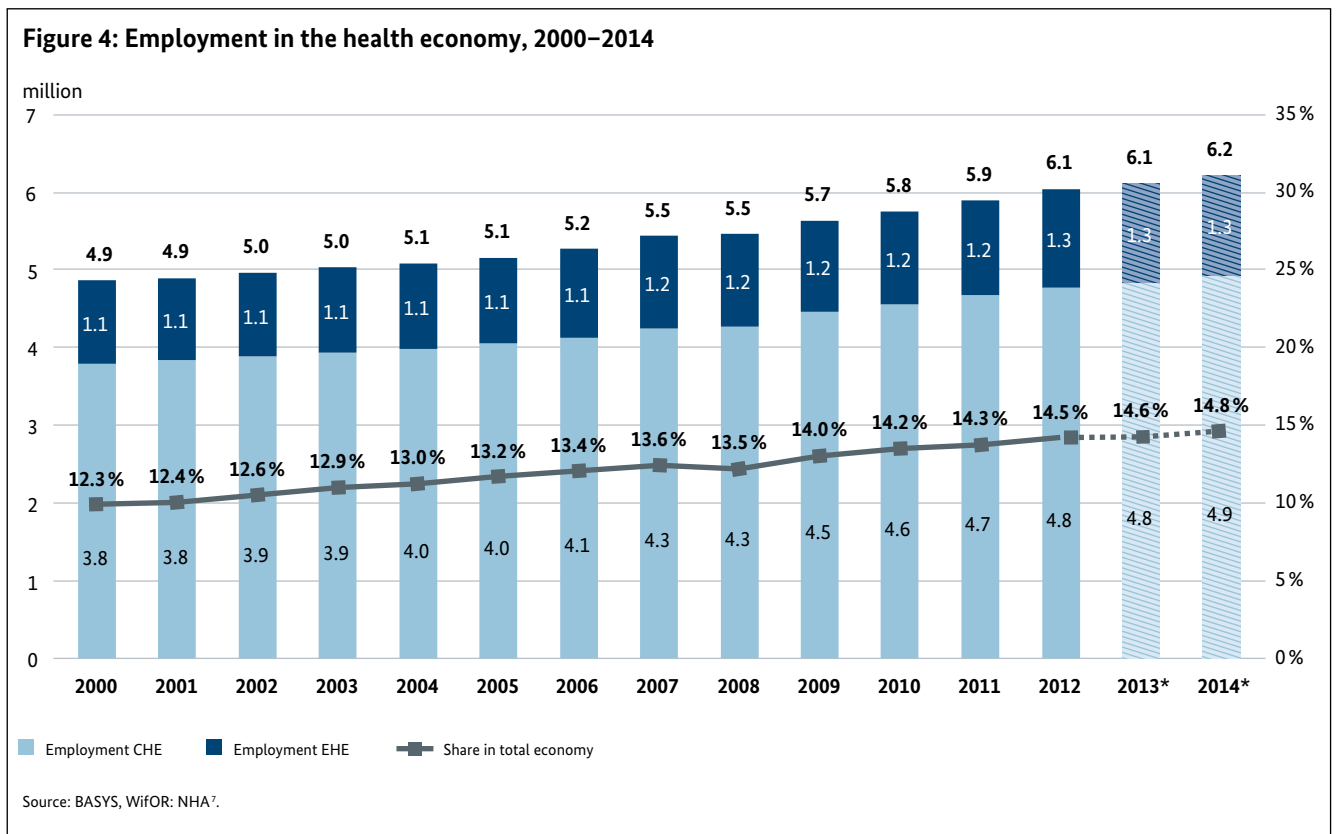
labour force in the health economy, at 1.8 percent, compared to the total economy at around 0.5 percent, underlines the importance of the health economy as an employment driver. Particularly in the 2009 crisis, the health economy was able to compensate for the decline in hiring in the economy as a whole. These employment figures furthermore show the stabilising impact and importance of the health economy as an engine of employment for the German labour market.

The development of productivity growth is key for employment and economic growth. However, at the same time it can be assumed that productivity gains vary in different segments of the health economy. In the following section these differences are explained, differentiating between industrial goods and trade on one hand, and health services on the other.

## 2.2 Data and facts of the industrial health economy

The definition of the production boundaries of the industrial part of the health economy follows the approach of official statistics and the criteria of the NHA. Focusing on the industrial health economy in the broad sense, the study includes industries of the primary and secondary economy, as well trade services in this boundary. Considering the fact that the trade margins of the respective industrially produced goods bring together intermediate services with production, this results in consistent calculation.

Figure 5 shows that both the core health economy (CHE) and the extended health economy (EHE) includes industrial manufacturing and trade. The distribution of value added separated into the non-health economy, the core, and the extended health economy are presented.



7 In contrast to the Health Labour Accounts (HLA) of the Federal Statistical Office, which presents the labour force of the health economy by providers, the figures of the working people of the NHA correspond to the concept SNA, supplement-ed and adjusted by specific data from secondary statistics as, for example, the HLA, the registers of physicians, or from the Federal Dental Association; see also Chapter 5.1.

In 2014, services in the health economy generated a gross value added of €207.0 bn, approximately ¾ of gross value added of the total German health economy. It is not surprising that the outpatient and inpatient services of the core area contribute, at €171.8 bn (83.0 percent), the overwhelming part of gross value added of health services.

In the following discussion, the industrial division of the health economy in particular is considered as a driver of productivity. The industrial division of the core area, with the sub-sections of the pharmaceutical industry for human use, medical devices and trade, contributes €50.6 bn of value added in the year 2014 and thus constitutes 70.2 percent of the industrial health economy.

**Industrial division contributes about 22.8 percent of value added of the core health economy**

Since 2000, the value added of the industrial division (pharmaceuticals for human use and medical devices) of the core health economy has increased by €21.9 bn, to €50.6 bn. (Figure 6). The GVA of the industrial division only, increased approximately 64.9 percent, from €15.1 bn to

€24.9 bn in 2014. In the same year, trade provided around half (€25.7 bn) of the total gross value added of the industrial health economy in the broad sense. With an increase of €12.1 bn or 88.9 percent of GVA this has significantly contributed to the GVA rise of the industrial health economy in recent years. This emphasises the important role of Germany not only as a production location, but also in the international trade in pharmaceutical goods for human use and medical-technical products.

**Service-oriented health economy as stabiliser – industrial health economy as growth driver**

Over the whole time span the service-oriented health economy of the CHE shows very stable growth rates (see Figure 7), but the more volatile and cyclical industrial health economy has a more important growth-driving role.

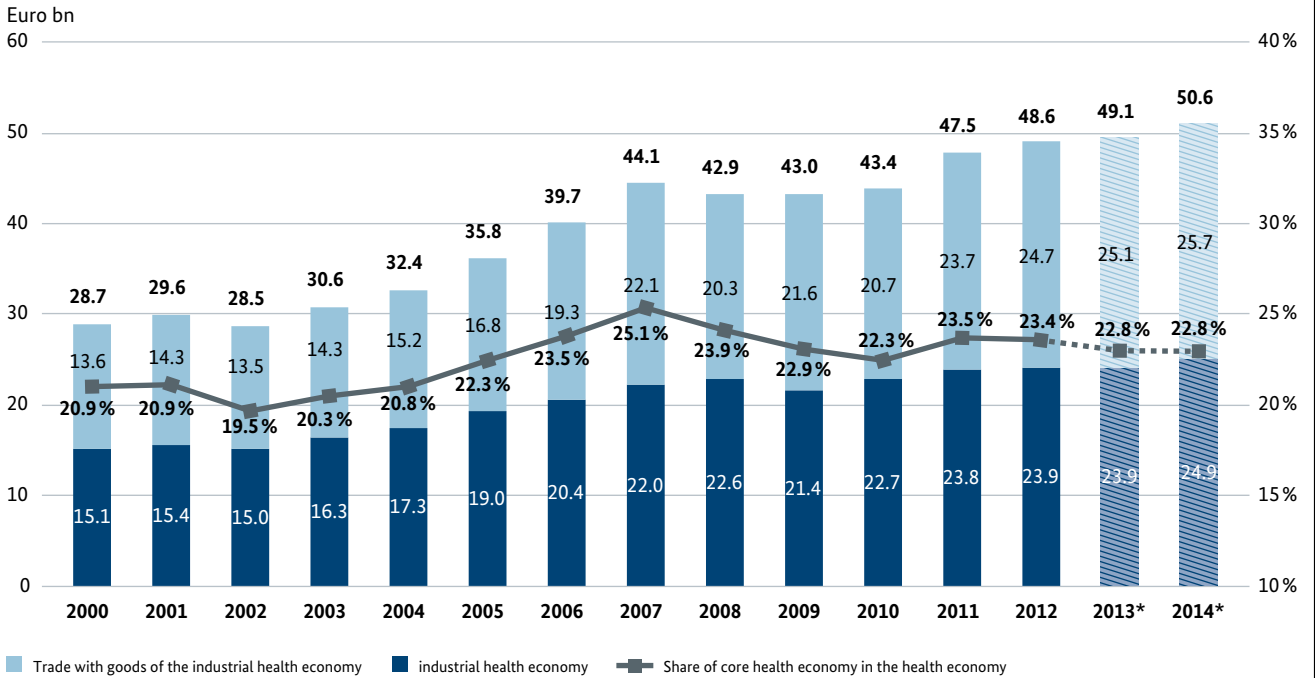
Thus the industrial health activities in the CHE recorded an average annual growth of 4.1 percent over the entire period. However, the growth rates within the time frame are very volatile. In 2008 annual GVA-growth of the industrial health

**Figure 5: Classification of value added in the health economy in goods, trade, and services, 2014**

German economy (total economy) in 2014					
Other activities (ca. 88.9%)		Health economy EUR bn 279.1 (ca. 11.1%)			
Goods and trade (40.9%)	Services (59.1%)	Industrial health economy EUR bn 72.1 (25.8%)		Services EUR bn 207.0 (74.2%)	
		Core health economy EUR bn 50.6 (70.2%)	Extended health economy EUR bn 21.5 (29.7%)	Core health economy EUR bn 171.8 (83.0%)	Extended health economy EUR bn 35.2 (17.0%)
		H1: Pharmaceutical industry for human use (30.8%)	E1: Health care goods (40.7%)	H4: Health insurance (5.9%)	E2: Services for sports, wellness and tourism (34.8%)
		H2: Medical-technical products (18.5%)	E3 (E34): Trade services of the extended health economy (33.6%)	H5: Services of inpatient facilities (49.4%)	E3 (E31.E32.E33): Other services of the health economy (27.8%)
		H3: Retail trade services of the core health economy (23.7%)	E4 (E43): Construction services in health industries (25.2%)	H6: Services of non-inpatient facilities (44.7%)	E4 (E41.E42.E44): Investment (34.6%)
H7: Wholesale trade services the core health economy (27.0%)	E5 (E51): Equipment for E-Health (0.5%)		E5 (E52.E53): E-Health (2.8%)		

Source: BASYS, WifOR: NHA.

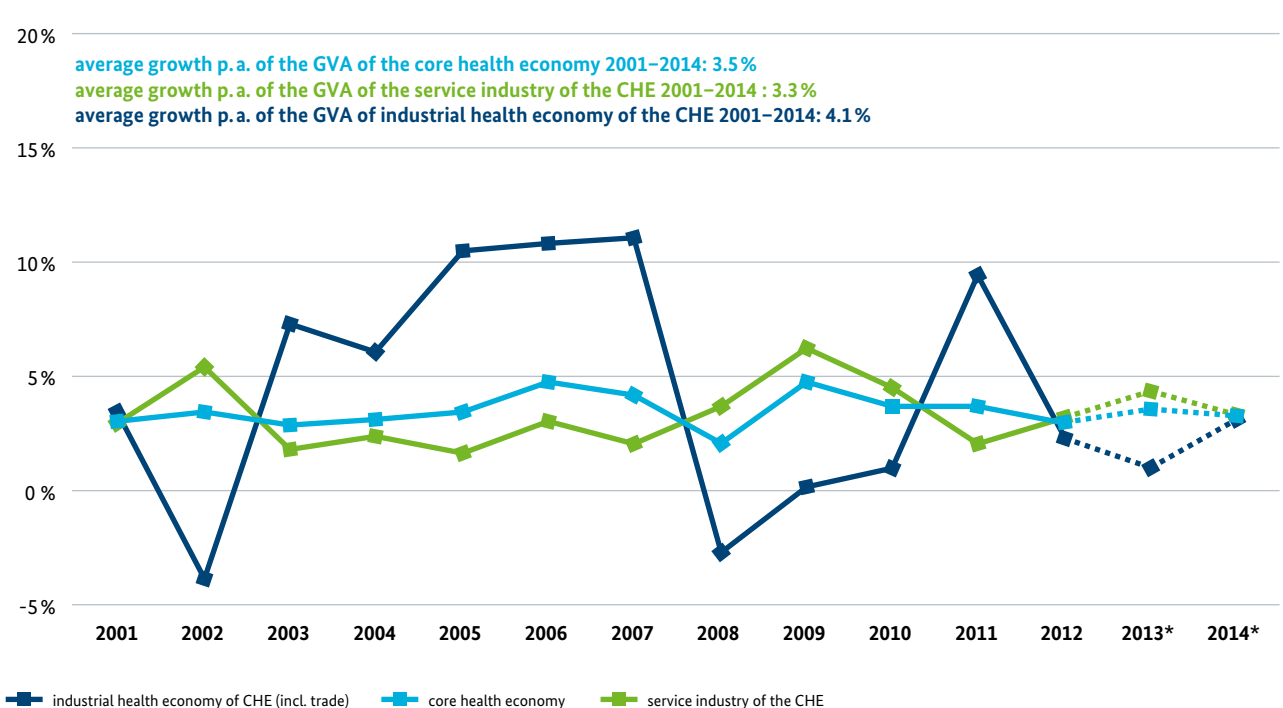
**Figure 6: Gross value added of industrial health activities of the core health economy, in bn Euro, and the share of industrial and trade activities on the core health economy, at current prices, 2000–2014**



Note: Deviations of totals are due to rounding.

Source: BASYS, WifOR: NHA.

**Figure 7: Development of the gross value added in the industrial health economy, the health-related services, and the total CHE, at current prices, 2001–2014**



Source: BASYS, WifOR: NHA.

economy (including trade) sharply declined. Above-average growth rates reappeared only by 2011.

In contrast, the service-oriented health economy has shown a consistently high growth rate. This positive trend can mainly be attributed to the development of the GVA in the services segments of the core area, i.e. in particular to the inpatient and non-inpatient facilities.

Hence it can be stated for the health economy, that the bulk of the stabilising impact comes from the service-oriented health economy. Certainly, the growth rates of the industrial health economy in the course of time are more volatile, but as described below, they also reflect foreign trade impulses.

**Industrial health economy is generating increasing foreign trade surplus**

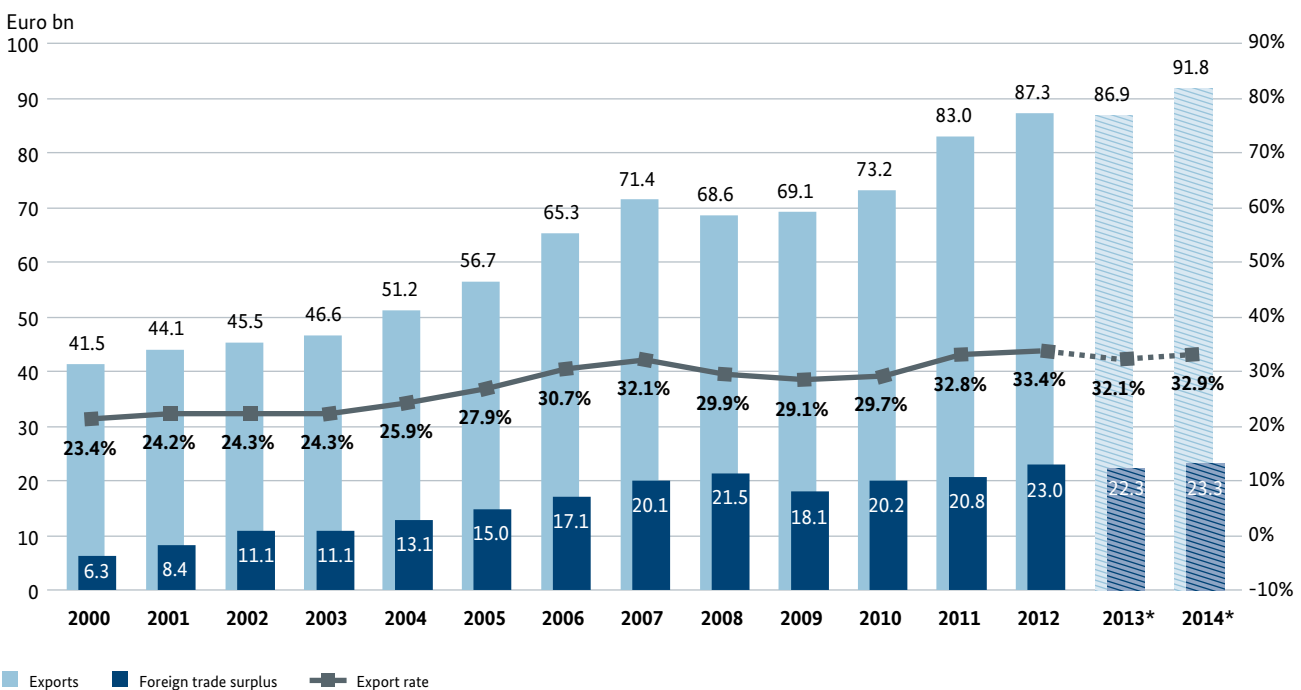
The export of health-relevant industrial goods of the core area rose by €41.5 bn in 2000 to €91.8 bn in the year 2014. This corresponds to an absolute increase of approximately

€50.4 bn and an average annual growth rate of 5.8 percent. This is evidenced by the steady increase of exports of the industrial health economy in the period under review, except for the years 2008, 2009, and 2013.

The export rate, as a ratio of exports to gross value added, has grown relatively steadily up to the year 2007, and was about 32.9 percent in 2014. In the course of the financial and economic crisis, this rate has declined for several reasons including the financial weakness of the importing countries. Only in the year 2011 did the export rate of the of industrial health economy regain its pre-crisis position.

However, the rise in the trade surplus over time is remarkable, almost quadrupling since 2000. While in the year 2000 the export rate of the industrial health economy was €6.3 bn higher than the import rate, the difference totalled €23.3 bn in the year 2014.

**Figure 8: Export- and foreign trade surpluses of the health economy, at current prices, 2000–2014**



Source: BASYS, WifOR: NHA.

### 2.3 Financing agencies and distribution of income

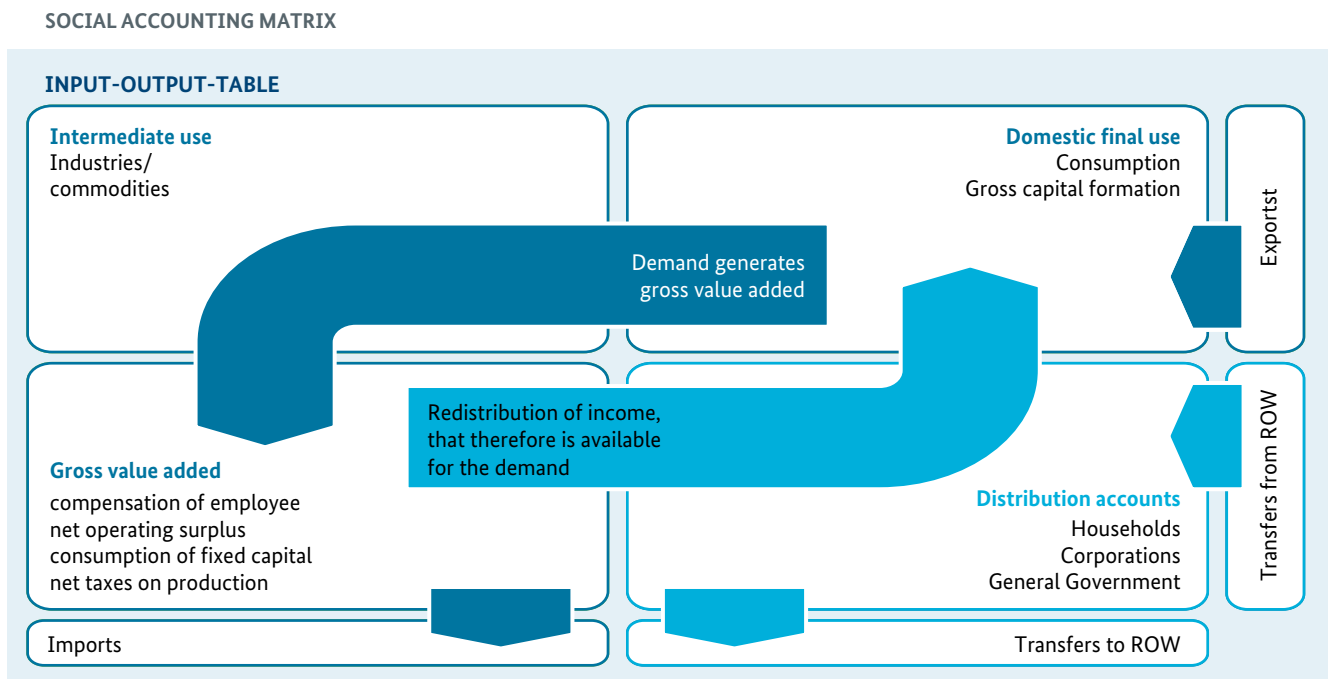
By further extension of the input-output-system to the social accounting matrix, the total economic income circle is closed and the health economy is connected with financing and redistribution. Hence it is possible to visualise:

- the impacts of the health economy on primary and secondary income distribution,
- and the impacts on the financing agencies (incl. government and social insurance).

The input- and output-effects of economic and health policy interventions in the health economy, on every individual financing agency, is becoming more transparent. Both households and social insurance funds, as well as the budgets of federal government, the “laender”, and local governments (local authorities), are taken into account.

The social accounting matrix constitutes the basis for the calculation of the effects of the health economy on the primary and secondary income distribution<sup>8</sup>, the breakdown of inputs for production in health economy, the value added in compensation of employees, and operating surpluses on the one hand; and on the other, the sectoral breakdown of output and income in institutional decision-making units (corporations, households, and general government including social security funds). The 2010 compilation of the social accounting matrix, presently carried out only for this year, serves as a feasibility test. Further refinements, with regard to groups of households, are workable and recommended for the simulation of economic policy measures concerning the development of social health insurance (SHI) and/or private health insurance (PHI), or the question of the effect of cost containment laws.

**Figure 9: Social accounting matrix as extension of input-output-table**



Source: Own illustration.

8 The secondary income result from the primary income distribution by social policy corrections of the general government. The result is the “disposable income”, that income which can be spent by households either for consumption or for saving. The instruments used (taxes, social contributions, transfers, etc.) and the objectives being pursued (family compensation, equal access to health care, prevention of old-age poverty, etc.) are numerous.

In the SNA, primary income includes income and property income before redistribution. The primary or functional income<sup>9</sup> distribution examines how the total income of an economy is distributed to the two production factors, labour and capital. The main results for the impact of the health economy on the primary (functional) income distribution are recorded below.

### The compensation rate of employees of the health economy is high

- In 2010, the compensation rate of employees<sup>10</sup> in the health economy with 75 percent was significantly higher than the compensation rate of employees of the total economy with 69 percent (adjusted for housing and buildings). In 2000, this rate was 81 percent, and 73 percent in the total economy.
- Possible reasons for the decrease of the compensation rate of employees within the health economy include the income development of self-employed persons and their measurement, the structural change within the health economy towards services, and also, demographic changes (see SVR-Wirtschaft 2012, Zif. 552).
- The higher compensation rate of employees results in a lower operating surplus in the health economy. Lower consumption of fixed capital rates than in the non-health economy is one important reason. As the capital coefficients in both sectors are at the same level, a somewhat longer service life for buildings and equipment in the health economy can be assumed.

### The social insurance funds dominate the financing of the health economy

- The social insurance funds secure access to high quality medical care largely free of co-payments for the German population. The impact of the health economy on secondary income distribution is summarised below:
- In 2010, the social insurance funds spent almost €189.1 bn on health commodities of the core and extended health economy.<sup>11</sup>
- Administration services and expenditures of local authorities for public health services and health authorities accounted for a further €8.1 bn of consumption expenditure by general government. By definition, these are not social transfers in kind, but are relevant to distribution because of their benefit. Coverage of medical treatment by social welfare and the war victims programme should also be noted.
- Social insurance also pays a considerable volume of cash benefits (transfer payments) in case of illness or disability.
- Health-related transfer payments increased in the period 2002-2012 by an annual average of 0.8 percent from €73.4 bn to €79.9 bn. This growth, however, was significantly lower than the rise of consumption of health goods, which was growing at a 3 percent annual average.<sup>12</sup>
- Employers are paying the largest financial contribution of health-related transfer payments because of continued wage payment during periods of absence from work due to sickness and maternity.

9 Reich 2001, p 169, has pointed out that capital income cannot be clearly traced back to the production activity and therefore might be classified as secondary income. In this report, capital income is classified as primary income.

10 The public debate on "distributional injustice" often uses the development of the compensation rate of employees. It should be noted that the macroeconomic compensation rate of employees has declined to the benefit of capital income and that the wage structure was further divided to the disadvantage of low-income workers (SVR Wirtschaft 2012, Zif. 547).

11 Final consumption expenditure of the government include a) the value of goods produced by the general government itself, and b) from the general government purchased goods of the market that are made without any transformation, as social transfers to households for their consumption available. Thus, the general government pays for goods that sellers directly provide to households (benefits in kind).

12 The definition is derived from the national health expenditure accounts. In the SHA, the LTC cash benefit is allocated to transfer services (see Statistisches Bundesamt (German Federal Statistical Office) 2014 and earlier years).



Figure 10: Change in final consumption expenditure according to the four quadrant market model, 2008–2014

		Primary market	Secondary market	TOTAL
Core health economy (CHE)	2014	€273 bn +26.0%	€31 bn +16.6%	€304 bn +25.0%
	2008	€217 bn (+4.3% p.a.)	€27 bn (+2.8% p.a.)	€244 bn (+4.2% p.a.)
Extended health economy (EHE)	2014	€28 bn 3.3%	€45 bn +27.5%	€73 bn +16.9%
	2008	€27 bn (0.5% p.a.)	€35 bn (+4.6% p.a.)	€63 bn (+2.8% p.a.)
TOTAL	2014	€301 bn +23.5%	€76 bn +22.8%	€378 bn +23.3%
	2008	€244 bn (+3.9% p.a.)	€62 bn (+3.8% p.a.)	€306 bn (+3.9% p.a.)

Note: Deviations of totals are due to rounding.

Source: BASYS, WifOR.

### More than one-fifth of health consumption is privately financed

- Consumer spending for statutory health services and goods in the CHE grew substantially during 2008–2014 and achieved in relation to the other three sub-areas with 4.3 percent p.a. the second strongest growth rate (see Figure 10, upper left).
- In contrast, the market of statutory health services of the EHE achieved the lowest growth of all growth rates, at 0.5 percent, whereas the market of complementary health services and goods of the EHE had the proportionally highest increase with 4.6 percent (see Figure 10, lower right).

By type of services, accommodation and services of inpatient care dominate in the complementary market, followed by drugs and medical devices, and special outpatient and inpatient medical care in fourth place.

# 3. Potential use of NHA

Having described the most important key figures of the health economy and its sub-divisions with regard to growth, employment and foreign trade, the research questions posed at the outset will be discussed.

The compilation of the German National Health Accounts (NHA) in SNA-categories enables so-called Input-Output analysis for the health economy. Input-Output accounting shows the inter- and intra industry relations of the health economy. Both demand and supply effects can be analyzed. By compiling industry-specific input-output-tables, statistical, prognostic and analytical insights can be realised, which ultimately provides better insight and facilitates interventions in the health economy. In numerous publications the calculation of indirect and induced economic effects are also referred to as the ‘economic footprint’, hereinafter measured for the German health economy.

## 3.1 Economic footprint of the health economy

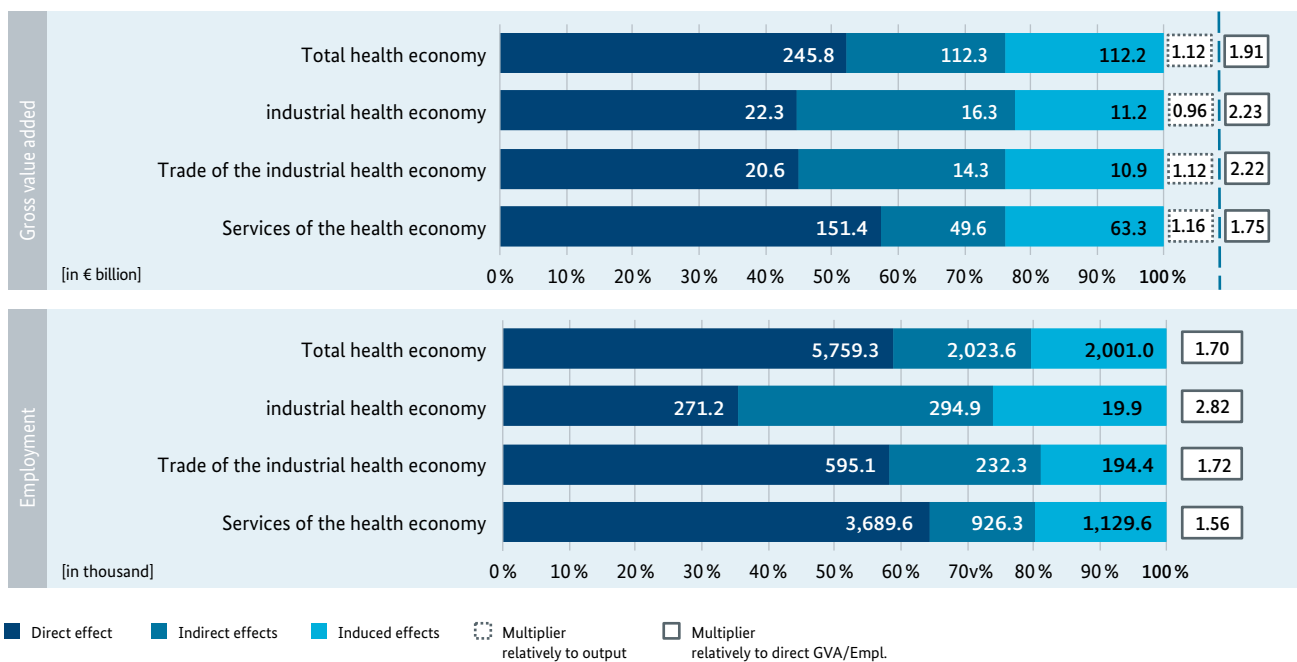
The figure below compares the direct, indirect and induced impacts of the German health economy overall and for different divisions.

### Industrial health economy with high multiplier effect

For the analysis of the spill-over effects of the year 2010 the following key results are summarised:

- The industrial division of the core health economy generated a direct GVA of €22.3 bn. A further €16.3 bn gross value added in related industries (indirect effect) was generated through intermediate consumption. Moreover, approximately €11.2 bn was induced in gross value added by the partial re-spending of the generated income (induced effect). The total value added effects that can be assigned to the economic activity of companies of the industrial health economy, thus amounted

**Figure 11: Effects of gross value added and employment of the industrial and service-oriented health economy, 2010**



Source: BASYS, WifOR: NHA.

to €49.8 bn. The ratio of the industrial health economy has a 2.23 GVA-multiplier, which is accompanied by the increase of gross value added by €1, and includes both indirect and induced effects.

- The direct gross value added of the service-oriented health economy of €151.4 bn was compared with €49.6 bn indirect value added effects resulting from the intermediate consumption of industry segment. A further €63.3 bn of induced gross value added was added, which resulted from consumption effects through the re-spending of income. Consequently, €264.3 bn gross value added was attributed to the economic activity of the service-oriented health economy. €1 gross value added in the service-oriented health economy thus generates direct, indirect, and induced €1.75 of GVA.

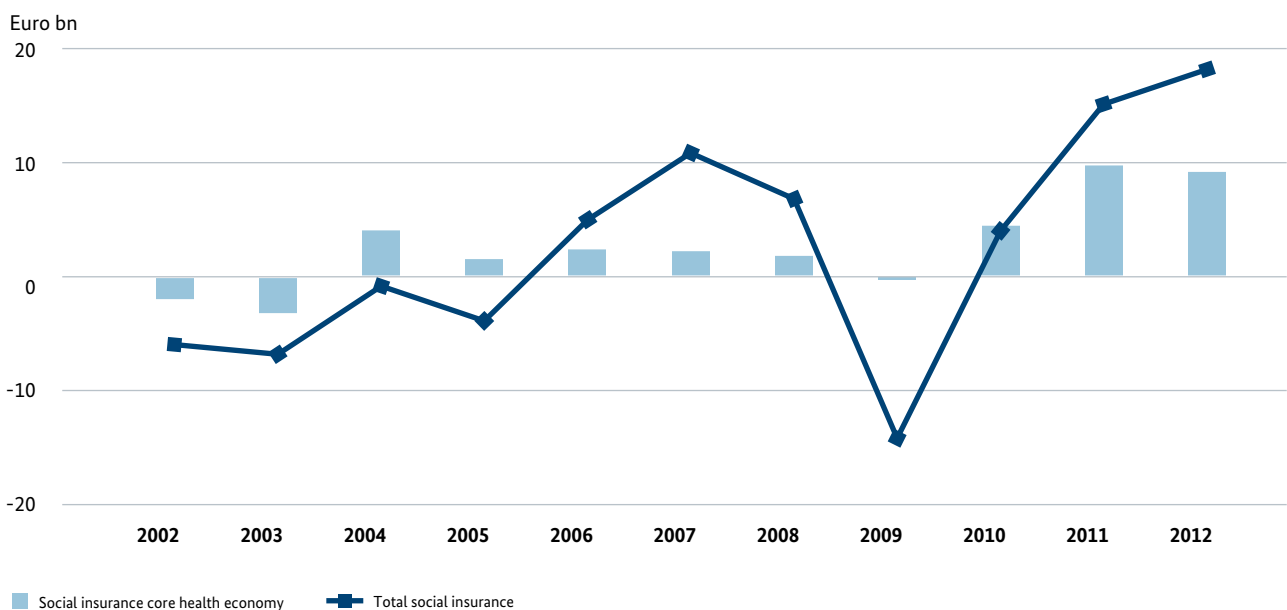
During the observation period, the gross value added and employment multiplier measured per generated gross value added/per employed person and thus the intensity of the industrial health economy were almost one third higher than in the total health economy. It can be concluded that the intermediate consumption of the industrial health

economy in relation to its own direct GVA-effect were higher and especially more GVA-intensive than in the service-oriented health economy.

#### Spill-over effects of health-related secondary income on financing agencies of general government including social insurance

The health economy has significant impacts on the expenditures and revenues of general government including social insurance. The cumulative balance for the period 2002–2013 reached €30.3 bn in the health economy, compared with €29.4 bn in total social insurance (for development of the annual net lending/net borrowing, see Figure 12). But at the same time an increasing burden for households and corporations can be seen through contribution rate increases in statutory health insurance and long-term care insurance. The stability of total contribution rates in the social insurance fund could only be achieved by a reduction in unemployment insurance.

**Figure 12: Net lending/net borrowing of the social insurance in the core area of the health economy (in bn Euro), 2002–2013**



Source: BASYS, WifOR: NHA.

However, the stated spill-over effects do not give a complete picture of impacts of the economic effects. In particular, the induced income and financing effects can be further classified by means of an extended input-output analysis in the form of a social accounting matrix.

### Cumulated spill-over effects

Compilations based on the social accounting matrix show that €1 additional spending on health services (excluding goods and trade) in the core health economy generates the following effects (see multipliers in column 4 of Figure 13):

- additional domestic production in the non-health economy of €1.34, of which €0.73 is allocated to industry and trade as well as a further €0.62 to services of the non-health economy. This reflects the high dependency of services in the health economy on domestically produced goods;
- additional domestic production in the core health economy of €1.22, of which €0.07 is in the industrial division, including trade, and €1.14 in services. In this area, the relatively low value of the industry is the result of high imports. However in the treatment of specific diseases, this can be different;<sup>13</sup>
- €0.03 additional domestic production in the industrial division, and in the services of the extended health economy;
- extra compensation of employees of €0.89;
- extra net operating surplus, including self-employment income of €0.38;
- additional property income of corporations of €0.29;
- an extra disposable income of households of €1.34, and

- an additional euro spent on services in the core health economy produces €0.23 extra revenues for social insurance.

The multiplier of 1.34 for the household sector is due to the fact that redistribution through social contributions and social transfers (secondary household income such as pensions, unemployment benefits) is explicitly considered. The intensified activity of the goods thus not only increases the primary income source (compensation of employees and operating surpluses), but also improves the financial basis of the factors relevant to the payment of secondary income in institutional sectors (social insurance fund and local authorities). An increase in demand in the health economy has a particularly strong (positive) effect on the disposable income of households.

The positive macroeconomic effect of a rising demand for the services of the health goods-producing economic sectors, and in particular the health-economic areas, is even higher if the relevant elements of the secondary income distribution of the institutional sectors are considered in the calculation of the multipliers. This can be concluded from the comparison of social accounting multipliers with the multipliers of the simple input-output table (Leontief-inverse).

## 3.2 Financial support from the complementary health care market

The complementary health care market can support financial agencies in different ways. In this section, income effects are investigated, resulting from the consumption of goods of the complementary health care market. The following basic mechanisms can be distinguished:

- Additive income effects per se result from an increased consumption of health services.

13 Furthermore, it has to be considered that the compilation of gross capital formation does not include research and development defined by ESA 2010.

- Substitutive income effects are primarily due to the shifting of health services by financing agencies of the statutory “market” to the privately financed complementary market.
- The assessment of income effects from an evidence-based perspective depends on how significant the reasons for additional health expenditures are. Depending on how the increasing empowerment of the consumers is assessed and recorded, the income effect can be classified accordingly.

Based on the health-related input-output table for domestic production for the year 2010, possible effects were identified and measured. Support to financing agencies was estimated by distinguishing between direct, indirect, and induced effects of complementary health care services and goods on the compensation of employees. For 2010, the following key findings can be recorded:

- Consumption of domestically produced commodities in the complementary health care market amounted to a total value of approximately EUR 58.4 bn. This corre-

sponds to a share of 57.3 percent of total private consumption expenditure on domestically produced commodities of the health economy (€101.9 bn).

- Total social insurance contributions of between €11.5 bn and €14.7 bn were generated by private consumption of commodities of the complementary health care market direct, indirect, and induced depending on the scenario, that can be considered as direct support to financing agencies. The share of direct, indirect and induced generated social insurance contributions by the complementary health care market in the total sum thus ranges from 2.9 percent to 3.7 percent.
- In 2010, total direct, indirect, and induced discharge effects for the statutory health insurance fund of the domestic manufacturing health economy of about €4.7 bn to €5.5 bn result from consumption in the complementary health care market. Expressed in the form of multipliers resulting from €1 that is spent on goods in the complementary health care market, this increases revenues of SHI with an amount of about €0.09.

**Figure 13: Multipliers of the social insurance matrix**

			Commodities					Factors		Sectors				
			1	2	3	4	5	6	7	8	9	10	11	
			NGT	NES	CGT	CHS	EGT	EHS	CEM	NOS	COR	HH	SI	
<b>Non-health economy</b>														
Commodities	1	Goods and trade	NGT	2.003	0.695	0.866	0.727	0.970	0.771	0.803	0.642	0.572	0.803	0.742
	2	Services	NES	0.598	1.731	0.639	0.615	0.656	0.697	0.638	0.510	0.455	0.638	0.636
	<b>Core health economy</b>													
	3	Goods and trade	CGT	0.020	0.021	1.081	0.073	0.027	0.027	0.031	0.025	0.022	0.031	0.080
	4	Services	CHS	0.088	0.102	0.097	1.144	0.094	0.123	0.150	0.120	0.107	0.150	0.442
	<b>Extended health economy</b>													
5	Goods and trade	EGT	0.013	0.014	0.015	0.025	1.030	0.019	0.018	0.014	0.013	0.018	0.019	
6	Services	EHS	0.015	0.019	0.036	0.027	0.020	1.072	0.023	0.018	0.016	0.023	0.031	
<b>Total demand effect of goods</b>				<b>2.737</b>	<b>2.583</b>	<b>2.734</b>	<b>2.612</b>	<b>2.799</b>	<b>2.709</b>					
Factors	7	Compensation of employees	CEM	0.712	0.747	0.777	0.889	0.754	0.930	1.471	0.377	0.336	0.471	0.599
	8	Net operating surplus	NOS	0.304	0.426	0.358	0.378	0.348	0.298	0.225	1.180	0.161	0.225	0.273
Sectors	9	Corporations	COR	0.234	0.323	0.275	0.291	0.267	0.235	0.196	0.854	1.140	0.196	0.223
	10	Households	HH	1.076	1.225	1.198	1.341	1.162	1.316	1.860	1.488	1.326	1.860	1.558
	11	Social insurance	SI	0.185	0.211	0.206	0.231	0.200	0.226	0.320	0.256	0.228	0.320	1.268

Note: Deviations of totals are due to rounding.

Source: BASYS, WifOR: NHA.

From a macroeconomic and fiscal perspective, the complementary health care market, through the direct and indirect effects of gross value added, employment and compensation of employees, generated revenue effects for the government sector and social security systems. It is clear that growth in the complementary health care market has a positive effect on sustainable funding of statutory health and long-term care.

### 3.3 Foreign trade impulses of the health economy on financing agencies

In this section, effect mechanisms, which go beyond the importance of health economic foreign trade of the health economy are identified and quantified, as a further measure in the context of the NHA. The determination of the relationship between exports and compensation of employees was based on the health-related input-output table for domestic production for the year 2010. The domestically produced exports of the health economy were determined, and, based on this, the direct, indirect and induced-dependent compensation of employees were shaped.

As a working hypothesis it was assumed that the exporting companies of the health economy receive intermediate consumption from Germany for their export of specific produced goods. By means of intermediate consumption, jobs were secured in related industries. Using this approach, not only the social insurance contributions generated by exporting companies in the health economy are ascertainable, but also those in the backward supply chain. The export activity of a company or industry thus has a further impact, in addition to that on the level of employment and related social insurance contributions payable in downstream firms or industries. Furthermore, in the exporting companies employees produce induced effects in the economy as a whole through their consumption. In combination with data on the export-dependent compensation of employees, we may draw some conclusions about the export-induced income of statutory health insurance (SHI), private health insurance (PHI) and statutory long-term care insurance (SLTCI).

The main results and indicators for this part of the analysis are as follows:

- In 2010, the health economy exported commodities for the amount of €56.6 bn with domestic origin.
- These export activities of the health economy generated total social insurance contributions at the level of €9.2 bn to €11.7 bn, which can be considered as export-induced relief effects of the health economy. Depending on the scenario, thus, the share of direct, indirect, and induced social insurance contributions generated by the export activities is between 2.3 percent and 3.0 percent of the total contributions.
- In 2010, total direct, indirect, and induced relief effects for statutory health insurance range from €3.7 bn to €4.4 bn resulting from the export activities of the domestically produced health economy. Expressed in terms of multipliers, for every €1, exported by the health economy, this produces revenues of about €0.07 for SHI.

### 3.4 Innovations and efficiency

Innovations contribute to a very important objective: to increase the productivity and efficiency of economic processes. Productivity increases, if for the same input more output is produced, or for the same output less input is consumed. In the health economy, productivity gains from product and process innovations, as well as new forms of health system organization in the provision of health commodities, might challenge the so-called Baumol's "cost disease" of services, which are very labour-intensive. In particular, the industrial health economy has proven to be the "motor" of medical-technological progress.

- In the period 2002 to 2012, labour productivity in the health economy – measured as the change in the value of output per hour worked – was growing at a rate of 0.8 percent per annum, and hence below productivity in the total economy (1.5 percent), with growth rates in the core and extended health economy being similar.

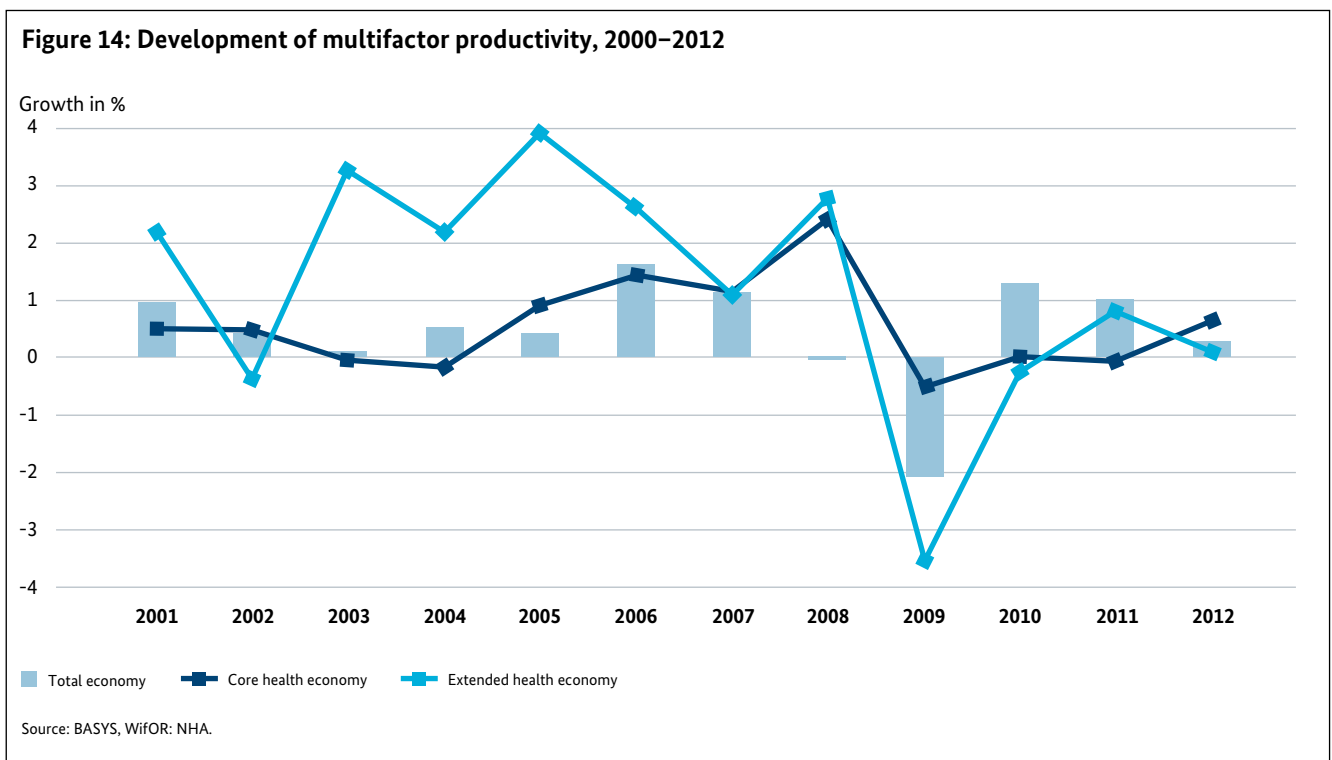
- The calculations for capital productivity<sup>14</sup> show a slight positive improvement. Capital productivity grew in the same period by an average of 0.3 percent in the health economy, at the same rate as the total economy.
- Multifactor productivity in the health economy grew at 0.5 percent, slightly stronger than in the total economy which grew at an average of 0.4 percent. Between the different economic sectors, however, large differences can be observed. The driver of development in the health economy is the core health sector, and in particular the industrial division with goods and trade of 1.2 percent.
- The growth contribution of industrial health goods was approximately 10 percent, in the period 2002-2012.
- Finally, the growth of capital expenditure in the health economy is worth mentioning as it lags behind production growth in recent years. This was due to structural

effects: stronger growth in the long-term care division and stagnation of investment in the industrial division after the economic and financial crisis.

The study has also examined the effects of productivity growth in the health economy on other industries. This was analysed in the areas of goods and trade, as well as services of the core health economy, based on the coefficients of the social accounting matrix for 2010.

### 3.5 Stagnant growth of health capital

The ultimate aim of the health economy is to contribute to maintaining and improving the health and well-being of the population. In the period 2000–2013, life expectancy at birth rose in Germany per year by an average of 3.6 months per annum for men and 2.3 months for women. At the same time, however, the age structure significantly shifted, to the disadvantage of young people. Total population



14 The values of the fixed assets are without construction of dwellings.

dropped simultaneously, from 82.1 to 81.9 million. As a consequence of these structural changes, health capital stagnated at 1.555 bn years (see Figure 15).

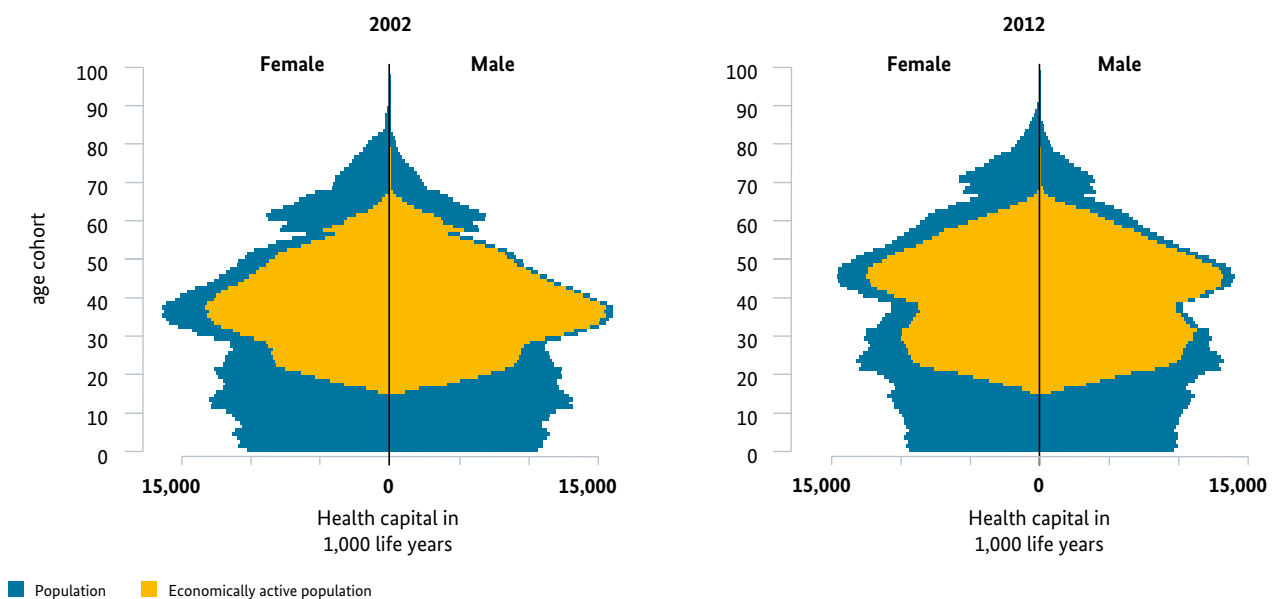
Arithmetically, health capital is equivalent to the sum of expected life years of the population, adjusted for limitations due to illness, disability and the need for care. Therefore, differences in the demographic structure of the population are considered. Young people and people of working age generally gain in importance compared to older people. With rising life expectancy, an increase in health capital is expected, and with increasing functional limitation, this reduces.

The relationship between health and economic growth is important for the health capital of the working population. Health capital is also subject to the natural aging process, and is characterised by an increasing share of people aged over 45 years, and an increase in morbidity is expected. There is also a noticeable shift in the panorama of diseases. Not surprisingly, the preliminary update of the disease-

based account<sup>15</sup> for core health activities shows that the various activities of the health economy had different effects on expenditure growth by disease during the period 2002–2012 (see Figure 16).

- Neoplasms and diseases of the blood recorded the biggest increase in expenditure: The growing use of some high-priced medical products play a special role in the treatment of these diseases.
- In the case of musculoskeletal disorders, however, outpatient treatment methods including outpatient rehabilitation, are becoming more important.
- In the class of cardiovascular diseases, which has the highest mortality decline of all ICD chapters, spending showed below average growth. Presumably, this is explained by both price reductions as a consequence of medical-technical progress and regulations, and by stagnation of inpatient cases (see *Deutsche Herzstiftung 2014*).

**Figure 15: Health capital pyramid of the population and the labour force in Germany in thousands of years by age-group, 2002 and 2012**



Source: BASYS, WifOR: NHA.

15 The update of COI from 2008 to 2012 is based on the structure of published data by disease groups (see *Statistisches Bundesamt 2010a*).



This first update of expenditure by disease accentuates the importance of the distinction between price and volume effects for the analysis of health economic processes. Further compilations and analyses of the price and quantity component by disease are required to understand these structural changes. This is also necessary because legal procedures are affecting diseases differently.

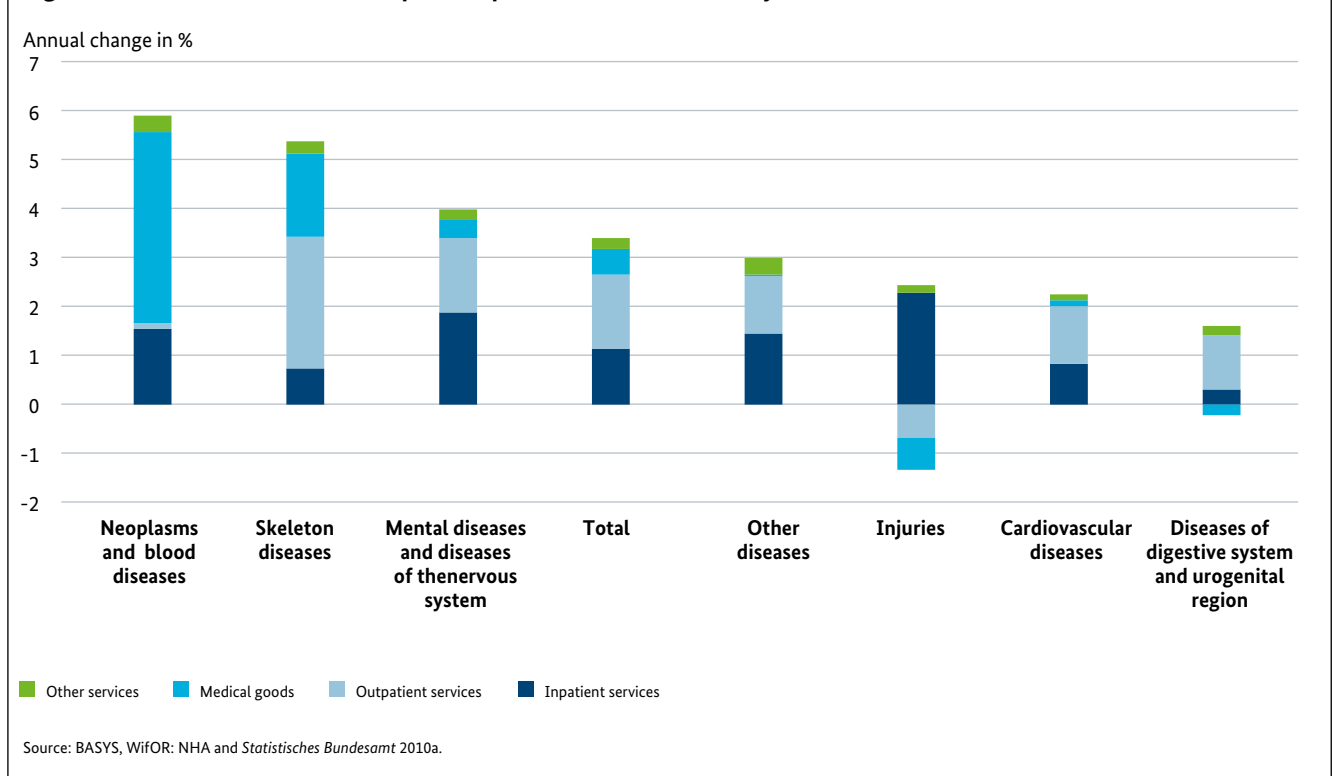
Key conclusions from updated cost of illness (COI) by NHA to 2012 in the core health economy include:

- increasing loss of working years due to incapacity for work and invalidity since the economic and financial crisis;
- above-average increase in expenditures for the treatment of malignant neoplasms and injuries;
- in contrast, below-average growth of treatment for metabolic diseases, diseases of the digestive system and urogenital diseases, as well as the oral cavity, salivary glands, jaw or tooth decay.

A more differentiated breakdown by disease and activities may modify the results. It should also be noted that causes based on health behaviour or risks of the social environment have not been taken into account in the NHA to date. Compilations by disease should be refined on the basis of price, structure, and volume, in the further update of NHA, and also include the risk factors.

Health capital is also educational capital part of human capital. For growth analysis, it is desirable that all capital components are available. With the calculation of health capital, an important element for the closure of the “health economics cycle” is available (see *BMWi 2013*).

**Figure 16: Growth of final consumption expenditures within CHE by disease and services, 2002–2012**



## 4. Contribution of voluntary work and households to the health economy

Demographic change leads to changes in many areas of life and the health economy is particularly affected by this. Demographic change leads to a shortage of labour supply, and the ageing of society increases the demand for health services (see Ostwald et al. 2013, p 20). This development is already evident, hence the Federal Employment Agency refers to a lack of skilled health and nursing professionals (see Bundesagentur für Arbeit - Federal Employment Agency 2013). We may assume that shortages of health and nursing professionals will intensify in the coming years. One study predicts a lack of specialists in health and nursing care of about 360,000 full-time equivalents by 2030 (see Burkhart et al 2012, p. 21-23). In 2030, this corresponds to about 30 percent of the possible demand for staff in nursing, or to 24 percent of the demand for medical staff (see also Karmann, Wolf 2013 for the specific area of preventive and rehabilitative hospitals).

Family caregiver and voluntary workers contribute to health services, and most of them are not recorded in the SNA. However, these activities provide a multidimensional benefit that causes largely unnoticed welfare effects. In this study, the scope of volunteer work in the health system and its economic assessment is therefore examined. In addition, the potential of voluntary work is analysed, to find out whether and how voluntary work and household production have an effect on shortages of professional health workers, or rather how they could contribute to mitigate shortages.

With regard to all voluntary work:

Analogously to voluntary work, the volume of health-related activities in household production can also be com-

puted. The time budget survey of the Federal Statistical Office reports the minutes that are spent on care of sick children and adult family members.

- To what extent the various voluntary commitments in health care can mitigate a future shortage of health professionals depends on the degree of possible professionalisation of voluntary work, but also on legal, political, ethical, and technological conditions. When estimating the expected gap of about 360 thousand full-time equivalents of nurses in the year 2030, the effect of medical-technological progress of medical devices/AAL, telematic services and others had been initially excluded. Over the twenty-year forecast period voluntary work contributes to – even with a 50 percent reduction in the usually imputed growth rate, a reduction of the shortage of health professionals by a third. Moreover, various measures for the reduction of the need of care can be identified: professionalisation of support systems, here, further qualification of voluntary workers for a professional commitment in care; delegation of professional caring activities to persons who were interested in voluntary work in representative surveys, but have not yet voluntary working – a potential of voluntary work that could more than double the number of today’s voluntary workers; increasing the efficiency of care processes and reducing the burn-out rate for professional nurses, for instance by a higher degree of self-determined work organization; prevention of the elderly and therefore demand-side reduction of care through prevention and training.

The required qualifications for professional nurses, who are – analogously to the hospice/palliative coordinators – able to guide the voluntary workers and to monitor the delegation have to be taken into consideration; furthermore, from

16 The health-related activities in voluntary work is compiled using primary data from three different sources. These are the results of the voluntary survey of the Federal Ministry for Families, Senior Citizens, Women and Youth (Bundesministerium für Familie, Senioren, Frauen und Jugend – BMFSFJ) and the “Engagementatlas” by Prognos, as well as the time budget survey of the German Federal Statistical Office. The “Engagementatlas” as well as the voluntary survey provide information on the percentage of the population who is committed to voluntary work.

17 Both studies divide the voluntary activities in areas of commitment. If the three commitment areas social, health and rescue services/fire brigade are summarized as health care service, based on the provided information the total number of hours that is provided in voluntary work per year in health care from the general commitment ratio, from the share of committed in health care and the average hours worked per month.

the education-side the focus have to be put on the increasing academisation of nurses. In addition, the demographic trend has to be considered, which on the one side increase the old-age dependency ratio and thus the need of care, but on the other side will also numerically reduce the age cohorts with largest commitment to voluntary work.

As outlined, the challenge for the society seems to cover the future need of care, by means of voluntary workers and accompanying measures – and among others by more closely specified additional professional nurses.

# 5. Intersections of the NHA with other satellite accounts

## 5.1 Intersections with German SHA

When comparing the two accounting approaches SHA and NHA, two items have to be distinguished. On the one hand the demarcation of the SHA by types of services and providers differs from the commodities and industries of the NHA, and on the other hand, there are methodological differences in the calculation.

However, the NHA has adopted the demarcation of the German SHA with the so-called core health activities. As a result, the demarcation of SHA is integrated in the compilation of the NHA. Thus, consumer spending as well as active employment figures of the CHE are comparable with accounting approaches of the Federal Health Monitoring – with some methodological restrictions.

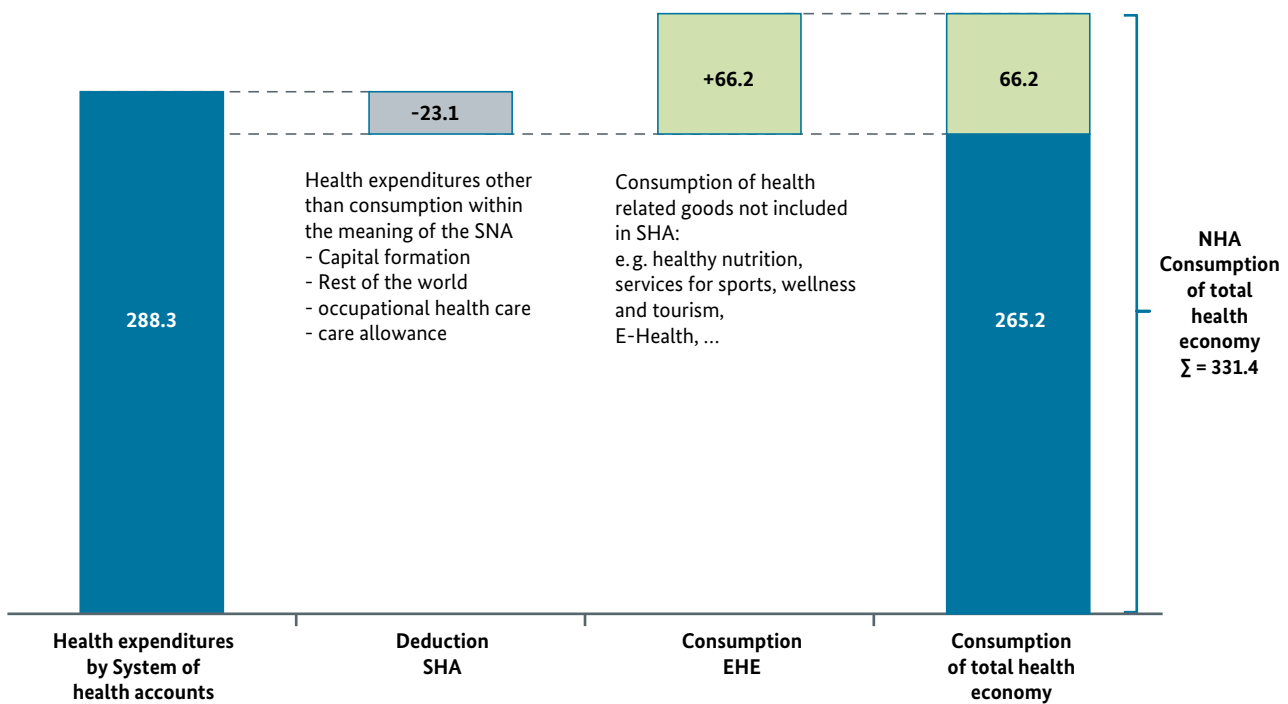
The methodological differences are in particular due to the rules of the SNA. The German SHA includes expenditure items that are not covered by the rules of SNA within the boundary of consumption. These include occupational

health care, the care allowance, services provided abroad, as well as investment. Although they are considered in the NHA in a suitable position, they must be deducted by comparing of health expenditure with the consumer spending of NHA. The difference in health expenditures by German SHA and consumption spending for the CHE at purchasers' prices counts €23.1 bn for the year 2010 (see Figure 17).

The wider health economy of the NHA includes, contrary to the German SHA, a large number of further goods (e.g. health tourism, healthy nutrition, ). These further health activities are summarised by the extended health economy EHE containing, by definition, commodities of the health economy, which are not included in the German SHA. €66.2 bn additional consumption spending on goods of EHE must therefore be taken into account by comparing with the German SHA.

Comparing the health labour account with NHA, further issues have to be considered. In the German SHA, the labor account represents jobs, so that people with multiple

**Figure 17: Correspondence between health expenditure by SHA and final consumption expenditure of health commodities by NHA in EUR bn, 2010**



Note: Deviations of totals are due to rounding.

Source: BASYS, WifOR: NHA.

employment in different institutions are also counted several times. In the SNA, and thus also in the NHA, employed persons are identified. Employment counts the number of persons, which means that persons with multiple co-existent employment are registered only once with their main job. Due to the different methodology and the extended definition, the employment figures in the NHA in 2010 are, at 5.8 million (4.6 million of them in the core area) around 1 million higher compared to 4.8 million in SHA labour accounts.

## 5.2 Intersections of the NHA with other satellite accounts

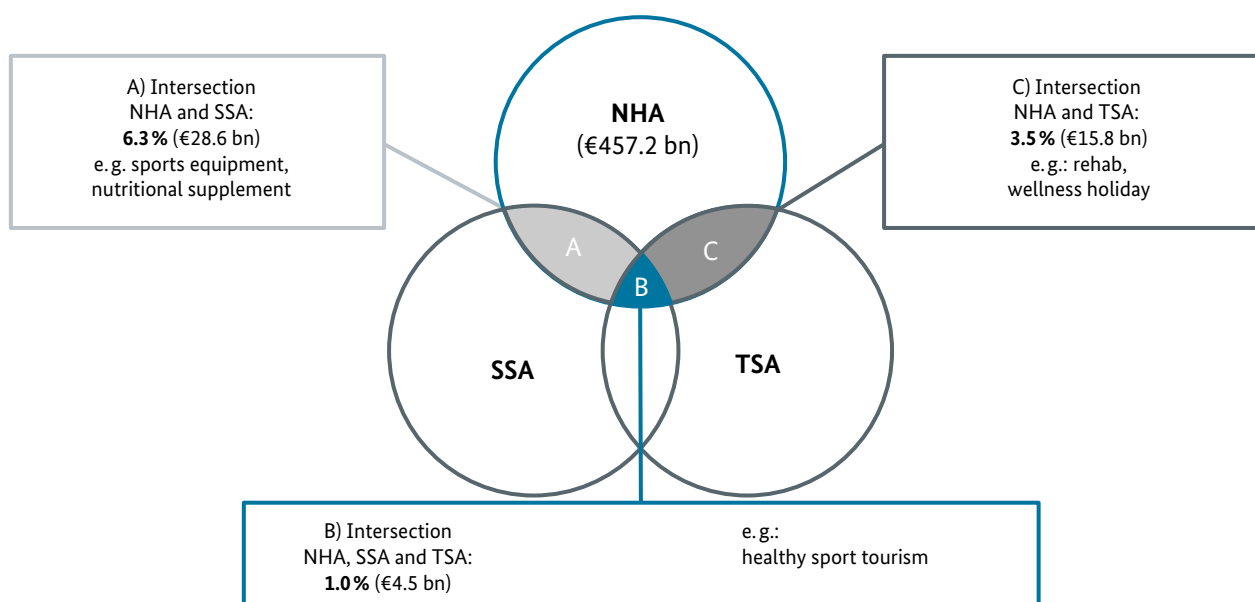
Due to many criticisms that double counting of cross-sectional industries would lead to an “artificial” increase of the economic importance of the illustrated industry, within this study, the intersections of the NHA with other satellite accounts both quantitatively and qualitatively were identified, and a comparison of the NHA was made with the Tourism satellite account (TSA) and Sports satellite account (SSA).

The following main results can thereby be stated:

- In 2008, all three satellite accounts had a common intersection of approximately €4.5 bn on the total utilisation of commodities. This corresponds to an overlap of approximately 1.0 percent of the total utilization of commodities of the NHA.
- The largest overlap was between the satellite accounts SSA and NHA. Altogether approximately €28.6 bn are included in the total use of commodities, both in the compilations of the NHA and the SSA. This corresponds to about 6.3 percent of the total use of the NHA.
- The overlap between TSA and NHA was slightly lower, with €15.8 bn and a share of 3.5 percent on the NHA.

In conclusion, it can be stated that there is indeed double counting between the three satellite accounts, but this is relatively low, even in the case of the SSA with almost 6.3 percent of the total use of the NHA. The existing overlap is useful. An aggregation of the values of the satellite accounts is not intended.

**Figure 18: Intersections of the satellite accounts**



## 6. Excursus: Impact of health economy on outcome, economic growth and prosperity

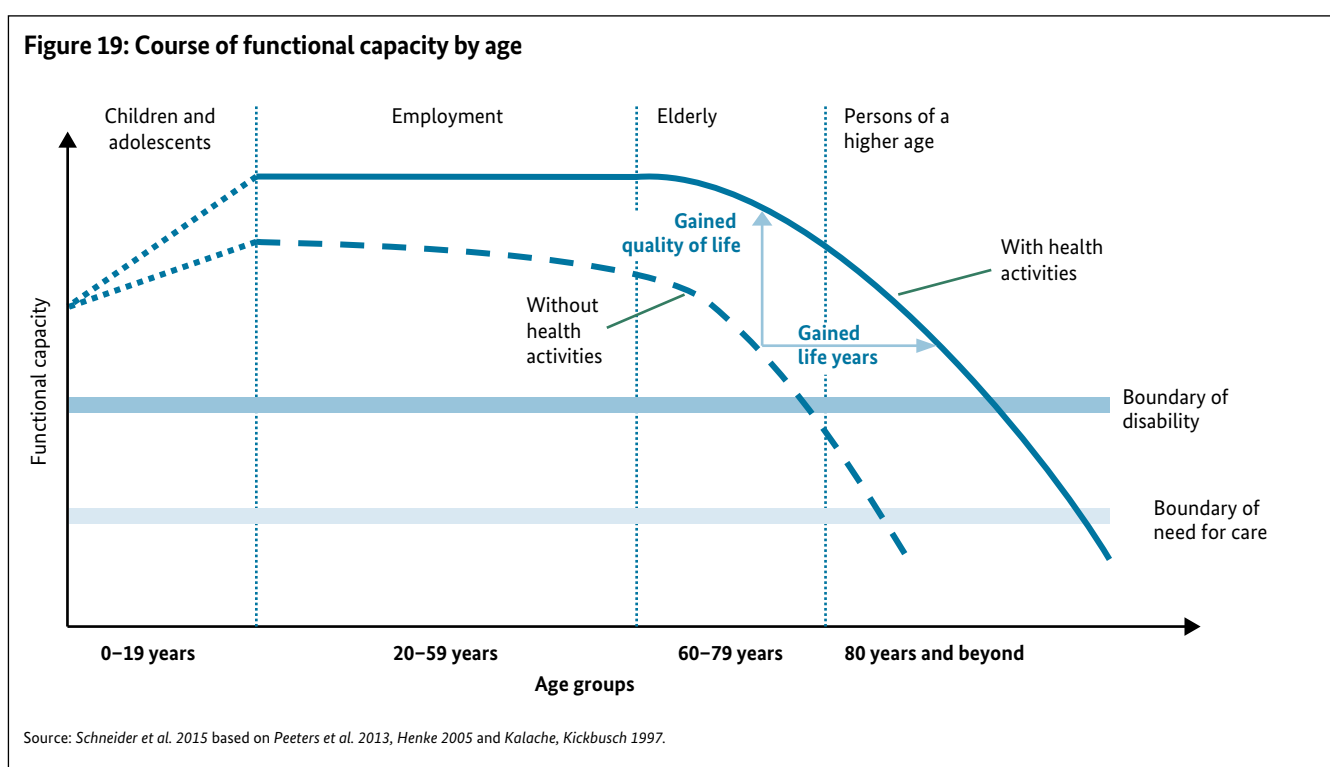
Any analysis of the multiple relationships between the health economy, population health, economic growth, and prosperity in a general sense, requires a broader view of the health economy. First, the life course perspective on people's health aims to maintain high functional capacities at higher ages. As shown in Figure 19, the existing potential of functionality in an increasingly ageing population should be exhausted on the one hand. On the other, apart from a larger symmetry of the two curves, ways to constantly improve the functional capacity should be identified (graphically a shift of the curve "upwards" or a more rectangular shape). Technological and organisational innovations in health and nursing care, and improvements in individual lifestyle factors, can contribute to this shift. There are numerous and manifold factors influencing health. In this section, the focus is on the impact of the health economy.

The production of the health economy as an economically relevant industry has an impact on the total economy, and thus also on key indicators such as GDP. Incorporated in this economic footprint are the direct, indirect and induced effects on the gross value added and productivity effects

(Schneider, Karmann, Braeseke 2014) which appear in the production and consumption of the economy as a whole, and also emerge through improved individual and collective health.

What is missing so far is the direct link, which is not always easy to identify, between the separate groups and categories of health activities in the core health economy (CHE) and in the extended health economy (EHE, as well as on the health of the population, i.e. results beyond the activities measured by GDP). For this analysis of the health care dividend in the narrow sense, identification of the benefits is required, i.e. especially the quality- or value-related analysis of processes and structures in the health economy.

The health care dividend in the narrow sense describes the impacts of health economic commodities on health. Subjects of measurement include specific indicators, such as life expectancy and well-being. The generated surplus in health can be compared with the health investment in the form of "cost-benefit analysis". A corresponding relation can be determined from the ratio of outcome to input. Based on the cost benefit ratio of individual interventions



it may be shown that past investments in health correlate in an acceptable relationship to the generated health benefits (Cutler *et al.* 2006; Cutler, McClellan 2001), so an acceptable positive health care dividend in the narrow sense is achieved.

What complicates the analysis of the health care dividend in the narrow sense, is the number of factors that influence individual and collective health. Health impacts are not only caused by individual factors such as age, gender, nutrition, semi-luxury foods and tobacco consumption, health awareness, physical activity, and other components of the individual lifestyle, but also policy interventions, and environmental influences. Given these different causal factors, the difficulty is to attribute a health effect to a specific investment. The problem is intensified by the time lag between the health investment and the effect on health. Because of different health production functions, only limited and in some cases specific, recommendations can be derived from health indicators (Gethmann *et al.* 2004, Romano, Hussey, Ritley 2010; Ganten, Niehaus 2014).

An additional perspective, going beyond the health care dividend in the narrow sense, arises from the supply- and demand-side effects of improved health. The health care dividend in the broader sense describes health as a value added factor, linking improved population health and economic growth, employment and the economic welfare of a country. On this second viewpoint, health is – apart from its high intangible value for every single person – examined on its social or collective benefits for society (Henke, Martin 2007, Weil 2007 and Barro 2013). Additional years of healthy life increase the demand for goods and services of different kinds, among others in the complementary health care market, with its share of about 2 percent of gross national product (GNP). The demand-side benefit is thus computable by GDP. In this way, there is furthermore an even marginal co-financing of the statutory by the complementary health care market.

A supply side benefit consists of possible voluntary and other unpaid work in society as a consequence of increasing health capacities and human capital, e.g. in sports clubs, communities, charities, neighbourhoods, etc.. Similar to the measurement of the health care dividend in the narrow sense, the inter-temporal comparison offers a method to determine the health care dividend in a broader sense, i.e., a comparison of current and historical health status and GDP (age-cohort analysis over time). In analysing the health care dividend in the broader sense, a number of variables may have an effect on health and on economic growth. However, some of these variables are difficult or impossible to measure. An influencing key factor, which determines both the level of GDP and also health status is, for example, the level of education. Because better education leads, *ceteris paribus*, to a change of nutrition, tobacco consumption, other ways of life, and lifestyle components.

Future research activities for the health economy should consider the so-called “Health Impact Assessment” in the context of Figure 19. Up to now, this is rarely used to take account of the health effects of various policy measures. Regardless of the results of NHA, and in addition to the economic dividend, the results of Health Impact Assessment studies would be a measure of evidence of special quality, since in this way, health effects may be compared across all life and policy areas.

Similar to environmental impact assessment, a health impact assessment would not only refer to health care services. Transport policy, education, and energy policy – to name just a few examples – would be considered (see Durand-Zalewski, Chevreul, Jeanblanc 2009, Bührlen *et al.* 2014). This approach gives priority to the life-course perspective of functional capacity across all age groups, as presented in Figure 19.

## 7. Conclusions and outlook of the research report

The present study of the German national health account is a substantial extension of the comprehensive accounting approach. For the first time the focus of the reporting is not only on statistical key figures, but also on the compilation of scenarios relating to various health economic issues, and their impacts, including responses to growth and employment, price development and the trade surplus.

Answers to the following questions are provided:

- What are the spillover effects of the German health economy on forward and backward linkages?
- What are the spillover effects of the German health economy on the primary- and secondary income of the household sector, as well as redistribution through social insurance fund?
- What is the impact of the complementary health care market on the income of social insurance?
- What impact has the trade surplus of the health economy on the income of financing agencies?
- How do productivity changes in the health economy affect the total economy and financing agencies?

Furthermore, two specific questions are answered:

- What value does the health economy provide to society?
- To what extent does voluntary work mitigate the shortage of health professions?

Hence, the updated and significantly extended NHA reflects the growing importance of the health economy and the different perspectives of the actors. As well as classic questions about the performance of health commodities for patients, increasingly specific questions arise about growth and employment effects, as well as the financial impacts of the health economy on social insurance and other financing agencies. Therefore, as part of this research project, the NHA was created as a comprehensive and integrated accounting tool. This tool makes it possible to use it, in the future, as a platform to analyse numerous health and economic policy issues.

Moreover, further research steps result from the ongoing work on NHA:

- The NHA provides a unique tool for the analysis of the health economy. However, it is important to use it, in order to refine and develop this tool in practically relevant applications.
- Furthermore, the compilations within the NHA should be institutionalised to permanently establish the information of this overall accounting approach in economy and policy. The refined compilations of the industrial relations are to be supported through ongoing data collection. Another advantage would provide a breakdown of the household sector into groups of households (e.g. active population and retired persons), and divide social insurance into the various social insurance funds. The information about private capital accumulation and investment activities should also be strengthened.
- For growth analysis and economic policy issues, it is necessary to consider human capital and to explicitly link it with the social accounting matrix.
- A future and promising field of action is the compilation of the health care dividend and hence the health outcomes of health economic activities. Future projects should focus on this linkage between health and economy.



## 8. Appendix of Tables

Figure 20: NHA Input-Output-Table of domestic output at basic prices, in bn Euro. 2010

CPA	Intermediate use						Final use						
	commodities						Total	Final consumption expenditure	Gross capital formation	Exports	Final use	Total use	
	NHE		CHE		EHE								
	GT	S	GT	S	GT	S	7	8	11	14	15	16	
CPA	1	2	3	4	5	6	7	8	11	14	15	16	
1 NHE – Goods and trade	916.8	127.0	18.3	15.5	12.7	5.6	1,095.9	560.5	259.2	807.1	1,626.8	2,722.7	1
2 NHE – Services	313.7	337.6	11.7	20.6	6.3	8.4	698.4	727.9	27.7	71.3	827.0	1,525.4	2
3 CHE – Goods and trade	2.1	0.5	5.3	10.3	0.3	0.2	18.7	31.5	-3.1	45.8	74.2	92.9	3
4 CHE – Services	1.1	4.4	0.0	7.8	0.0	0.8	14.2	211.8	0.9	0.0	212.7	227.0	4
5 EHE – Goods and trade	4.7	2.4	0.2	2.6	0.8	0.3	11.1	16.2	9.9	7.9	34.0	45.1	5
6 EHE – Services	1.9	3.8	1.7	1.8	0.2	2.8	12.3	37.1	1.5	3.0	41.6	53.9	6
<b>7 Total (1:6)</b>	<b>1,240.3</b>	<b>475.8</b>	<b>37.4</b>	<b>58.7</b>	<b>20.4</b>	<b>18.1</b>	<b>1,850.7</b>	<b>1,585.1</b>	<b>296.2</b>	<b>935.1</b>	<b>2,816.3</b>	<b>4,667.0</b>	<b>7</b>
8 Imports	433.7	50.7	11.9	8.9	5.3	2.0	512.6	147.0	100.9	230.5	478.4	991.0	8
9 Net taxes on products	24.6	33.5	0.6	8.0	0.4	1.4	68.5	155.9	35.4	0.0	191.3	259.8	9
<b>10 Total (7:9)</b>	<b>1,698.7</b>	<b>560.0</b>	<b>50.0</b>	<b>75.5</b>	<b>26.1</b>	<b>21.5</b>	<b>2,431.8</b>	<b>1,888.0</b>	<b>432.5</b>	<b>1,165.5</b>	<b>3,486.0</b>	<b>5,917.8</b>	<b>10</b>
11 Compensation of employees	652.5	456.3	27.2	97.4	11.7	23.7	1,268.6						11
12 Net taxes on production	-9.2	1.6	0.1	-4.1	-0.5	-0.7	-12.8						12
13 Consumption of fixed capital	147.4	203.3	3.8	18.3	2.2	5.2	380.2						13
14 Net operating surplus	233.4	304.2	11.9	39.9	5.6	4.1	599.1						14
<b>15 Gross value added</b>	<b>1,024.0</b>	<b>965.4</b>	<b>43.0</b>	<b>151.4</b>	<b>19.0</b>	<b>32.3</b>	<b>2,235.2</b>						<b>15</b>
<b>16 Output</b>	<b>2,722.7</b>	<b>1,525.4</b>	<b>92.9</b>	<b>227.0</b>	<b>45.1</b>	<b>53.9</b>	<b>4,667.0</b>						<b>16</b>
17 Employment	19.5	15.3	0.9	3.7	0.4	0.8	40.6						17
18 of which: employees	17.4	13.6	0.8	3.3	0.4	0.7	36.1						18

Note: Deviations of totals are due to rounding.

Source: BASYS, WifOR: NHA.

**Figure 21: Real NHA Input-Output-Table of the domestic output at 2005 prices, in bn Euro. 2010**

CPA	Intermediate use						Final use						
	commodities						Total	Final consumption expenditure	Gross capital formation	Exports	Final use	Total use	
	NHE		CHE		EHE								
	GT	S	GT	S	GT	S	7	8	11	14	15	16	
CPA	1	2	3	4	5	6	7	8	11	14	15	16	
1 NHE – Goods and trade	874.0	121.1	17.4	14.8	12.1	5.3	1,044.7	534.4	247.1	769.4	1,798.0	2,595.6	1
2 NHE – Services	300.5	323.4	11.2	19.7	6.1	8.1	669.0	697.3	26.6	68.3	818.7	1,461.2	2
3 CHE – Goods and trade	2.1	0.5	5.2	10.1	0.3	0.2	18.3	30.7	-3.0	44.6	69.4	90.7	3
4 CHE – Services	1.0	4.3	0.0	7.6	0.0	0.8	13.8	205.5	0.9	0.0	207.2	220.2	4
5 EHE – Goods and trade	4.4	2.3	0.2	2.4	0.8	0.3	10.5	15.2	9.3	7.4	41.1	42.3	5
6 EHE – Services	1.8	3.6	1.6	1.7	0.2	2.7	11.6	35.0	1.4	2.8	40.7	50.8	6
<b>7 Total (1:6)</b>	<b>1,183.9</b>	<b>455.1</b>	<b>35.8</b>	<b>56.3</b>	<b>19.4</b>	<b>17.3</b>	<b>1,767.9</b>	<b>1,518.1</b>	<b>282.2</b>	<b>892.6</b>	<b>2,975.2</b>	<b>4,460.8</b>	<b>7</b>
8 Imports	374.1	77.6	10.5	9.5	4.7	1.8	478.1	133.4	111.9	241.2	598.4	964.6	8
9 Net taxes on products	20.6	28.2	0.6	6.8	0.3	1.2	57.7	129.3	30.6	0.0	190.5	217.6	9
<b>10 Total (7:9)</b>	<b>1,577.8</b>	<b>560.8</b>	<b>46.8</b>	<b>72.6</b>	<b>24.5</b>	<b>20.3</b>	<b>2,302.8</b>	<b>1,780.8</b>	<b>424.7</b>	<b>1,133.8</b>	<b>3,764.1</b>	<b>5,642.1</b>	<b>10</b>
<b>11 Gross value added</b>	<b>1,017.8</b>	<b>900.4</b>	<b>43.8</b>	<b>147.6</b>	<b>17.9</b>	<b>30.5</b>	<b>2,158.0</b>						<b>11</b>
<b>12 Output</b>	<b>2,595.6</b>	<b>1,461.2</b>	<b>90.7</b>	<b>220.2</b>	<b>42.3</b>	<b>50.8</b>	<b>4,460.8</b>						<b>12</b>

Note: Deviations of totals are due to rounding.

Source: BASYS, WifOR: NHA.

## 9. Literature and selected references

- Barro, R. J.* (2013), Health and Economic Growth, *Annals of Economics and Finance* 14-2(A): 305-342.
- BASYS, GÖZ, IEGUS* (2013), Messung der Produktivitätsentwicklung der Gesundheitswirtschaft, Studie im Auftrag des Bundeswirtschaftsministeriums, Augsburg.
- Bührlen, B., Hegemann, T., Henke, K.-D., Kloepfer, A., Reiss, T., Schwartz, F.W.* (2014), Gesundheit neu denken, Fragen und Antworten für ein Gesundheitssystem von morgen, Fraunhofer Verlag, 2. Aufl., Stuttgart.
- Bundesagentur für Arbeit* (2013), Der Arbeitsmarkt in Deutschland – Fachkräfteengpassanalyse Dezember 2013, Nürnberg.
- Burkhart, M., Ostwald, D. A., Ehrhard, T.* (2012), „112 – und niemand hilft“, herausgegeben von PricewaterhouseCoopers AG Wirtschaftsprüfungsgesellschaft (PwC) in Kooperation mit dem Wirtschaftsforschungsinstitut WifOR.
- Cutler, D., Deaton, A., Lleras-Muney, A.* (2006), The determinants of mortality. *The Journal of Economic Perspectives* 2006; 20: pp. 97-120.
- Cutler, D.M., McClellan, M.* (2001), Is technological change in medicine worth it? *Health Affairs* 2001; 20: pp. 11-29.
- Deutsche Herzstiftung e.V.* (2014), Deutscher Herzbericht 2014. Sektorübergreifende Versorgungsanalyse zur Kardiologie und Herzchirurgie in Deutschland, Frankfurt am Main.
- Durand-Zalewski, I., Chevreur, K., Jeanblanc, G.* (2009), Financing for Health in All Policies, in: Kickbusch, I., Hrsg., *Policy Innovation for Health*, Springer 2009, S. 67-94.
- European Commission et al.* (2009), *System of National Accounts 2008*, New York.
- European Commission* (2013), *European system of accounts, ESA 2010*, Publications Office of the European Union, Luxembourg.
- Ganten, D., Niehaus, J.* (2014), Die Gesundheitsformel. Die großen Zivilisationskrankheiten verstehen und verhindern. München, 2014.
- Gethmann, C.F. et al.* (2004), *Gesundheit nach Maß? Eine transdisziplinäre Studie zu den Grundlagen eines dauerhaften Gesundheitssystems*, Berlin, S. 241-323.
- Henke, K.-D.* (2005), Kosten, Nutzen, Evaluation und Finanzierung von Prävention: Wirtschaftlicher Nutzen und Evaluationsprobleme eines Evaluationsgesetzes, in: Pitschas R. (Hrsg.), *Prävention im Gesundheitswesen – Leitvorstellungen und Eckpunkte für ein Präventionsgesetz des Bundes*, Deutsche Hochschule für Verwaltungswissenschaften Speyer, Speyerer Arbeitsheft Nr. 174, S. 185-208.
- Henke, K.-D., Martin, K.* (2007), *Gesundheitsökonomische Szenarien der Prävention*, Nomos, Baden-Baden.
- Henke, K.-D., Troppens, S., Braeseke, G., Dreher, B., Merda, M.* (2011), *Innovationsimpulse der Gesundheitswirtschaft – Auswirkungen auf Krankheitskosten, Wettbewerbsfähigkeit und Beschäftigung*, Ergebnisse des gleichnamigen Forschungsprojektes im Auftrag des Bundeswirtschaftsministeriums. Herausgeber: Bundeswirtschaftsministerium (BMWi), Berlin.
- Hesse, S.* (2013), *Input und Output der Gesundheitswirtschaft, Eine Stabilitätsanalyse der Gesundheitswirtschaft in Bezug auf die gesamtwirtschaftliche Bedeutung in den Jahren der Finanz- und Wirtschaftskrise*, Dissertation der Universität Koblenz-Landau, 2012, veröffentlicht im Rahmen der Reihe *Sozialökonomische Schriften* (46) im Verlag Peter Lang, Frankfurt am Main.
- Kalache, A., Kickbusch, I.* (1997), A global strategy for healthy ageing, in: *World Health* 1997; 50: 2.
- Karmann, A., Wolf, D.* (2013), *Demografischer Wandel: Beschäftigungspotenziale im sächsischen Gesundheitswesen – Eine Analyse für die Vorsorge- und Rehabilitationseinrichtungen*, Statistik in Sachsen, S. 19-4.
- OECD, Eurostat, WHO* (2011), *A System of Health Accounts – Version 1.0*, OECD Publishing, Paris.
- Ostwald, D. A., Henke, K.-D., Kim, Z.-G.* (2013), *Vom Gesundheitssatellitenkonto zur Gesundheitswirtschaftlichen Gesamtrechnung*, Bundeswirtschaftsministerium, Berlin.
- Peeters, G. et al.* (2013), A life-course perspective on physical functioning of women, in: *Bulletin of the World Health Organization*, 2013; 91: 661-670.
- Reich U.-P.* (2001), *National Accounts and Economic Value – A Study in Concepts*, Palgrave, New York.

Roland Berger, TU Berlin, BASYS (2009), Erstellung eines Satellitenkontos für die Gesundheitswirtschaft in Deutschland, Abschlussbericht eines Forschungsprojektes im Auftrag des Bundeswirtschaftsministerium (BMWi), Berlin.

Romano, P. S., Hussey, P., Ritley D. (2010), Selecting quality and resource use measures: A decision guide for community quality collaboratives. US Department of Health and Human Services, Agency for Healthcare Research and Quality.

Rutten, M., Reed, G. (2009), A comparative analysis of some policy options to reduce rationing in the UK's NHS: Lessons from a general equilibrium model incorporating positive health effects, *JHE* 28(1): 221-233.

Schneider, M., Karmann, A., Braeseke, G. (2014), Produktivität der Gesundheitswirtschaft, Gutachten für das Bundeswirtschaftsministerium, Springer Gabler Verlag, Heidelberg.

Schneider, M., Hofmann, U., Köse, A., Krauss, T., Brecht J. G. (2015), Die Bedeutung der Prävention und Gesundheitsförderung für die wirtschaftliche Entwicklung Baden-Württembergs – Eine Argumentationshilfe auf Landes- und Kreisebene -, Studie gefördert vom Ministerium für Arbeit und Sozialordnung, Familie, Frauen und Senioren und der Robert Bosch Stiftung, Augsburg.

Smith, R. D., Yago, M., Miller, M., Coast, J. (2005), Assessing the macroeconomic impact of a health care problem: The application of computable general equilibrium analysis to antimicrobial resistance, *JHE* 24(6): 1055-75.

Statistisches Bundesamt (2014), Gesundheit – Ausgaben 2012 – Fachserie 12 Reihe 7.1.1, Wiesbaden.

Statistisches Bundesamt (2014b), Fachserie 18 Reihe 1.4: Volkswirtschaftliche Gesamtrechnungen – Inlandsproduktberechnung Detaillierte Jahresergebnisse 2013, Veröffentlichungsstand Mai 2014, Wiesbaden.

Statistisches Bundesamt (2014c), Fachserie 18 Reihe 2: Input-Output-Rechnung 2010, Veröffentlichungsstand Januar 2014, Wiesbaden.

SVR-Wirtschaft (2012), Stabile Architektur für Europa – Handlungsbedarf im Inland, Jahresgutachten 2012/13, Wiesbaden.

Temurshoev, U., Timmer, M. P. (2010), Joint estimation of Supply and Use Tables, Groningen.

Weil, D. (2007), Accounting for the Effect of Health on Growth, *Quarterly Journal of Economics* 122: 1265-1306.

WifOR, TU Berlin, Roland Berger Strategy Consultants (2013), Vom Gesundheitssatellitenkonto zur Gesundheitswirtschaftlichen Gesamtrechnung Hauptergebnisse des Forschungsprojektes des Bundeswirtschaftsministeriums (BMWi) „Nutzung und Weiterentwicklung des deutschen Gesundheitssatellitenkontos (GSK) zu einer Gesundheitswirtschaftlichen Gesamtrechnung (GGR)“, Herausgeber: Bundeswirtschaftsministerium (BMWi), Berlin.

