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Healthcare expenditure projections up to 2060

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Contents

List of abbreviations

AHV:	Federal Old Age and Survivors' Insurance
AHV-HE:	AHV Helplessness Allowance
AWG:	Ageing Working Group of the European Union (Economic Policy Committee and European Commission – Directorate General for Economic and Financial Affairs)
DRG:	Diagnosis-Related Groups, i.e. service-related flat rates or flat-rate payments per case; the Swiss system of flat-rate payments per case is known as Swiss DRG.
EL:	Supplementary Benefits
ESA:	European System of Accounts
EU:	European Union
FFA:	Federal Finance Administration, Federal Department of Finance
FC:	Federal Council
FOPH:	Federal Office of Public Health, Federal Department of Home Affairs
FTA:	Full-Time Equivalents
GDP:	Gross Domestic Product
HeL:	Healthcare excluding Long-Term Care
IPR:	Individual Premium Reduction
IV:	Federal Disability Insurance
IV-HE:	IV Helplessness Allowance
HIA:	Federal Health Insurance Act
KOF:	KOF Swiss Economic Institute
LTC:	Long-Term Care from the Age of 65
MC:	Managed Care (Integrated Care)
Obsan:	Swiss Health Observatory
OKP:	Mandatory Basic Healthcare Insurance
Seco:	State Secretariat for Economic Affairs, Federal Department of Economic Affairs
SFSO:	Swiss Federal Statistical Office, Federal Department of Home Affairs
SUVA:	Swiss Accident Insurance Fund
Swiss DRG:	see DRG

Summary

Following their first publication in 2008 (Colombier and Weber, 2008), the expenditure projections for the Swiss healthcare system are now available for the second time. These have been drawn up in collaboration with the Federal Office of Public Health. The expenditure projections form the basis for the healthcare development scenarios unveiled by the Swiss Federal Council as part of the legislature financial planning process (FC 2012: Legislature Financial Plan 2013–15, Paragraph 9.1.2 and Appendix 7, publication: January 2012), following on from a similar undertaking in 2008. The legal basis for the development scenarios is Article 8 of the Financial Budget Ordinance which entered into force in April 2006 (see footnote 5, page 15). The development scenarios are designed to capture longer-term trends such as demographic development, which only feed through into the budget and financial plan to a limited degree, with a view to assessing their repercussions for the public finances.

A key concern of this study is to evaluate the increase in healthcare expenditure as a result of an ageing Swiss population and to highlight the resulting financial burden for the public finances and mandatory basic healthcare insurance. In addition, the study also shows the adjustment levers through which healthcare policy can influence expenditure development in the healthcare system. In addition to the ageing of the population per se, the costs of healthcare are also significantly influenced by the relationship between increasing life expectancy and the state of health of the population (morbidity rate) on the one hand, and non-demographic cost drivers such as advances in medical technology and Baumol's cost disease (the "Baumol Effect") on the other.

The expenditure projections span the period 2009-2060 and constitute a look into the future, an undertaking which is by definition subject to a number of uncertainties. For example, these uncertainties include assumptions on macroeconomic developments and cost drivers, as well as to a lesser extent assumptions on the demographic scenarios put forward. Accordingly, these projections should not be understood as forecasts, but instead represent an extrapolation of long-term trends and their repercussions for healthcare expenditure. As a consequence, these projections neither can nor should allow any conclusion to be drawn with respect to the precise level of healthcare expenditure in 50 years' time. Their aim is rather to provide a rough

orientation for expenditure development and to show how sensitively expenditure development reacts to a variety of cost drivers. With this in mind, various scenarios have been drawn up based on the assumption that the prevailing regulatory status quo in healthcare will not change (status quo scenarios, "no policy change"). Furthermore, this study for the first time sets out efficiency scenarios which attempt to assess the cost savings achievable as a result of various reform measures, such as the promotion of managed care models (integrated care). Other key differences to the previous study include the integration of projections for mandatory basic healthcare insurance and a comparison with other Swiss studies on this issue.

Where expenditure projections are concerned, a so-called "cohort approach" has been adopted in line with the standard international practice of the EU (AWG, 2012) and the OECD (Oliveira Martins et al., 2006). In order to determine the additional burden for the public finances and mandatory basic healthcare insurance, expenditure projections have to be made in a first step for the healthcare system overall. In keeping with standard international practice, the expenditure projections are drawn up for two different areas, namely "healthcare excluding long-term care" and "long-term care from the age of 65".

In the following Table Z1, the results are given for the "Reference scenario" of these projections, broken down by area and financing sources.

Table Z1: Expenditure on healthcare in the reference scenario by area and source of financing

Level	2009	2060	Change 2009–2060	
	in % of GDP			in %
Total healthcare	**11.3***	**15.8**	**+4.5**	**40**
Healthcare excluding long-term care	9.5	11.4	+1.8	19
Long-term care (from 65 and upwards)	1.5	4.3	+2.7	180
Government (including social welfare)	**3.5***	**5.6**	**+2.1**	**60**
Confederation	0.4	0.6	+0.1	50
Cantons	2.3	3.9	+1.7	70
Communes	0.3	0.6	+0.3	100
AHV-IV	0.4**	0.5	+0.1	25
Mandatory basic healthcare insurance (OKP)	**3.3+**	**4.6**	**+1.3**	**39**
Other expenditure	**4.5**	**5.6**	**+1.1**	**24**
Private households	*2.8++*	*4.0*	*+1.2*	*43*
Mandatory accident insurance, supplementary insurance, private foundations	1.7	1.6	-0.1	-6

* Including expenditure on care for persons below 65. Social welfare excluding OKP and SUVA

** Helplessness allowance, contributions to medical services and therapeutic equipment

\+ Excluding participation in the public sector in the form of individual premium reduction, which is assigned to the government sector.

++ Cost contribution of OKP and out-of-pocket payments (OOP); excluding transfers of social security for OOP.

As expected, the projections show that the ageing of the population is the strong cost driver in healthcare. This is particularly true for the long-term care of the population from the age of 65. More than two thirds of the increase in expenditure in this area is attributable to the ageing of the population. Accordingly, the projections indicate that expenditure on long-term care as a proportion of GDP will triple between 2009 and 2060. When healthcare excluding long-term care is considered, more than half of the cost increase can be explained by non-demographic cost drivers such as advances in medical technology. Ageing does have a major role to play here too, but the overall average nominal increase over the projection timeframe, which works out at 3 %, is much lower than the equivalent 4.5 % in the case of long-term care. The development in long-term care from the age of 65, combined with the additional burden for the cantons following the introduction of the new arrangement for the financing of care and for new hospital financing (Swiss DRG), will result in the financing burden for the public sector increasing by a disproportionate amount compared to the burden on mandatory basic healthcare insurance and on private households. Particularly affected by the additional public sector burden are the finances of the cantons, which currently meet some 66 % of public expenditure on healthcare. The strong momentum in the cost development of long-term care is likewise reflected in the finances of the communes and the AHV helplessness allowance, for which expenditure will double and treble respectively. In comparison, the cost pressures for the Confederation will be less pronounced, as its involvement in the healthcare system is largely focused on individual premium reduction. As a significantly lower proportion of expenditure on mandatory basic healthcare insurance will be channelled into the financing of care than is the case in the public sector, the projections show that expenditure on basic insurance will increase less strongly, which in turn means that expenditure on individual premium reduction will rise less strongly.

Moreover, the projections reveal that healthcare policy can mitigate the cost pressures via the following adjustment levers:

- The way the population's state of health develops as life expectancy increases has a strong impact on the development of healthcare expenditure. Accordingly, preventative healthcare measures can make a substantial contribution to keeping healthcare costs in check.

- In view of the anticipated scarcity of healthcare personnel and a phenomenon known as Baumol's cost disease, additional pressure on healthcare expenditure can be expected as a result of above-average increases in wage costs. This pressure can be alleviated by forward personnel planning so as to ensure a sufficient supply of younger workers in the healthcare area. Close collaboration between the Confederation and the cantons is also essential in this context.

- The question of immigrant labour is also closely interconnected with the anticipated scarcity of healthcare personnel. According to the projections of this study, a higher net level of immigration is unlikely to bring about a reduction in cost pressure in the area of healthcare. This is explained by the fact that stronger economic momentum as a result of immigrant labour is almost wholly offset by the associated income effects, such as an increased demand for healthcare services. However, if net immigration were to be largely concentrated on workers in the healthcare area, the picture would improve if this development were to reduce the wage pressure problem referred to above.

- The projections continue to suggest that major cost savings could be realised by supply-side reforms, i.e. through efficiency increases in the healthcare system.

- Finally, cost pressures in long-term care from the age of 65 can be reduced by focusing more strongly on the provision of long-term care within the home.

The efficiency scenarios indicate that reform measures such as the introduction of electronic patient files (as part of an "eHealth" strategy), the promotion of managed care models, and the introduction of the new hospital financing system could result in cost-saving effects, but at a comparatively low level. According to the projections, the greatest savings would be achieved in the area of mandatory basic healthcare insurance. However, the efficiency scenarios are subject to a methodological reservation: The cohort approach applied here does not allow a picture to be painted of how the players in the healthcare industry would react to reforms. In this context a dynamic microsimulation model would be more suitable. Such a model has yet to be developed for the Swiss healthcare system, however.

In a comparison with the latest projections on public healthcare expenditure by countries of the EU, it becomes clear that the increase in expenditure on healthcare (excluding long-term care) in Switzerland is significantly higher than for the average eurozone country. This could be attributable to differences in underlying assumptions on demographic development and to a different expenditure structure in the base year. By contrast, as a result of developments in long-term care for people aged 65 and upwards, the additional financing burden on the public finances (incl. OKP) in the "Reference scenario" is broadly the same in Switzerland as it is for countries of the eurozone.

The comparison with other studies on the long-term development of Swiss healthcare expenditure shows that the divergent results are first and foremost attributable to differences in the modelling of non-demographic cost drivers. In a number of studies, a trend extrapolation is applied for the non-demographic cost drivers. However, this method has the severe drawback that spill-over effects between demographic and economic development as well as the dynamic development of expenditure in healthcare are not taken into account. For this reason, an approach has been selected for this study which takes account of these interrelationships. Whatever the approach adopted, however, considerable uncertainties remain with respect to the impact of a number of supply-side cost drivers, particularly advances in medical technology.

1 Introduction*

Among the countries of the OECD, Switzerland has the third most expensive healthcare system as a proportion of gross domestic product (GDP) at 10.7 %, behind only the USA (16.4 %) and France (11.1 %) (data taken from 2008).[1] This puts Swiss healthcare expenditure significantly above the OECD average of 8.8 % of GDP (33 countries). On a per capita basis, Switzerland actually spent the second-highest amount of any OECD country in 2008, namely USD 3,740 (in purchasing power parities of the year 2000), behind only the USA at USD 6,300. As in almost all developed nations, healthcare in Switzerland is exposed to strong upward cost pressures. For example, expenditure on healthcare expressed as a proportion of gross domestic product (GDP) more than doubled in Switzerland between 1960 and 2009, from 4.8 % to 11.4 % (see Figure 1). This development is likely to be attributable to a number of factors specific to healthcare provision. For one thing, the provision of healthcare services has a long track record of market failures.[2] In addition, a number of distributional objectives were defined with the introduction of the Federal Health Insurance Act (HIA) in 1996.[3] If the failure of the market is to be corrected and the distributional objectives achieved, strong government regulation will be required. When regula-

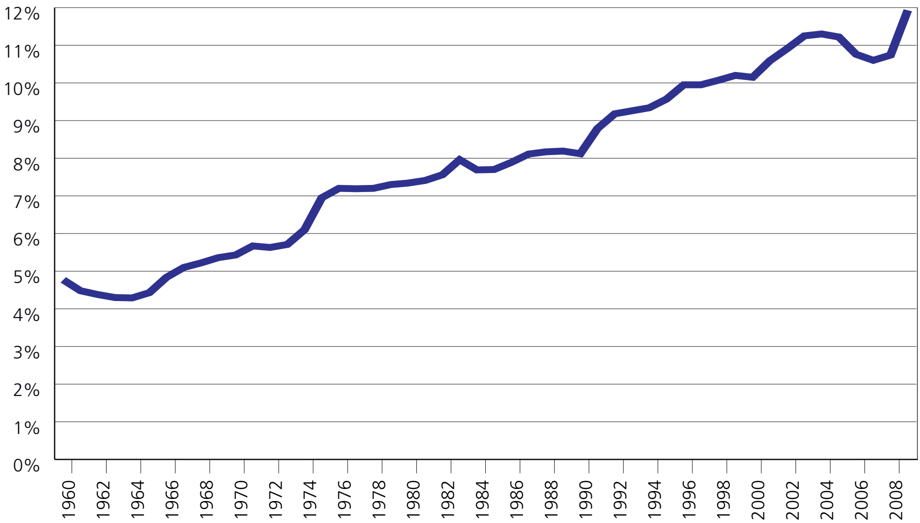
* The expenditure projections for healthcare were drawn up in collaboration with the Federal Office of Public Health. At this point I would like to offer my warm thanks for the valuable commentaries and suggestions put forward by the support group of the FOPH under Stefan Spycher. This working paper likewise benefited from the constructive contributions of France Weaver and Marc Wildi, who examined the 2012 development scenarios and the projection methodology applied here. Finally I would like to thank my colleagues from the Economic Analysis and Policy Advice department of the FFA for their valuable input. Any errors or faults that remain are the sole responsibility of the author. In addition, the usual disclaimer applies (see inside of front cover).

1 The year 2008 is used for the comparison of expenditure as a percentage of GDP, as the most recent available data at the point this data was drawn from the OECD healthcare statistics in 2009 is heavily influenced by the financial and economic crisis.

2 For more on market failures in healthcare and their macroeconomic significance see Hsiao and Heller (2007), for example.

tion is being drawn up, there is a risk that the influence of powerful lobbying associations in the health-care industry and interest-led policy will result in the objectives of the regulation not being met and health-care expenditure actually mushrooming. Market failure would then be compounded by subsequent political or government failure.[4] But even if politicians act solely with the benefit of the people in mind, it is difficult to structure reforms with any degree of exactitude given the complexity of the healthcare system and the associated transaction costs involved. On top of this comes the fact that growing prosperity leads to greater demands of the healthcare system being made by the population.

Figure 1: Swiss healthcare expenditure from 1960 to 2009 (in GDP %)



Source: SFSO

3 According to these objectives, access to high-quality healthcare provision should be guaranteed (provision objective), and individuals with modest incomes should be financially supported (solidarity objective). In addition, the increase in healthcare expenditure should be contained (cost containment objective).

4 For a detailed treatment of distributional aspects, market failures, and government failures in healthcare see Rice (2003).

An additional challenge confronting the financing sources of the healthcare system, such as the public finances and mandatory basic healthcare insurance (OKP), is an ageing Swiss population. According to the medium base scenario of the Swiss Federal Statistical Office (SFSO) (A-00-2010), the over 80-year-old segment of the population alone is expected to more than double between 2009 and 2060, from just under 5 % to just under 12 %. This much can also be adduced from the fact that in 2009 there were around three full-time equivalent workers for every pensioner, whereas this ratio will amount to just 1.5 to 1 by 2060 according to the SFSO's demographic scenario A-00-2010. Accordingly, healthcare is an area in which the state will have to grapple with major financial policy challenges in the foreseeable future.

This consideration motivated the Swiss Federal Council to once again draw up development scenarios for healthcare as part of the legislature financial planning process (FC 2012: Legislature Financial Plan 2013–15, Paragraph 9.1.2 and Appendix 7), following on from a similar undertaking in 2008. The legal basis for these so-called development scenarios is Article 8 of the Financial Budget Ordinance, which entered into force in April 2006.[5] The development scenarios are designed to capture longer-term trends such as demographic developments, which only feed through into the budget and financial plan to a limited degree, with a view to assessing their repercussions for the Swiss public finances. The Federal Council first presented development scenarios for healthcare as a part of the report on the Legislature Financial Plan 2009–2011 (FC, 2008).

5 Article 8 of the Financial Budget Ordinance reads as follows:
1 To supplement the Financial Plan, the Federal Council will periodically submit, at a minimum every four years, longer-term development scenarios for certain task areas.
2 The development scenarios stretch several years beyond the Financial Plan, and will be drawn up on the basis of the longer-term development of the finances of all three levels of government as well as the social security funds.
They highlight the development trends with their financial consequences as well as potential controlling and correction measures.

This study sets out the basis for the development scenarios. The time horizon selected is the period 2009–2060. The purpose of the expenditure projections is to highlight the future financial additional burden on the public finances and mandatory basic health insurance (OKP), but also on society overall and therefore Swiss households, as a result of the anticipated cost pressures in the area of healthcare. In addition, the study also aims to highlight the adjustment levers with which healthcare policy can influence expenditure development in the area of healthcare.

However, this focus on the problem of rising healthcare costs should not blind us to the fact that a well-functioning healthcare system is of great benefit to society, insofar as it preserves and improves the state of the population's health. Indeed, given that it can improve the health of the population, healthcare can actually have a positive impact on economic growth (Suhrcke et al., 2006). It has been demonstrated, for example, that the preservation of a good state of health promotes the formation of human capital and productivity. In addition, a healthcare system helps a society exploit the full potential of its labour force by reducing illness-related absenteeism. As a consequence, the rising costs of healthcare provision are not disadvantageous as long as they can be set against an increase in social wellbeing of at least a similar magnitude.

In addition to providing a detailed commentary on the results, which have already been presented in brief in the 2012 development scenarios (FC, 2012), this study also looks at the methodological aspects of the projections and undertakes a comparison with the results of the EU and other Swiss studies. Projecting future developments is inevitably bound up with uncertainties, particularly over such a long timeframe. Accordingly, these projections should not be understood as forecasts, but instead represent a projection of long-term trends and their repercussions for healthcare expenditure. As a consequence, these projections neither can nor should allow any conclusion to be drawn with respect to the precise level of healthcare expenditure in 50 years' time. Their aim is rather to provide a rough orientation for expenditure development and to show how sensitively expenditure development reacts to a variety of cost drivers. Various scenarios involving different underlying assumptions for the repercussions of cost drivers have therefore been drawn up. These scenarios illustrate how healthcare expenditure would change if the political parameters relevant to the healthcare system were to undergo no change compared to the current status quo (status quo scenarios, "no policy change"). Unlike in the expenditure projections drawn up in 2008, efficiency scenarios are also taken into account here. In these scenarios, an attempt is made to illustrate the cost-saving effects that current attempts at reform (such as the promotion of managed care models) could have on long-term expenditure development. Furthermore, these projections differ from those of 2008 in that expenditure projections for mandatory basic healthcare insurance (OKP) are presented for the first time. There are also a number of other differences, in particular with respect to certain details in the construction of the scenarios.

It should additionally be borne in mind that the selected methodology is subject to certain limitations. As already mentioned, projecting future scenarios inevitably involves a number of uncertainties. That said, a proportion of demographic development is already established on the basis of past developments, which increases the reliability of demographic scenarios. Uncertainties nonetheless remain, particularly with respect to migration assumptions. Other uncertainties include predictions on macroeconomic development, which likewise have an impact on non-democratic cost drivers. Even assuming that the course of Swiss macroeconomic development were known, there would still be considerable uncertainty over the non-demographic cost drivers, the magnitude of the cost effects, and the way these should be modelled. This is particularly true of advances in the area of medicine. For that reason, studies such as Vuilleumier et al. (2007) undertake a trend extrapolation for the effects of non-demographic cost drivers. In our view, however, this approach has a crucial flaw in that it fails to take account of the interrelationships between demographic development, macroeconomic development, and healthcare expenditure. This can result in contradictions arising between the assumptions made. For that reason, this study has deliberately adopted an approach that takes into account the above-mentioned interrelationships.

Viewed in overall terms, the current projections confirm the results of the predecessor study (Colombier and Weber, 2008). The area of long-term care from the age of 65 is particularly influenced by the ageing of the population. Where healthcare excluding long-term care is concerned, ageing is likewise a factor in the mix, but here the non-demographic cost drivers such as advances in medical technology are more important. This characteristic gives a wider range of options to policymakers than if expenditure development were purely driven by demographics. In terms of the public finances, it is the cantons that are particularly affected. The efficiency scenarios indicate that reforms such as the promotion of managed care have rather a limited impact. In the long term, savings are most likely to be realised in the OKP.

This study is structured as follows. In Section 2, the methodology applied in the expenditure projections is explained. In Section 3, the ageing of the Swiss population is highlighted along with the key cost drivers in Switzerland's healthcare system. Section 4 looks at the status quo scenarios. Sections 5 to 7 focus on the results of the expenditure projections for the healthcare system overall, for the public finances, and for the OKP. Section 8 sets out the efficiency scenarios. A comparison of the results of this study with those of the predecessor study and other studies on the Swiss and EU healthcare systems is undertaken in Section 9. In the final section of this present paper some conclusions are drawn.

2 Projection methodology

2.1 The selected approach

In order for the results of this study to be comparable with the projections of the EU in particular, the methodology of these expenditure projections mirrors that of studies conducted by the Ageing Working Group of the EU (AWG, 2006, 2009, 2012) and the OECD (Oliveira Martins et al., 2006). This methodology is known as the cohort approach. Its distinguishing feature is that healthcare expenditure, broken down by so-called "age cohorts", is projected in line with population development over a longer timeframe, which in this study covers the period 2009-2060 (see Paragraph 2.2). Where the development of the Swiss population is concerned, the medium base scenario of the Swiss Federal Statistical Office (A-00-2010) has been adopted (see Table 1).

Table 1: Key figures for population scenarios

Population scenarios (SFSO)		**2010**		**2060**	
		Women	Men	Women	Men
A-00-2010					
Birth rate	1.5				
Net immigration p.a.					
2010–2030	from 50,600 to 22,500				
from 2030 p.a.	22,500				
Life expectancy at birth		84.6	80.3	90.2	86.1
Life expectancy at 65		22.2	19.2	26.8	23.7
Old-age dependency ratio[a] (in %)		27.5		53.1	
Youth ratio[b] (in %)		33.5		34.5	
Overall employment rate in FTEs (in %)[d]		49.4		44.1	
A-17-2010[c]		**2010**		**2060**	
		Women	Men	Women	Men
Birth rate	1.5				
Net immigration p.a.					
2010–2030	from 69,200 to 40,000				
from 2030 p.a.	40,000				
Life expectancy at birth		84.6	80.3	90.2	86.2
Life expectancy at 65		22.2	19.2	26.8	23.7
Old-age dependency ratio[a] (in %)		27.5		50.9	
Youth ratio[b] (in %)		33.5		34.4	
Overall employment rate in FTEs (in %)[d]		49.4		44.4	

Notes: [a] Number of people aged 65 and upwards per hundred 20 to 64-year olds; [b] Number of people aged up to 19 per hundred 20 to 64-year olds; [c] As for A-00-2010 excluding net migration and repercussions for old-age dependency and youth ratios; [d] Working population in FTEs (incl. workers of 65 and upwards) as a proportion of the overall population; FTEs:= full-time equivalents.

In order to evaluate the sensitivity of expenditure projections to a higher level of net immigration, an alternative population scenario has also been drawn up (A-17-2010). The project timeframe of around 50 years has been chosen so as to allow the costs of an ageing population to be fully factored in, particularly with respect to the baby boomer generation. In addition to ageing, other non-demographic cost drivers such as advances in medical technology are also taken into account. This also involves making certain assumptions regarding future macroeconomic development.

Table 2: Overall economic development from 2016 to 2060

Variable	Annual average 2016–2060[a]
Real GDP growth rate	
• as per A-00-2010	0.98%
• as per A-17-2010	1.23%
Productivity advances	1.00%
Real wage growth	1.00%
Inflation rate	1.50%

Notes: Real GDP growth rate = productivity advances p.a. x change in working population in FTEs p.a.
[a] From 2011 to 2015 the key figures of the Legislature Financial Plan 2013–15 are assumed. These are as follows for real and nominal GDP growth rates: 2011: 1.9 %, 2.5 %; 2012: 0.9 %, 1.4 %; 2013: 1.8 %, 2.8 %; 2014: 2.0 %, 3.5 %; 2015: 2.0 %; 3.5 %.

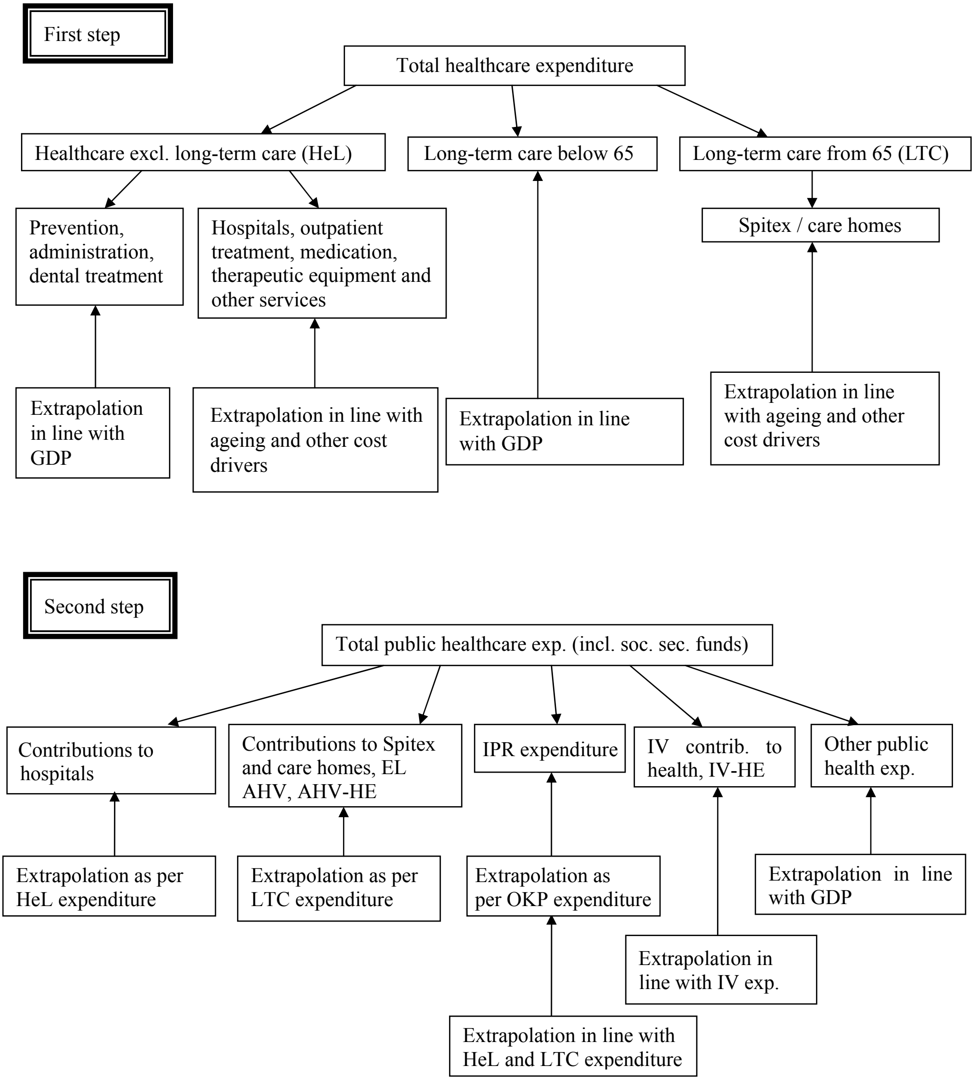
Where macroeconomic data such as gross domestic product (GDP) and wage developments is concerned, the assumptions are the same as those in the long-term outlook for Swiss public finances (see Geier and Zahno, 2012, 18).[6] For the years 2011 to 2015, the macroeconomic figures of the (federal) Legislature Financial Plan 2013–15 have been used, while for the years 2009 to 2010 the data from the national accounts of the SFSO has been used (see Table 2). From 2016 onwards, GDP growth rates have been derived from a combination of assumed productivity advances (1 % p.a.) and the development of the wage-earning population in full-time equivalents (FTEs) which result from the hypothesised population development scenarios. In the case of the GDP projections, a straightforward trend is replicated, and potential economic fluctuations are not factored in. For the years 2009 to 2015, the GDP trend is predicted with the existence of the so-called "k coefficient".[7]

Healthcare expenditure is typically expressed as a proportion of GDP. The reason for this is as follows: GDP is an indicator of total economic income. By expressing healthcare expenditure as a proportion of GDP, it can be seen how much a society is paying for its healthcare as a proportion of its income. This in turn shows how an increase in healthcare expenditure represents an additional burden on society as a whole, as well as for individual financing sources such as the public sector and the OKP. If healthcare expenditure is expressed as a proportion of GDP, this also strips out the effect of population growth on healthcare expenditure. This can be illustrated by means of a straightforward observation. If one assumes that all age cohorts of the population grow at the same percentage rate, the structure of the population will not change. Accordingly, the working age population as a proportion of the overall population will remain constant. In other words, GDP growth that derives from the increase in the working-age population will virtually match the increase in healthcare expenditure. As a consequence, the size of the population has no impact on the proportion between healthcare expenditure and GDP.

6 It should be pointed out here that the reverse also applies: a proportion of the expenditure projections for healthcare is in turn incorporated into the long-term outlook.

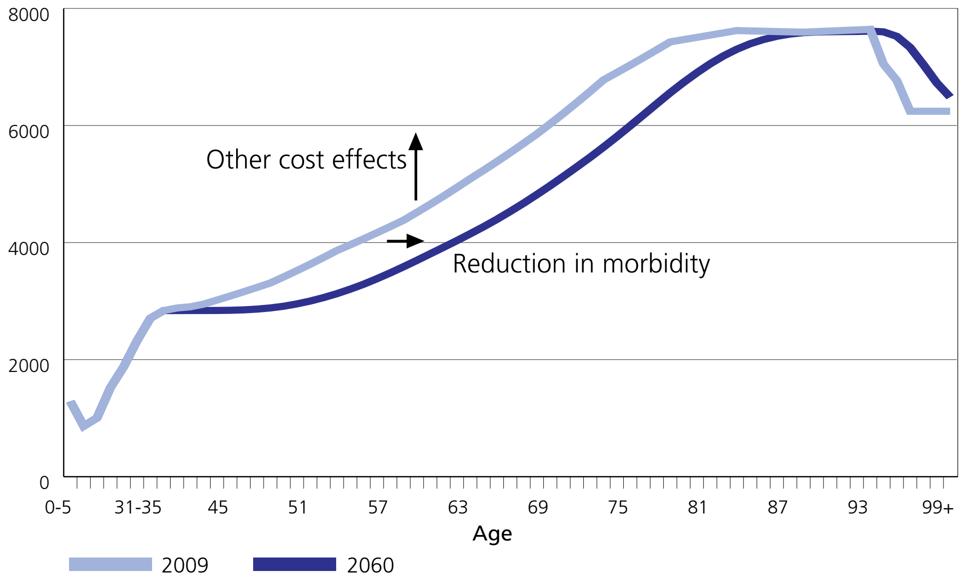
7 For an explanation of the "k" coefficient see Colombier (2006, 523), for example.

Figure 2: Schematic representation of projection methodology



As the different cost drivers and indeed the same cost drivers have a different level of impact on different areas of the healthcare system, healthcare expenditure in the expenditure projections is typically broken down into the areas of healthcare excluding long-term care (HeL) and long-term care from 65 years of age (LTC) (e.g. AWG, 2012) (see Figure 2).[8] All that remains is long-term care for the under-65 age group. In a first step, the overall expenditure for each area is projected on the basis of this breakdown. In a second step, the proportion of healthcare expenditure financed by the public sector and the OKP is carried forward in the form of projected expenditure for the entire healthcare system. Figure 2 provides an overview of the projection methodology.

Figure 3: Expenditure profiles outpatient treatment (per woman, in CHF)



Source: SFSO

8 For a formal representation of the project methodology see Appendix A1.

The data for healthcare expenditure is taken from the SFSO statistics for "Healthcare costs and services".[9] The most recent data available at the time the projections were drawn up relates to 2009, making this the base year for the projections. The graphic illustration of expenditure per capita of population (depending on age group) is described as the expenditure profile (see Figure 3).[10] In order to project the healthcare expenditure for the HeL and LTC areas, the expenditure profiles are further differentiated by gender as well as by outpatient and inpatient treatment. The latter distinction is required for the projections of public healthcare expenditure. If the per capita expenditure for the age cohorts of these expenditure profiles is multiplied by the development of the population in the relevant age cohorts according to the SFSO projections, the effect of the change of age structure and population size on healthcare expenditure can be established. Here it is assumed that population development has no influence on per capita expenditure and thus no impact on the price or the extent of services (e.g. therapies, medications) per capita. Consequently, this cost effect can be used to express how a change in the age structure of the population and the number of inhabitants in Switzerland will have the effect of changing overall demand for healthcare services. For the sake of simplicity, the expenditure on long-term care of the under 65-year-old age group is extrapolated in line with GDP.

The starting point for the projections is therefore the expenditure profiles broken down by age, gender, and inpatient and outpatient services. The SFSO breaks down these profiles into 5-year age cohorts. According to several epidemiological theories, the increase in life expectancy assumed in the demographic scenarios correlates closely with the development of the state of the population's health and therefore the population's morbidity rate (see Section 3.1). In order to reflect morbidity changes in the projections appropriately, however, healthcare expenditure needs to be annualised. Furthermore, the analysis of the impact of morbidity requires the establishment of the probability of an average person in

9 For an overview of the data base applied see Appendix A3, Table A3.

10 The expressions "expenditure per capita" and "expenditure per inhabitant" are used synonymously in this paper.

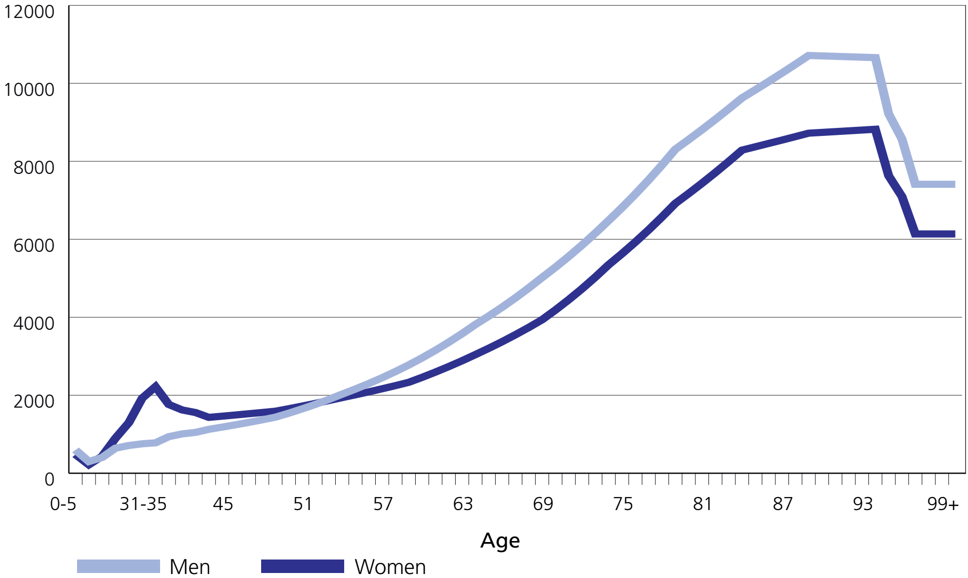
each age group falling sick or requiring care. However, as things stand there is virtually no data for such illness frequencies, which is why – just as in the studies of the EU (AWG, 2009, 2012) and the OECD (Martins et al., 2006) – the change in expenditure per inhabitant has to be used as a proxy for the change in morbidity (see Paragraph 4.2, Box 1).[11, 12] When extrapolating LTC expenditure, the EU approach differs from this study in that it applies care requirement ratios.

For the HeL area, the annualisation of the expenditure profiles is only carried out from the age of 40 upwards. The reason for this is the fact that the per capita expenditure of the base year 2009 is fairly low up to the age of 40, exhibiting a comparatively weak rise, with morbidity proving a problem for the elderly in particular. Where annualisation is concerned, it is assumed that the average expenditure of each five-year age cohort is equivalent to the expenditure incurred by the median age of this cohort. For those aged 96 and above, it is assumed that expenditure per capita remains constant. As a result of significant differences in life expectancy between the different age groups, as well as between men and women, it is not the change in average life expectancy of the population as a whole that is used to determine the effects of morbidity, but the change of life expectancy according to age group and gender. In the base year of 2009, the profile illustrated in Figure 4a reflects the per capita expenditure of inpatient treatment in hospitals for women and men. Figures 4b to 4d illustrate the expenditure profiles for the services of care homes and inpatient treatment in both HeL and LTC.

11 It should be stressed here that the modelling of changes of morbidity in both these projections and those of the OECD and the EU presuppose the following correlation. The expenditure per inhabitant, E/Pop, can be described as the product of expenditure per patient, E/Pat, and the probability of falling ill, P/Pop. A decline in the morbidity rate means a decline in P/Pop. Assuming that a change in the morbidity rate does not have an impact on the expenditure per patient, E/Pat, if all other things remain the same this leads to a proportional reduction in expenditure per inhabitant, E/Pop. If this premise is not correct, the effect of morbidity changes will be distorted in the expenditure projections.

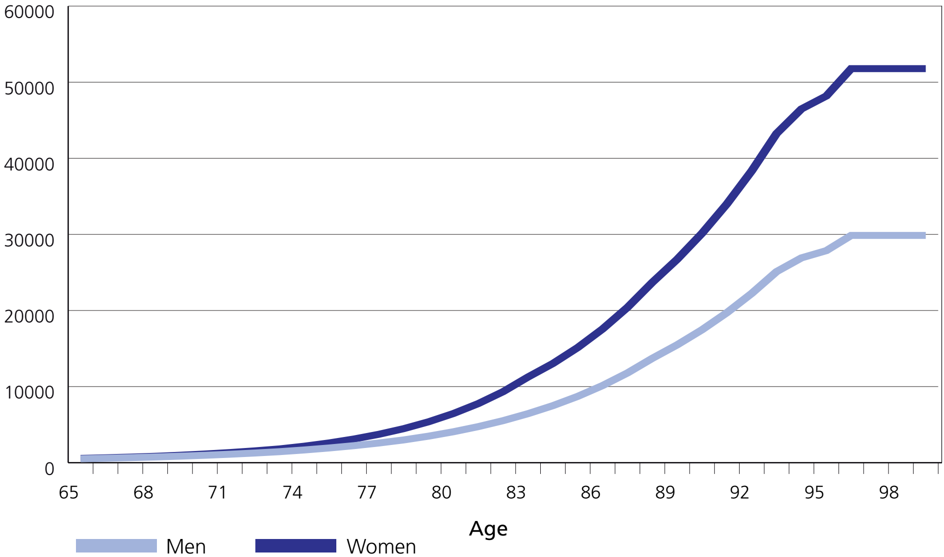
12 In a recent study, the Swiss Health Observatory has predicted the care requirement ratios for long-term care of Swiss people from the age of 65 up until the year 2030 (Bayer-Oglesby and Höpflinger, 2010).

Figure 4a: Expenditure profile for inpatient treatment in hospitals – base year 2009 (in CHF)



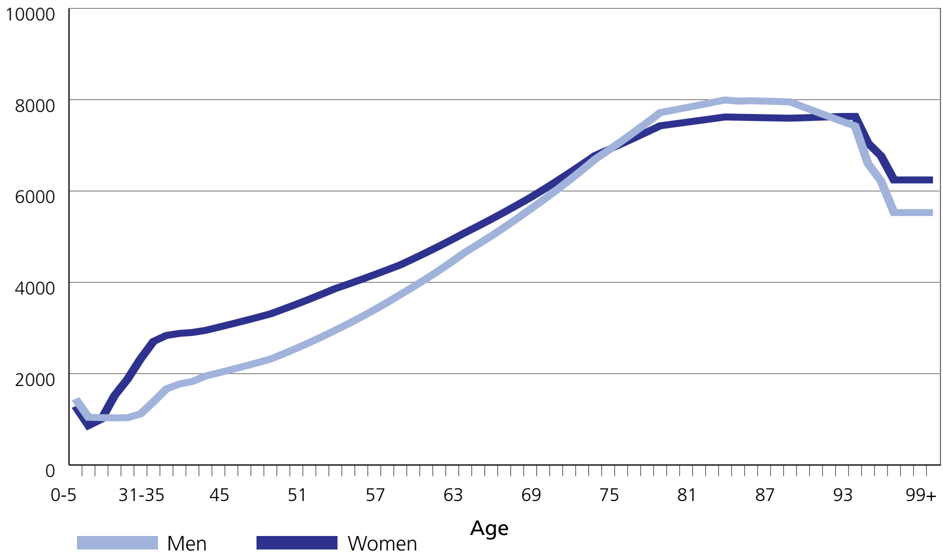
Source: SFSO

Figure 4b: Expenditure profile for inpatient treatment in care homes – base year 2009 (in CHF)



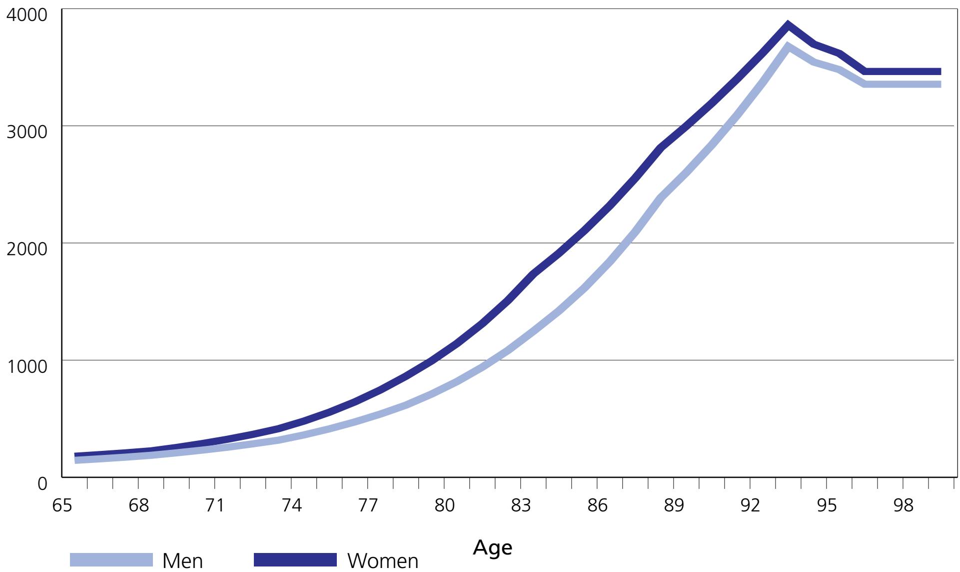
Source: SFSO

Figure 4c: Expenditure profile for outpatient treatment (healthcare excluding long-term care) – base year 2009 (in CHF)



Source: SFSO

Figure 4d: Expenditure profile for outpatient treatment (Spitex) long-term care from age of 65 – base year 2009 (in CHF)



Source: SFSO

In addition to the ageing of the population, various other important cost drivers in healthcare are also taken into account. These are examined more closely in Section 3. As there are a number of uncertainties regarding the extent of the impact of the various cost drivers, several different scenarios have been drawn up (see Section 4). Before taking a look at these cost drivers and the scenarios constructed around them, the next section discusses the projection approach adopted in this study.

2.2 Discussion of the approach

2.2.1 Classification of the projection methodology

In addition to the cohort model, various other models are also used for the projection of healthcare expenditure (see Astolfi et al., 2011, 14 et seq.). The choice of model is typically decided by the objective of the study and the availability of data. The different models can be classified according to both the degree of detail with which they replicate the structures of healthcare and in the forecasting horizon they apply:

- Component models (incl. cohort approach): For these projections, healthcare expenditure is broken down into various different areas of healthcare or/and into groups of individuals such as age cohorts. If age cohorts are used, the term "cohort approach" is used. The age cohorts can then be subdivided by applying further criteria such as gender or the type of healthcare services used. For each age cohort, per capita expenditure (average costs) is determined, which is then multiplied by the projected development of the age cohort in question in order to project future cost development. Such an approach is by its nature static, however, as the average costs do not change over the course of time. In order to make the average costs dynamic, further cost determinants such as advances in medical technology or a change in the morbidity rate are factored in. Models of this kind are particularly suitable for illustrating the effects of longer-term developments – such as the ageing of the population – on healthcare expenditure. A key drawback of this model is the fact that feedback effects, such as a response of private households to a rise in healthcare expenditure, cannot be factored in. In this respect, component models are very limited in their suitability for the analysis of healthcare policy measures, as the impact of the measures has to be given exogenously.

- Microsimulation models (dynamic): These models focus on the micro level, i.e. the level of an individual entity such as a private household or company. Dynamic models can be used to simulate how the characteristics of individual entities develop over time, for example. These models are able to illustrate how the state of health of individuals changes over an entire lifespan up to death, depending on a large number of factors such as age, gender, lifestyle habits, education, family, etc. A simulated individual is able to learn over the course of time and to change his or her pattern of behaviour accordingly. These simulations are used for a representative sample of an overall population, such as the population of a country. These models can be used to replicate the effects of an ageing population on healthcare expenditure. In addition, interactions between individuals and responses to political measures such as tax increases can be simulated. As a result, these models are particularly suitable for the analysis of longer-term repercussions of health policy measures. On the other hand, the data requirement for these models is very onerous, and developing such models is an extremely complex undertaking. For that reason, models of this kind have rarely been used up until now for the projection of healthcare expenditure.[13]

- **Macro models**: These models are time series models that can be used to draw up short-term forecasts for overall healthcare expenditure. Ideally, there should be no structural breaks in the underlying time series. Examples of such models in Switzerland include the OKP forecast model of the Zurich University of Applied Sciences in Winterthur, and the healthcare forecast model of the KOF Swiss Economic Institute of ETH Zurich (Wildi et al., 2004; Abrahamsen et al., 2005). The category of macro models also includes computable general equilibrium models. These models break down the economy into two sectors, healthcare and the remaining economy. Equilibrium models can provide insights into how an increase in healthcare expenditure has an impact on total economic income or social wellbeing via a reaction on the part of consumers and investors, for example. However, equilibrium models have a number of drawbacks. In particular, they rest on highly simplified assumptions regarding the behaviour of private households, companies and governments. Unlike microsimulation models, equilibrium models focus on the analysis of a representative individual rather than on the analysis of a representative population. In addition, the equilibrium is defined by parameters which do not change over the course of time. Finally, states of equilibrium are taken into account prior to and after a political intervention, but the same is not true of the adjustment process from one state of equilibrium to another.

13 For an example of a recent study, see Ministry of Health and Social Affairs, Sweden, 2010.

2.2.2 Identification of non-demographic cost drivers

In the light of the above, it is clear that both the cohort approach and a dynamic microsimulation model may be suitable for expenditure projections in the area of healthcare. Up until now, only the cohort approach has been pursued in the analysis of ageing in the Swiss healthcare system (see Table 3).

Table 3: Swiss healthcare expenditure – projections using the cohort approach

Study	Projected areas	Time horizon	Methodology for non-demographic factors	Death-related costs	Database (demographic scenarios/ expenditure)
Oliveira Martins et al. (2006)	Public expenditure on healthcare excluding long-term care and on long-term care from 65 years and upwards	2005–2050	Coupling of expenditure to projected GDP development, residual approach for advances in medical technology	Yes	National data/estimate, OECD data
Steinmann et al. (2007)	Healthcare excluding long-term care	2000–2030	Not taken into account	Yes	Münz & Ulrich (2001)/ health insurer, estimate
Steinman & Telser (2005)	OKP premium	2000–2030	Not taken into account	Yes	Münz & Ulrich (2001)/OKP statistics
Vuilleumier et al. (2007)	Overall expenditure	2004–2030	Extrapolation of trend 1997–2004	No	SFSO/SFSO healthcare statistics
Weaver et al. (2008)[1]	Long-term care from 65 and upwards	2005–2030	Extrapolation of OECD and Seco trend data	No	SFSO/Obsan
Colombier & Weber (2008, 2011)	Total expenditure, healthcare excluding long-term care, long-term care from 65 years and upwards, public expenditure by government level and healthcare area (OKP unpublished)	2005–2050	Coupling of expenditure to projected GDP development, assumption of correlation between GDP and advances in medical technology	Yes	SFSO/SFSO healthcare statistics, FFA financial statistics
Colombier (2012)	see Colombier/Weber (2008, 2011) plus OKP	2009–2060	see Colombier/Weber (2008, 2011)	No	SFSO/SFSO healthcare statistics, FFA financial statistics[2]

1 Weaver et al. (2008) rely on two predecessor studies (Fuhrer et al., 2003; Pelligrini et al., 2006). These earlier studies are not explored in this study. For a comparison see Weaver et al. (2008, 77 et seq.).
2 For more details on the database used in this study see Appendix A3.

In addition to differences in the level of detail and the time horizon applied, cohort studies also differ in the way non-demographic cost drivers are identified. This is a reflection of the fact that there is a greater degree of uncertainty surrounding non-demographic cost drivers than there is for demographic cost drivers.

Essentially, a distinction can be made between two approaches for identifying non-demographic cost drivers (see Table 3). As part of the residual approach, the expenditure trend attributable to non-demographic cost drivers is extrapolated from the past (Vuilleumier et al., 2007). In other words, the expenditure impact of the non-demographic cost drivers is captured in the form of a residual value, the residual growth rate, which cannot be explained by demographic cost determinants. In the second approach, a correlation is assumed to exist between projected overall economic development, non-demographic cost determinants and expenditure dynamism in healthcare. As well as being used for this study, this approach is also adopted by the OECD (Oliveira-Martins et al., 2006) and by the Ageing Working Group (AWG) of the EU (AWG, 2012).

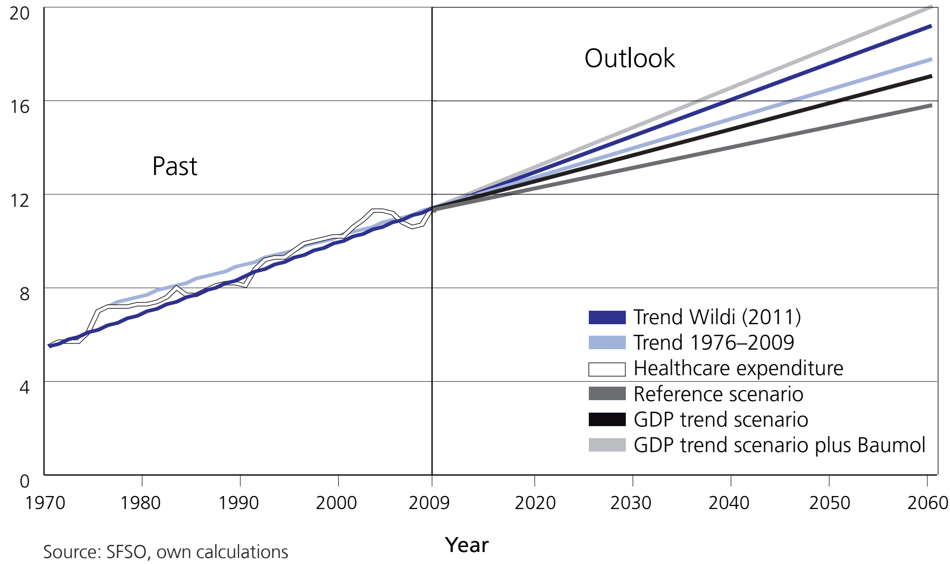
When extrapolating expenditure growth that cannot be explained by demographic cost drivers, it is assumed that – irrespective of demographic changes – the future will be a mirror of the past. And yet the macroeconomic parameters are in fact changing through the very fact of demographic development alone. The projected decline in the working-age population is therefore having a restrictive effect on economic momentum, even if other parameters remain the same. As healthcare can hardly be decoupled from overall economic development in the long run, this is inevitably going to have an impact on healthcare expenditure.[14] As well as assuming that macroeconomic development in the future will mirror that of the past, an extrapolation also disregards the impact of demographic changes on macroeconomic development and therefore on healthcare expenditure. For this reason, the assumption is made in this study that there is a correlation between demographic developments, macroeconomic development, and healthcare expenditure.

It is striking that the projected development of the expenditure trend in this study works out significantly weaker than a pure extrapolation of the same trend. The very point is made by Wildi (2011), for example.[15] Contrasting such a naive extrapolation of the expenditure trend from 1970 to 2009 expressed as a proportion of GDP (see Figure 5, blue line) with the expenditure trend of the “Reference scenario” (see Figure 5, dark grey line) reveals a “forecast kink”.

14 To assume a decoupling would be to imply that a nation’s entire GDP would have to be generated through healthcare alone at some point.

15 Cf. the report by Wildi (2011) on the projection methodology applied in this analysis.

Figure 5: Comparison of trend extrapolation and projection of healthcare expenditure (in GDP %)



Source: SFSO, own calculations

The linear trends have been drawn up in keeping with the approach taken by Wildi (2011). Here a simple line is drawn between the start value and the end value of expenditure over the period in question, namely between 1970 and 2009 for the trend extrapolation, and between 2009 and 2060 for the "reference scenario". In view of increasing demographic pressures, the weakening trend that emerges from the "reference scenario" raises the question as to whether future expenditure development is being systematically underestimated with this approach (Wildi, 2011).

This may be countered first of all by observing that these projections are designed to be anything but a straightforward extrapolation of past development into the future. After all, as much relevant information as possible is supposed to be taken into account in these expenditure projections. In this respect, the methodology applied here does not constitute a naive projection when compared to an extrapolation. Furthermore, with a naive trend extrapolation one is confronted with the difficulty of choosing the appropriate timeframe. An extrapolated trend reacts very sensitively to the choice of timeframe. For example, it may be observed that there was significantly steeper growth in inflation-adjusted healthcare expenditure per capita between 1960 and 1975 than in subsequent years (see Appendix A2, Figure A2.2). This is demonstrated by the fact that the median growth rate for inflation-adjusted expenditure in the years 1970–2009 (3.3 %) is significantly higher than the median growth rate between 1976 and 2009 (3.0 %). If the timeframe for the trend extrapolation is limited to the period 1976–2009, there is a strong flattening of the extrapolated trend accordingly (see Figure 5, light blue line). One reason why the trend in the "Reference scenario" works out considerably weaker when compared to the past is that a far weaker level of economic growth is expected to apply in the period 2009–2060. Indeed, it is assumed that real GDP will grow at an average rate of just under 1 % a year. By contrast, the average annual growth rate for the period 1976–2008 is much higher at 1.9 %.[16] If a scenario such as the "GDP trend" scenario simulates this higher rate of economic momentum on the basis of the "Reference scenario", the resulting trend is a much closer to the extrapolated trend for the period 1976–2009 (see Figure 5, black and light blue line).[17] This shows that the "forecast kink" is partly attributable to the significantly weaker assumed level of economic momentum compared to the past. If the "GDP trend" is further enhanced by the thoroughly plausible assumption that the price increase for healthcare services in the HeL area will prove ¼ higher than the inflation rate as a result of the Baumol Effect ("GDP trend plus Baumol" scenario), expenditure develops even more dynamically than it does with the trend extrapolations (see Figure 5, light grey line). In this case, the "Forecast" does not shift downwards, as it does for the "Reference

16 The crisis year of 2009 is excluded, as the economy rebounded immediately afterwards, and healthcare expenditure reacts only very slowly to a change in GDP.

17 For the relevant comparative period of 1970 to 2009, an income elasticity of 1.15 is estimated. This elasticity value, which deviates from the "Reference scenario" (income elasticity: 1.1), is taken over accordingly for the "GDP trend" scenario. For a detailed illustration of income elasticity estimates see Appendix A2.

scenario", but upwards. In view of the fact that the development of healthcare expenditure is shaped by the interaction between various cost drivers, economic developments, and demographic developments, however, a "forecast kink" in itself is unlikely to allow any confident statement to be made regarding the value of the projection. Moreover, using an unsophisticated extrapolation of the expenditure trend as a measure for projections gives rise to a number of significant problems, not least the choice of the appropriate timeframe.

In the view of Wildi (2011), a further weakness of the approach selected here is the fact that the expenditure ratio (healthcare expenditure as a proportion of GDP) does not fluctuate in line with GDP. The logic behind the argument put forward by Wildi (2011) is as follows: Nominal healthcare expenditure is barely affected by economic developments, but as GDP is subject to economic fluctuations, the expenditure ratio rises more strongly in times of recession (all other things being equal), and rises to a lesser extent (or even falls) during peaks of the economic cycle. Over a longer timeframe, however, economic cycles cannot be predicted, so on pragmatic grounds alone it is advisable to base expenditure projections on a long-term GDP trend. Accordingly, the economic cycle is stripped out of GDP development for the purposes of these projections, which means the expenditure ratio remains independent of economic cycles. In addition, the results of the empirical analysis of cost drivers in the Swiss healthcare system indicate that there is a close correlation in the long term between economic growth on the one hand and expenditure development in healthcare on the other (see Appendix A2). This is taken into account in the projections accordingly.

In addition, projections for healthcare expenditure also have limitations insofar as we remain largely in the dark with respect to the transmission channels of advances in medical technology. This is due to the fact that such advances are highly complex and thus very difficult to gauge on an empirical basis, particularly at the macro level (see Dybczak and Przywara, 2010, 6 et seq.). Accordingly, advances in medical technology can only be very roughly incorporated into the expenditure projections, which in turn increases the uncertainty of those projections (see also Section 3.3). Different approaches are therefore adopted by different studies to take account of advances in medical technology when undertaking expenditure projections. Essentially a distinction is made between two approaches. In the so-called residual approach, an expenditure trend based on advances in medical technology – but also on other supply-side factors such as the change in relative prices – is extrapolated from the past. This is the approach taken by the OECD (Oliviera-Martins, 2006) and by the Australian Productivity Commission (2005), for example. The basis of this approach is an estimate involving real per capita healthcare expenditure as the dependent variable and the cost drivers that apply in the case in question. Advances in medical technology are therefore to be incorporated through the inclusion of a deterministic trend (see AWG, 2009, 933 et seq.; Dybczak and Przywara, 2010, 9 et seq.). The expenditure trend established in this way can be viewed as the residual cost factor that remains after removing the impact of all cost drivers explicitly factored in. A residual trend can also be established with the help of expenditure profiles from the past (see Productivity Commission AUS, 2008, Chap. 1.1). This approach corresponds to that used for the extrapolation of expenditure. Demographic development in the past, broken down by age cohorts, is multiplied by the per capita expenses that apply for the relevant age cohort in question. The aggregate per capita expenditure for all age cohorts is then extrapolated on the basis of observable non-demographic cost drivers.[18] The growth established in this way is then deducted from the actual rise in per capita expenditure. The resulting residual rise is then assigned to advances in medical technology but also to other non-observable supply-side factors. Where the non-demographic cost drivers are concerned, studies frequently rely on the parameter estimates of a regression. The residual approach to determine the influence of advances in medical technology involves the extrapolation of a past trend, and is therefore linked to the above–mentioned residual approach for the totality of non-demographic cost drivers.

The alternative approach is based on the assumption that there is a long-term interdependency between the influence of medical advances in healthcare on the one hand and general macroeconomic develop-

18 The OECD approach only takes into account macroeconomic income as a non-demographic cost determinant, and assumes an income elasticity of one (see Oliviera Martins et al., 2006, 12).

ment on the other. Advances in medical technology are captured with the assistance of the correlation between GDP and healthcare expenditure via income elasticity (see Section 3). This indirect approach is adopted by both this study and that of the EU Ageing Working Group (AWG), for example (see Dybczak and Przywara, 2010, 6 et seq.).[19] The justification for this approach is the fact that empirical studies regularly indicate that the effect of GDP on healthcare expenditure is exaggerated – i.e. they suggest too high a level of income elasticity – inasmuch as advances in medical technology are not directly taken into account through a proxy in the regression (see Dybczak and Przywara, 2010, 17; Smith et al., 2009, 1280; Oliviera Martins et al., 2006, 76, Appendix A2). Consequently, at least a proportion of the impact of advances in medical technology would appear to be reflected in income elasticity. In addition, an empirical analysis of the cost drivers in the Swiss healthcare system in the current study suggests that Swiss healthcare expenditure has so far not followed any deterministic trend (see Appendix A2). This is an argument against the use of the residual approach in the case of Switzerland.

According to our estimates, long-term expenditure dynamics in Switzerland are essentially driven by real GDP, demographics, and advances in medical technology (see Appendix A2). Indeed, a cointegration between these variables and real per capita expenditure can be demonstrated. These cost drivers each explain around a third of the rise of expenditure between 1975 and 2009.[20] Where advances in medical technology are concerned, a frequently-applied proxy has been selected, namely the research and development expenditure of the USA on healthcare (USA R&D) (see Productivity Commission AUS, 2005, Chap. 1.2, for example). The estimates indicate that the coefficients of real GDP and the proxy for demographics – namely the proportion of the overall population aged 65 and older – are overestimated if advances in medical technology are not taken into account in the regression equa-

19 However, the EU AWG (2009, Annex 2) also uses the residual approach to evaluate the cost impact of advances in medical technology in extra scenarios.

20 This result is consistent with the results arrived at by Smith et al. (2009, 1276) for the USA. These broadly suggest that between 27 % and 48 % of the rise in expenditure since 1960 is attributable to medical advances.

tion. This would suggest that advances in medical technology are reflected in the overestimated coefficients.[21] As such, the overestimation of the coefficients is likely to account for a large proportion of the effect of advances in medical technology as captured by the USA R&D proxy. For example, at least where the whole sample for the period 1960–2009 is concerned, the explanatory contribution of the regression works out at 99 % irrespective of whether the USA R&D proxy is taken into account in the estimation equation (see Appendix A2, Table 2.4). Furthermore, the results suggest a strong correlation between advances in medical technology and the costs that are attributable to the rising proportion of the older population, i.e. that aged 65 and upwards. The same conclusion is also reached by Dormont et al. (2006, 958) with their microsimulation for the French healthcare system. According to this study, product innovations such as the introduction of new medications have a substantial influence on the level of expenditure for the older population. Accordingly, advances in medical technology would lead to a disproportionate increase in expenditure for the older part of the population, so that the rise of the expenditure profile such as that illustrated in Figure 3 would continuously steepen with the passage of time. This effect of advances in medical technology is not taken into account in the expenditure projections of this study, which means that the cost effects of advances in medical technology may be underestimated as a result.[22] In summary, and given the current state of our knowledge, it may be said that healthcare expenditure projections suffer from the fact that major uncertainties surround the cost impact of advances in medical technology.

21 For the correlation between total economic income and advances in medical technology see Section 3.3.

22 As far as the author is aware, no age-specific effect as a result of advances in medical technology has yet been taken into account in long-term healthcare projections. Steinmann and Telser (2005) look at age-specific cost development for a projection of OKP premiums, but only insofar as they undertake a straightforward extrapolation from the past. In addition to the drawbacks of a trend extrapolation already referred to in this section, there is also a risk that the age-specific effect will be overexaggerated on the basis of perpetuation of one-off, non-systematic cost increases in the past.

3 Cost drivers in healthcare

Among the key cost drivers in healthcare is the ageing of the population. This cost driver has already been discussed in detail as part of the methodological explanations set out in section 2.1. This section therefore focuses on the other cost drivers that are significant for cost development in healthcare besides an ageing population. These cost drivers exercise an impact on expenditure per capita (population) as displayed in equation (1). A better understanding of these cost drivers can be gained by breaking down expenditure per capita of population (average costs) into the following components: [23, 24]

Expenditure per capita of population (1)

=

Expenditure per service x Services per patient x Patients per capita of population

=

Expenditure per service x Services per capita of population

Expenditure per capita can be broken down into expenditure per healthcare service provided (price), the services provided per patient (services used per patient) and the number of patients as a proportion of the population (probability of falling sick or requiring care). The latter two elements can in turn be summarized as the overall extent of services per capita (volume per capita).

23 For a technical illustration see Appendix A1.

24 From here onwards, expenditure per capita refers to expenditure per capita of the population, unless otherwise stated.

3.1 Rising life expectancy and morbidity rate

When drawing up projections for expenditure, the correlation between the increase in life expectancy and developments in the state of health (morbidity rate) or the care requirement for the population is an important factor. [25] Very generally speaking, morbidity in this study is understood as an indicator of the prevalence (frequency) of illness among the population or among certain age groups of the population. A fall in the morbidity rate is equivalent to an improvement in the population's state of health.

The state of a population's health in developed countries is largely determined by the prevalence of degenerative ailments such as cardiovascular disease and cancer, as well as chronic conditions such as diabetes, but it is virtually unaffected by infectious diseases (see Höpflinger et al., 2011, 34). In other words, it is conceivable that life expectancy could rise even for patients suffering from severe ailments, for example on the basis of good medical care. But this complicates the process of forecasting whether or not rising life expectancy goes hand in hand with a good state of health (i.e. a declining morbidity rate). There are essentially three competing theories that have evolved in this area (see for example Robine and Michel, 2004, 590):[26]

25 The state of health is defined in different ways (see Höpflinger et al., 2011, 34). The WHO for example uses the concept of "health-adjusted life expectancy". This indicator measures the average number of years that a person can expect to spend in a good state of health. This involves subtracting from life expectancy those years of life spent in morbidity. Another indicator, namely "disability-free life expectancy", measures the number of years of life that a person can expect to live free of disability. This means a person not being subject to any restrictions with regard to the "activities of daily life" (ADL scale) such as washing, getting dressed, shopping, etc. Above all, this latter indicator provides information on the level of care needed by a person, whereby this care requirement is frequently the consequence of multiple morbidity.

26 On the basis of the latest data available, Robine and Michel (2004) have recently developed a dynamic theory which assumes that the phases of expansion and compression of morbidity actually vary.

1. **"Healthy Ageing" or "Dynamic Equilibrium"** (relative compression of morbidity): This theory assumes that there is no change in the period of life spent suffering from a particular ailment or requiring care. Although an increase in chronic degenerative conditions is anticipated as a result of rising life expectancy, it is believed that the impact of these conditions will be less severe than they have been hitherto, which compensates for the rise in these conditions. As a consequence, the extra period of life gained is spent in a good state of health.
2. **"Compression of Morbidity"** (absolute compression of morbidity): As a result of improved preventative measures, the frequency of chronic degenerative conditions can be reduced, so that the period of life spent suffering from a condition or requiring care is actually compressed. As a consequence, the period of life spent in good health rises more strongly than life expectancy.
3. **"Pure Ageing" or "Expansion of Morbidity"** (expansion of morbidity): As a result of an increase in chronic degenerative conditions, the extra period of life gained cannot be spent in good health. The population's state of health deteriorates.

Empirical research does not provide conclusive evidence as to which theory is the most accurate. A comparison between different EU countries between 1995 and 2003, based on the disability-free life expectancy of individuals of 65 and upwards, reveals varying developments between different countries and between genders (see Seematter-Bagnoud et al., 2009, 19–20; Fn. 25). In the case of the age group of 65 and upwards in Switzerland between 1981 and 2002, for example, it emerges that the number of disability-free years of life for men has risen in step with the rise in life expectancy ("healthy ageing"), whereas for women there has actually been a compression in the years of life spent with disability ("compression of morbidity"). Here the per capita expenditure is influenced by the probability of falling ill or requiring care (number of patients or persons requiring care per capita) as shown in Equation (1). The correlation between rising life expectancy and a population's state of health is a further demand-side factor alongside the ageing of the population. According to the "healthy ageing" assumption, the state of health of the population should improve across all age cohorts, for example. In other words, expenditure per capita should decline for each age cohort ceteris paribus. A decline in the morbidity rate of the population is reflected in the projections through a shift of the expenditure profile to the right (see Figure 3).

Later on we will look at the relevant non-demographic cost drivers that have caused the expenditure profile in Figure 3 to shift upwards.

3.2 Income effect – income elasticity

The correlation between income and development of healthcare expenditure is incorporated into this study via income elasticity. Unlike in economic theory, this term is applied here not just on the demand side, but also on the supply effects that have an influence through income.[27]

From a theoretical standpoint, however, the income effect is actually a demand-side-effect. It is based on the assumption that people are prepared to spend a disproportionate amount of their income on healthcare products as their income increases. Healthcare services should accordingly be classified as a superior or luxury goods category. At private household level, this can hardly be demonstrated empirically if insurance cover is in place that weakens the correlation between individual budget restrictions and the demand for healthcare products, depending on the scope of the policy in question (see Getzen, 2000, 262–263). The budget restriction is therefore only binding at the level of the wider pool of insured persons when that pool reflects the entire population of a developed economy, as is the case in Switzerland due to its mandatory healthcare insurance system. Accordingly, a positive disproportionate correlation between overall income development in an economy and healthcare expenditure can be observed empirically, whereas only a weak correlation can be observed between individual income and healthcare expenditure (see Getzen, 2000, 266 et seq., Table 1).

Nevertheless, it is difficult to distinguish empirically between the demand-side income effect described above and existing interdependencies between income and certain supply-side-effects (see Smith et al.,

27 Smith et al. (2009, 1280) therefore use the term “expenditure elasticity” instead of the term “income elasticity”.

2009, 1280).[28] The projections of this study are therefore based on the assumption that a number of supply-side and demand-side cost drivers can be captured through the income effect. These include advances in medical technology (see Section 3.3), the increasing demands made of the healthcare system by the population, and the demand by patients induced by the knowledge and information advantage of suppliers in the healthcare system.

3.3 Advances in medical technology

This cost driver is generally considered one of the most important – if not the most important – cost driver in the healthcare economy (see Smith et al. 2009, 1281). Advances in medical technology result in innovations which can broadly be said to lead to progress in diagnosis, therapy and the prevention of illnesses, as well as improvements in the organisation and financing of healthcare. Examples of this progress include the introduction of new medications and new diagnosis procedures such as magnetic resonance imaging (MRI) in the 1970s. Advances in medical technology change the conditions of production in healthcare, thus making such advances a supply-side factor. The innovations brought about by advances in medical technology should lead to improved healthcare provision and an improved state of health of the population (see Dybczak and Przywara, 2010, 6 et seq.). Furthermore, innovations can also lead to more cost-effective supply, while at the same time at least preserving the existing level of quality.

If it is assumed that an innovation such as the introduction of a new therapy procedure will improve the quality of healthcare provision, this means first and foremost that better or more services will be provided per patient. At the same time, the question arises as to what repercussions this service enhancement will mean for costs, and therefore how costs per service provided will develop. This depends to no little extent on whether other healthcare services can be replaced by the new procedures, or whether the new procedures turn out to be complementary. In addition, innovations can also require healthcare staff to learn new

28 It is often difficult for certain supply-side-effects such as advances in medical technology to be properly controlled in a regression. This can feed through into an overestimation of income elasticity (see Smith et al., 2009, 1280 and Appendix A2).

skills, which in turn can lead to an additional requirement for qualified personnel. Finally, the number of patients can be reduced in the medium term, for example if the number of chronically ill persons declines as a result of more effective therapy procedures. Consequently, advances in medical technology can have an impact on all three expenditure per capita coefficients set out above (see Equation (1)). It is therefore not clear on a priori basis whether advances in medical technology have the effect of increasing or decreasing costs.

Past experience shows that advances in medical technology have the effect of increasing costs, but the empirical quantification of such advances is difficult, as no satisfactory indicators exist (see Dybczak and Przywara, 2010, 6 et seq.). The projections in this study are therefore predicated on the assumption that the cost effect of advances in medical technology can be measured by means of total economic income development (see Section 2.2.2). This can be justified by the fact that close interdependencies exist between advances in medical technology and overall economic income (see Smith et al., 2009, 1277). It may be assumed that as a society grows more prosperous, demand for innovations in medicine also grows through what is known as the "demand pull" (see Dybczak and Przwara, 2010, 8). At the same time, increasing prosperity also provides society with a greater range of sales opportunities for healthcare products, which in turn increases the incentive to invest in research and development (the "supply push"). Moreover, empirical estimates for Switzerland suggest that advances in medical technology can be captured through income elasticity (see Appendix A2).

3.4 The "Baumol Effect" or Baumol's cost disease

This supply-side-effect implies that prices in certain labour-intensive industries such as healthcare rise more strongly than in other industries (Baumol, 1967). This is explained by the fact that relatively inelastic demand for healthcare services facilitates a level of wage increases that exceeds what are assumed to be low healthcare productivity advances. It is generally assumed that real wages in healthcare grow in line with the higher productivity advances generated by the wider economy. The price increase in healthcare accordingly exceeds the general rate of inflation by the difference between overall economic productivity advances and productivity advances in health care. A full Baumol Effect is deemed to exist if there are no productivity advances in healthcare whatsoever. The Baumol Effect therefore leads to an increase in the expenditure per service provided in Equation (1). The Baumol Effect has a direct link to advances in medical technology. For example, if productivity advances are generated thanks to technological innovations in healthcare, the average costs of service provision decline, i.e. the expenditure per service provided falls (see Equation (1)). The Baumol Effect is thus weakened accordingly.

Where healthcare expenditure projections are concerned, a consensus appears to have emerged that the Baumol Effect is of particular significance in the area of long-term care (Oliviera-Martins et al., 2006; AWG, 2012). That said, there is some uncertainty over the extent to which the Baumol Effect has an impact in healthcare.[29] Recent panel data analyses do not paint a clear picture of the relevance of the Baumol Effect in developed OECD nations, for example. According to analysis conducted by Hartwig (2008), the Baumol Effect can be felt throughout the entire healthcare system. However, as Colombier (2010) shows, Hartwig (2008) implicitly assumes that virtually all workers are employed in service areas of the economy which – like healthcare –are assumed to be unproductive. Accordingly, only a very few workers are employed in the productive sectors of the economy like manufacturing. This assumption simply does not tally with the empirical facts of OECD nations, however. Colombier (2010) takes this into account in his empirical analysis and shows, like Hartwig (2008), the relevance of the Baumol Effect for healthcare. However, the results of Colombier (2010) accord a far lower relevance to the Baumol Effect than the results that emerge from Hartwig (2008). Where the Swiss healthcare system is concerned, the empirical analysis presented here accords virtually no relevance at all to the Baumol Effect (see Appendix A2). The results of Colombier (2010) in turn are compatible with the consensus mentioned above insofar as this consensus believes that the Baumol Effect is primarily found in the area of long-term care. The projections of this study therefore assume the validity of the Baumol Effect for all scenarios of

29 This is also linked to the measurability of the Baumol Effect (e.g. Hartwig, 2008).

LTC, in keeping with the aforementioned consensus and the empirical results. However, given the lack of cohesion in the empirical results, it cannot be ruled out that this price effect is likewise valid in the HeL area too, which is why it is incorporated in a specific corresponding scenario (see Paragraph 4.1, "Baumol scenario").

3.5 Scarcity of healthcare personnel

Healthcare is considered to be a relatively labour-intensive production technology. Indeed, staff costs account for some 70 % of all healthcare costs (see SFSO "Aktuell", 2007, 9). According to estimates drawn up by the Swiss Health Observatory (Obsan), as a result of the ageing of both the Swiss population and healthcare staff in the hospital area, around 10 % to 16 % of the current workforce of 120,000 (data as at 2006) would have to be recruited by 2030 just to maintain the current level of care (see Jaccard-Ruedin and Weaver, 2009, 10 et seq.). In the area of long-term care, as many as 110,100 to 170,000 care workers would have to be employed to maintain this level. This is equivalent to some 140 % to 210 % of the current workforce of 80,000 care workers. Departures as a result of ageing healthcare staff will occur above all after 2020. Furthermore, according to population scenario A-00-2010, a general decline in the working-age population is expected from 2022 onward. In other words, we can expect to see more intense competition for ever-diminishing labour resources between industry sectors in Switzerland, but also increased competition with other European countries facing the same demographic challenges as Switzerland. If a "no policy change" scenario is assumed, i.e. that there will be no policy changes to the status quo regarding the overall extent of services provided per patient over the projection period, the scarcity of healthcare specialists could lead to upward pressure on wages.[30] This would lead to a rise in prices, which in turn would result in an increase in expenditure per service (see Equation (1)).

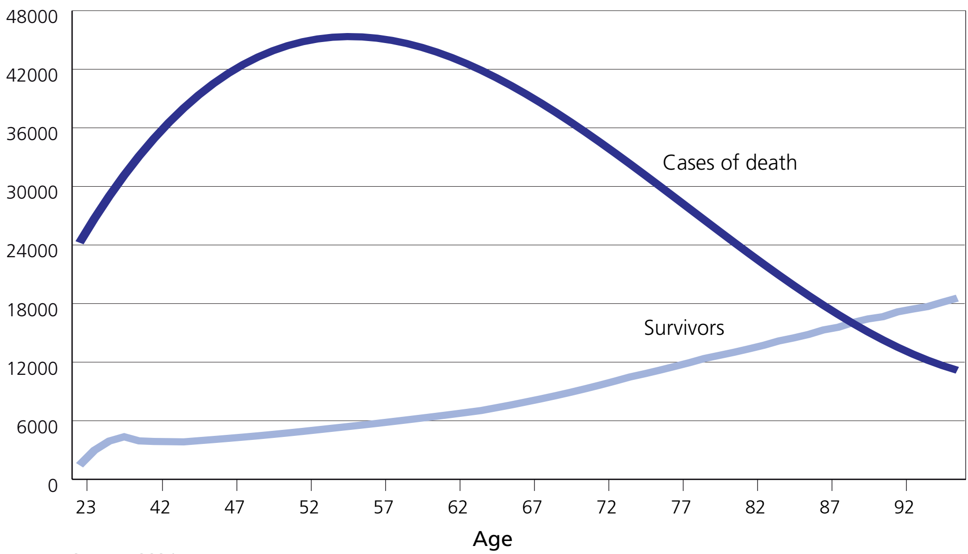
30 A further problem in healthcare is the so-called "drop-out" phenomenon, i.e. the decision by healthcare staff to leave the healthcare industry as a result of work pressures, particularly in the area of long-term care (see Jaccard-Ruedin and Weaver, 2009, 16). This has the effect of intensifying the shortage of healthcare staff. However, an improvement in working conditions, particularly in long-term care, can really only be achieved through an increase in the number of workers employed in this area, which would put additional pressure on healthcare expenditure.

3.6 Cost drivers not taken into account

Empirical studies indicate that an important role is played in healthcare expenditure by proximity to death (Zweifel et al., 1999). This is what underlies the thesis of a number of healthcare economists that – LTC aside – the ageing of the population has virtually no impact on healthcare expenditure (Werblow et al., 2007).

This is attributed to the fact that expenditure on persons who are close to death differs greatly from expenditure on those persons who will live a while longer. Accordingly, when costs are broken down into the costs of patients who die and the costs of patients who survive, the expenditure profile – which increases with age – flattens out (see Figures 3 and 6).

Figure 6: Expenditure profiles for cases of death and survivors outpatient treatment 2004 (per woman, in CHF)



Source: CSS-Insurance

According to this thesis, neglecting the costs of patients who die will – at the very least – lead to an overestimation of the importance of ageing as a cost driver. This is discussed in more detail below.

As an example, Figure 6 illustrates outpatient per capita healthcare expenditure (excluding long-term care) for women in 2004, broken down by patients who die and patients who survive. For the age cohorts up until around 90 years of age, expenditure per deceased exceeds expenditure per survivor. According to the population scenarios of the SFSO, the mortality rate rises continuously up to 2060. If the expenditure projections are drawn up on the basis of the expenditure profiles illustrated in Figure 6, however, the relative weighting of death-related costs declines, whereas the weighting of survival costs rises across all age cohorts due to the declining mortality rate. For the age cohorts in which expenditure per deceased exceeds expenditure per survivor, per capita expenditure declines. This effect cannot be captured in projections that do not make a distinction between death-related costs and survival-related costs. Observers who point out the relevance of death-related costs therefore argue that projections which do not take into account proximity to death systematically overestimate the costs of ageing. However, this argument in turn overlooks the fact that a counter-effect exists which has the effect of increasing expenditure per capita (see Colombier and Weber, 2011, 254 et seq.). This results from the fact that death-related expenditure works out lower than survival-related expenditure for the higher age cohorts (see Figure 6).[31] It can therefore not be stated on a priori basis whether neglecting death-related costs systematically results in an overestimation or an underestimation of expenditure per capita. Furthermore, the results from the initial expenditure projections from 2008 show that the increase in the expenditure rise for the “Death-related costs” scenario is just 0.1 % of GDP lower than the “Reference scenario”, which is virtually negligible (see

31 It should also been taken into account that the mortality rate in the SFSO population scenario declines more strongly for the high age cohorts than it does for the low ones.

Colombier and Weber, 2008, 52, Table A3). The same conclusion, albeit with a different methodology, is arrived at by Steimann et al. (2005), who likewise project healthcare expenditure taking into account death-related costs. Moreover, as the work involved in drawing up a death-related costs scenario is extremely onerous and time-consuming, and as no official data exists on death-related costs in Switzerland, after weighing the costs and benefits a decision was taken not to elaborate such a scenario again.

It is apparent that social trends can continue to influence the way healthcare expenditure develops over time. In particular, clear evidence has emerged of a shift from looking after those requiring care in a family environment to more formal solutions ("Spitex" and care homes). The rise of the latter is attributed to the changing status of women in professional life (increasing female labour participation rate) and changed family structures, and could result in additional pressures on expenditure in the area of long-term care for those aged 65 and upwards. However, there is not yet any robust data that allows for a precise evaluation of the extent of this effect. For example, if the development of the female labour participation rate alone were to be considered the driver of this trend, the pressure on costs ought (at least) not to rise. According to the demographic scenario A-00-2010, the female labour participation rate (in FTEs) is expected to decline from just under 38 % in 2009 to 36 % in 2060. There is therefore uncertainty not just over the extent of this trend, but the evidence for it in the first place. Due to these relatively problematic imponderables, this trend is not taken into account in these scenarios.[32] Instead, the current division between formal and informal LTC is extrapolated in the projections. For the same reason, trends possibly evident in the past which lead to a shift in costs between various areas of healthcare, such as the inpatient and outpatient areas, are not extrapolated. On the other hand, the current projections do facilitate an illustration of how strongly the inpatient and outpatient

32 In the initial expenditure projections of 2008, a "Trend towards formal care" was calculated, in which it was assumed that expenditure between 2010 and 2020 would grow 10 % more strongly overall than in the "Reference scenario" (see Colombier and Weber, 2008, 36 et seq.). Accordingly, the rise of expenditure works out 0.3 % of GDP higher than in the "Reference scenario".

areas influence the development of expenditure in their different ways. This in turn allows conclusions to be drawn as to what impact a structural shift has on the cost dynamics.

4 Scenarios for healthcare

As already mentioned in Section 2.1, it is unclear how precisely the above-mentioned cost drivers have an impact on healthcare expenditure. This uncertainty is taken into account through the elaboration of a number of different scenarios. With the help of these different scenarios, the extent to which healthcare expenditure reacts to individual cost drivers can also be established. In the status quo scenarios, it is assumed that the statutory parameters currently in place will not change during the projection timeframe ("no policy change"). In addition, so-called efficiency scenarios are drawn up which are designed – in contrast to the status quo scenarios – to illustrate the effects of health policy measures. These are examined in Section 8.

4.1 Healthcare excluding long-term care

The paragraphs below explain the scenarios drawn up for the area of healthcare excluding long-term care (HeL). Table 4 provides a summary overview of this respect.

Table 4: (Status quo) **scenarios for healthcare excluding long-term care** (HeL)

Scenario	Morbidity Δgood health / Δlife expectancy	Income elasticity Δexpendit. p.c. / Δreal GDP p.c.	Price effect of wages Δexpendit. p.c. / Δreal wages HeL[b]	Demographic scenario
Reference	0.5	1.1	0.0	A-00-2010
Morbidity				
Pure ageing	0.0	1.1	0.0	A-00-2010
Healthy ageing	1.0	1.1	0.0	A-00-2010
Compression of morbidity	1.5	1.1	0.0	A-00-2010
Wage costs				
Wage pressure	0.5	1.1	0.2 (from 2020)	A-00-2010
Baumol	0.5	1.1	0.25	A-00-2010
Migration	0.5	1.1	0.0	A-17-2010
EU[a]	0.5	1.1->1.0	0.0	A-00-2010

Notes: Δ:= change; p.c.:= per capita, [a] Same assumptions as the "Reference scenario" of the AWG of the EU (2009) and the expenditure projections of 2008 (Colombier/Weber, 2008); [b] If real wages in HeL grow more strongly than productivity advances in HeL as a result of the Baumol Effect or a scarcity of healthcare personnel, a positive price effect would be the result.

Reference scenario: For the projection of expenditure, the SFSO's medium base scenario A-00-2010 is assumed. As there is no dominant theory discernible regarding the correlation between rising life expectancy of the population and its state of health, a compromise is assumed whereby the population spends half of the extra period of life gained in good health. On the basis of the results of the empirical estimates, it is assumed that expenditure rises slightly disproportionately to cyclically-adjusted GDP (income elasticity of 1.1) (see Appendix A2). Here it is assumed that both demand-side (healthcare as a form of luxury goods) and supply-side cost drivers such as advances in medical technology are to be taken into account (see Section 3.2). In keeping with the standard international approach, no Baumol Effect is taken into account in the "Reference scenario" for HeL.

Pure ageing: In contrast to the "Reference scenario", it is assumed that the population spends the extra years of life gained in ill health (expansion of morbidity).

Healthy ageing: Unlike the "Reference scenario", it is assumed that the population spends the extra years of life gained in good health (relative compression of morbidity).

Compression of morbidity: Unlike the "Reference scenario", it is assumed that the population spends 1.5 times the extra period of life gained in good health (absolute compression of morbidity).

Migration: In contrast to the "Reference scenario", population scenario A-17-2010 is assumed. This hypothesises that net immigration in Switzerland works out higher than the medium base scenario A-00-2010 (see Table 1).

Wage pressure: With the expected decline in the working-age population from around 2020, the shortage of personnel in healthcare becomes more acute, which leads to pressures on wages in the healthcare industry. It is assumed that healthcare wages rise by 1.2 times the average annual increase in wages from 2020 onwards.

Baumol: In contrast to the "Reference scenario", it is assumed that the Baumol Effect has a 25 % impact. As the wages of healthcare personnel grow in line with the remaining economy, and productivity advances in the HeL area are a quarter slower than in the overall economy, the prices of HeL services rise 25 % more strongly than the general level of prices.

EU: To improve comparability with the projections of the EU, it is assumed that income elasticity over the project timeframe converges towards one, as per the "Reference scenario" of the EU itself.[33]

4.2 Long-time care from the age of 65

The paragraphs below explain the scenarios for the area of LTC. Table 5 provides a summary overview. It is implicitly assumed in these scenarios that the current share of informal (i.e. unpaid for) care remains constant (see Section 3.6).

Table 5: (Status quo) **scenarios for long-term care from 65 years and upwards** (LTC)

Scenario	Morbidity Δgood health / Δlife expectancy	Baumol Effect (price effect) Δexpenditure p.c. / Δreal wages HeL	Demographic scenario
Reference	0.5	1.0	A-00-2010
Morbidity			
Pure ageing	0.0	1.0	A-00-2010
Healthy ageing	1.0	1.0	A-00-2010
Compression of morbidity	1.5	1.0	A-00-2010
Wage pressure	0.5	1.3 (from 2020)	A-00-2010
Migration	0.5	1.0	A-17-2010

Note: Δ:= change.

33 This was also the underlying assumption of the "Reference scenario" of the expenditure predictions up to 2050 (see Colombier and Weber, 2008, 15).

Reference scenario: This scenario assumes a correlation between rising life expectancy and the care requirement of the population from the age of 65 and upwards. It is assumed that the population spends half the extra years of life gained without requiring care. The Baumol Effect is felt in full, but macroeconomic income developments have no impact on care expenditure.

The assumptions of the **Pure ageing**, **Healthy ageing**, **Compression of morbidity** and **Migration** scenarios, which are otherwise based on the "Reference scenario", vary in accordance with the scenarios for HeL. In the **Wage pressure scenario**, it is assumed that wages in the healthcare industry rise by 1.3 times the overall economic average from 2020 onwards. This level of wage growth is higher than for HeL, as the assumption that external parameters are unlikely to change in turn means that the long-term care area suffers particularly acutely from a shortage of personnel (see Section 3.5).

5 Total healthcare expenditure

The expenditure projections reveal that the ageing of the population leads to a clear rise in total healthcare expenditure, irrespective of the scenario (see Table 6).

Table 6: Total expenditure on healthcare (in GDP %)

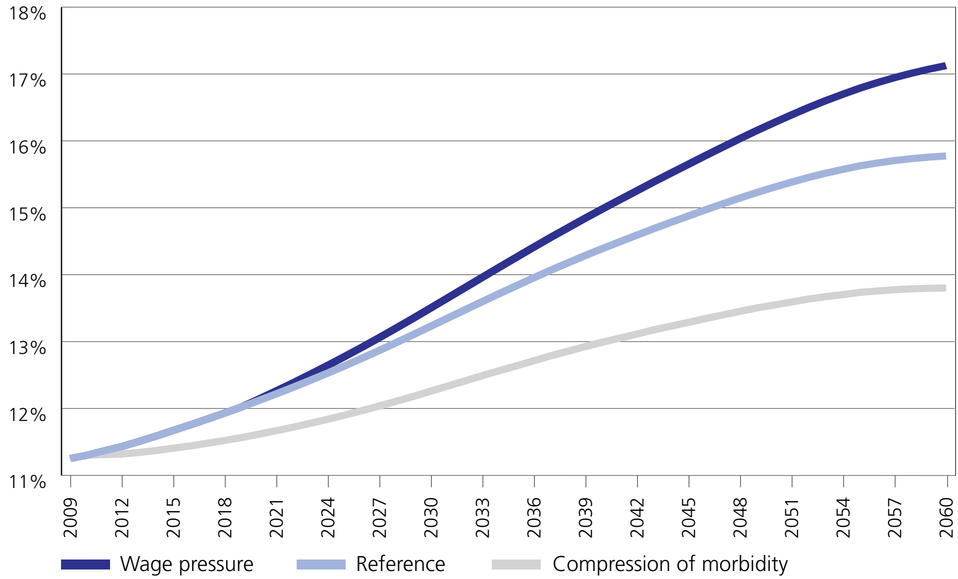
Scenario	Base year 2009	2060	Change 2009–2060	Difference to reference scenario
Reference		15.8	+4.5	–
Morbidity				
Pure ageing		16.9	+5.7	+1.1
Healthy ageing		14.8	+3.5	-1.0
Compression of morbidity		13.8	+2.6	-2.0
Wage costs	11.3			
Wage pressure		17.1	+5.9	+1.4
Baumol		17.1	+5.8	+1.3
Migration		15.4	+4.2	-0.4
EU		15.6	+4.3	-0.2

This means an additional financial burden for public sector budgets, the OKP and private individuals.[34] In the “Reference scenario”, expenditure rises from 11.3 % of (cyclically-adjusted) GDP in the base year of 2009 to 15.8 % of GDP in 2060. In each case, half of this rise in expenditure is attributable to demographic developments, the other half to non-demographic influence factors such as rising demand for healthcare services, advances in medical technology, and wage costs (Baumol Effect).

The alternative scenarios to the “Reference scenario” show that changes in the morbidity rate and wage costs have a significant impact on the development of healthcare expenditure. “Compression of morbidity” is therefore the most optimistic scenario. Here it is assumed that the period of life spent in an ill state of health will be compressed as life expectancy increases.

34 For a more detailed overview of the results of the “Reference scenario” see table appendix, Table A1.

Figures 7: Scenarios for overall healthcare, 2009–2060 (in GDP %)[1]

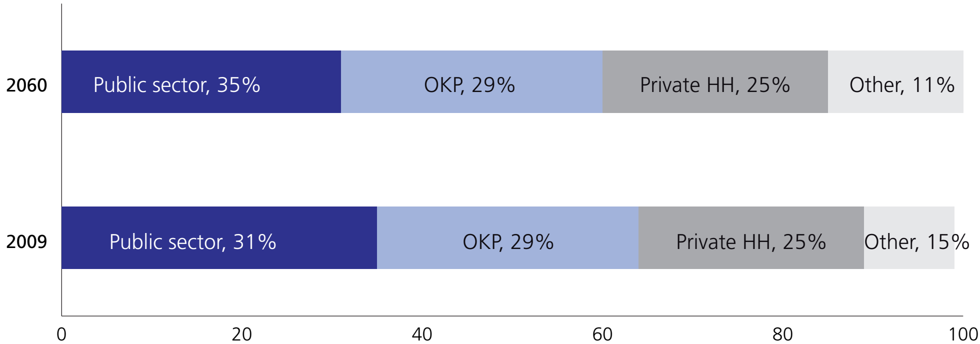


1 Note that the value range scale does not begin at zero.

The most pessimistic scenario is the "Wage pressure" scenario (see Figure 7). Both the "Compression of morbidity" scenario and the "Wage pressure" scenario deviate significantly from the projected expenditure development of the "Reference scenario", in the former case by 40 % (-2.0 % of GDP), and in the latter case by 30 % (+4.5 % of GDP). By contrast, the "Migration" scenario – which assumes that average annual net immigration will be higher by some 20,000 people – leads to a moderate cost saving of just under 10% (-0.4 % of GDP) compared to the expenditure projections of the "Reference scenario" (see Table 6). This development is attributable to the greater dynamism of GDP development. However, this effect is largely offset by the fact that healthcare expenditure increases more strongly in line with the assumption of faster-growing incomes. The difference to the "Reference scenario" is even smaller (at -0.3 % of GDP) if a convergent development of income and the income-driven component of healthcare expenditure is assumed, instead of a constant income elasticity of 1.1 as per the “EU” scenario.

The pressure of demographic developments weighs in particular on expenditure in the area of long-term care. Whereas in the “Reference scenario” for the LTC area, around 70 % of the rise in expenditure is accounted for by demographic developments, the equivalent figure for HeL is much lower at 40 %. As a result, the proportion of expenditure on long-term care in the “Reference scenario” rises to about 27 % of overall expenditure by 2060, virtually double the level of around 14 % in the base year. By contrast, the proportion of expenditure on healthcare excluding long-term care declines from 85 % to 72 % over the same timeframe.

Figure 8: Breakdown of healthcare expenditure by source of financing in reference scenario, 2009 and 2060 (in %)

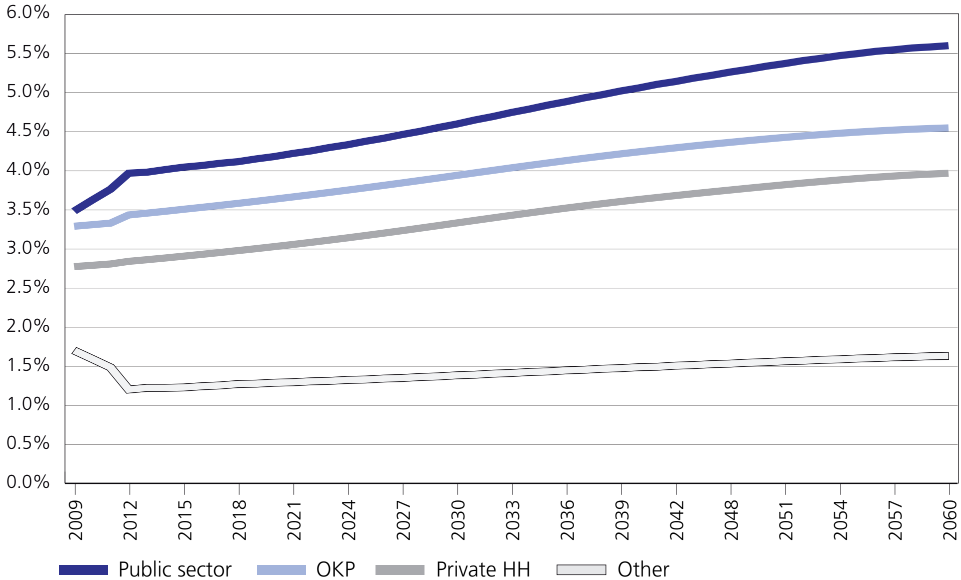


Source: FFA 2011, SFSO 2011

Together with the new arrangements for the financing of care (see also Section 4.2), which entered into force on 1 January 2011 and involve the share in the financing costs of the OKP and private households being capped, growth in long-term care requirements is likely to place an additional burden on the cantons and communes. According to Figure 8, the financing share of all health-care expenditure met by the public sector will rise from 31 % in 2009 to 35 % in 2060, whereas the shares of the OKP and private households will remain virtually constant at 29 % and 25 % respectively. [35]

35 The expenditure of the OKP is adjusted by the cost participation of the insured and the expenditure on IPR. The latter cost is borne by the cantons.

Figure 9: Expenditure developement by source of financing in reference scenario, 2009–2060 (in GDP %)



Despite this constant financing share, the OKP and private households will nonetheless have to bear a tangible additional financing burden, namely +1.3 % and +1.2 % of GDP respectively. The share of the remaining sources of financing, which include compulsory accident insurance (SUVA; financing proportion in 2009: 3 %) and supplementary insurance, would be lower in 2060 than in the base year. The strong rise in public sector costs at the beginning of the projection timeframe is attributable to reforms in the financing of care and hospitals (see Section 6). The OKP is likewise affected by the new hospital financing regime (see Section 7).

5.1 Healthcare excluding long-term care

The HeL comprises expenditure on inpatient treatment in hospitals (including psychiatric clinics), outpatient treatment (in doctors' surgeries and hospitals, as well as physiotherapy and psychotherapy), medications, therapeutic equipment, dental treatment, administration, prevention and other services such as laboratory, transport and rescue services.[36] The expenditure on administration, prevention and other services, which accounted for some 20 % of HeL expenditure in the base year of 2009, is extrapolated in line with GDP, as these areas are not exposed to the same cost drivers as other areas of healthcare (see Figure 2). For simplicity's sake, the same approach is taken with expenditure on dental care, as this has virtually no impact on public sector expenditure.

Table 7: Expenditure on healthcare excluding long-term care (in GDP %)

Scenario	Base year 2009	2060	Change 2009–2060	Difference to reference scenario
Reference		11.4	+1.8	
Morbidity				
Pure ageing		11.8	+2.3	+0.5
Healthy ageing		10.9	+1.4	-0.4
Compression of morbidity		10.5	+0.9	-0.9
Wage costs	9.5			
Wage pressure		12.2	+2.6	+0.8
Baumol		12.6	+3.1	+1.3
Migration		11.2	+1.7	-0.2
EU		11.1	+1.6	-0.2

According to the "Reference scenario", HeL expenditure rises from 9.5 % of GDP in 2009 to 11.4 % of GDP in 2060 (see Table 7). The expenditure for inpatient treatment in hospitals rises at a different rate to outpatient treatment as a result of different expenditure profiles in the base year (see Section 2.1, Figures 4a and 4c). Expenditure for outpatient

36 It should be pointed out here that expenditure on institutions for the disabled, addicts, and people with psychosocial problems are assigned to the area of healthcare excluding long-term care. This expenditure includes expenditure on long-term care for people below 65 years of age, short-term care, and medical services, which makes clear classification more problematic. In 2009 this amounted to 0.5 % of GDP.

treatment rises from 4.4 % to 5.2 % of GDP over the observed timeframe. Expenditure for hospitals rises by 1.0 % of GDP, from 3.2 % in 2009 to 4.2 % of GDP in 2060. This means that the growth in expenditure is rather higher for hospitals than it is for outpatient treatment. The former rose by a nominal annual average of 3.2 %, compared to a rise of 2.8 % for the latter. This means that the relative significance of hospital expenditure rises from 28 % in 2009 to 37 % in 2060. The proportion of expenditure accounted for by outpatient treatment remains at around 46 %. There is a decline in the relative weighting of remaining healthcare expenditure, such as for administration and prevention.

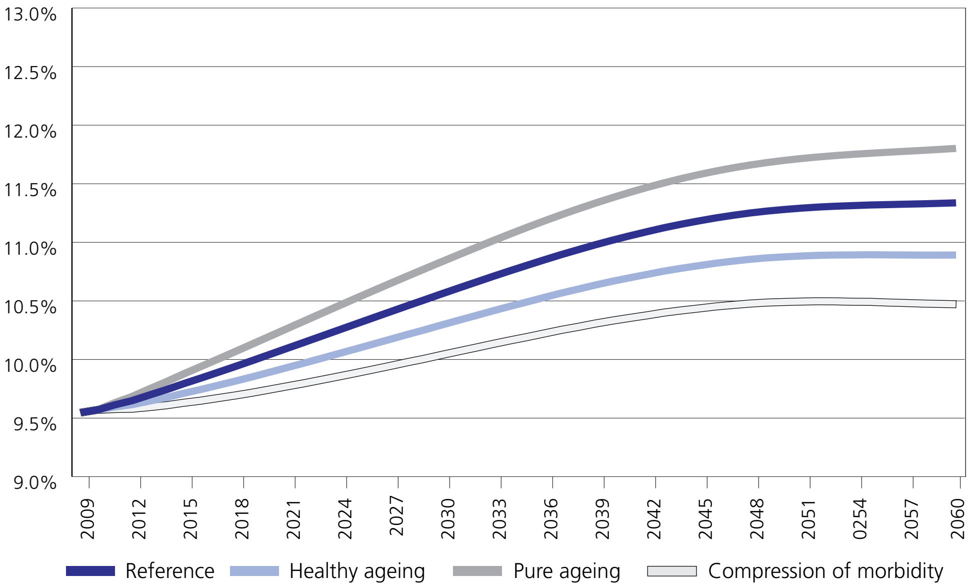
The expenditure dynamic differs sharply from the "Reference scenario" above all as a result of wage costs and a change in morbidity caused by increasing life expectancy.

If it is assumed that the growth in productivity advances in HeL is ¼ lower than the overall economic average, and the Baumol Effect plays a partial role, expenditure is 1.3 % of GDP (or 70 %) higher than in the "Reference scenario" (see also Figure 10b). The strong price pressure that can result from wage cost developments is likewise documented by the "Wage pressure" scenario. In this scenario it is assumed that healthcare wages will rise at an above-average rate as a result of a potential shortage of personnel from 2020 onward. At 2.6 % of GDP, the rise in expenditure is significantly higher than the growth of 1.8 % of GDP in the "Reference scenario".

An almost equally large reduction in the rise in expenditure results if it is assumed that the population's state of health improves much more sharply than is assumed in the "Reference scenario" (see Figure 10a). In the "Compression of morbidity" scenario, the rise of expenditure would work out 0.9 % of GDP (or 50 %) lower than in the "Reference scenario". If the population's increase in life expectancy does not result in any improvement in the general state of health, however, as is assumed in the "Pure ageing" scenario, there is an increase in expenditure of 0.5 % of GDP or just under 30 %. As is the case with overall expenditure, there is virtually no change in expenditure development in the "Migration" and "EU" scenarios compared to the "Reference scenario" (see Section 5). However, the result of the EU scenario does not allow us to conclude that the income elasticity assumption has little impact on expenditure development. The difference between the constant income elasticity of 1.1 assumed in the "Reference scenario" and the income elasticity converging towards one between 2009 and 2060 is minimal. The assumption of higher income elasticity, for example as a result of greater cost pressures through advances in medical technology, is likely to accelerate the expenditure equally sharply.

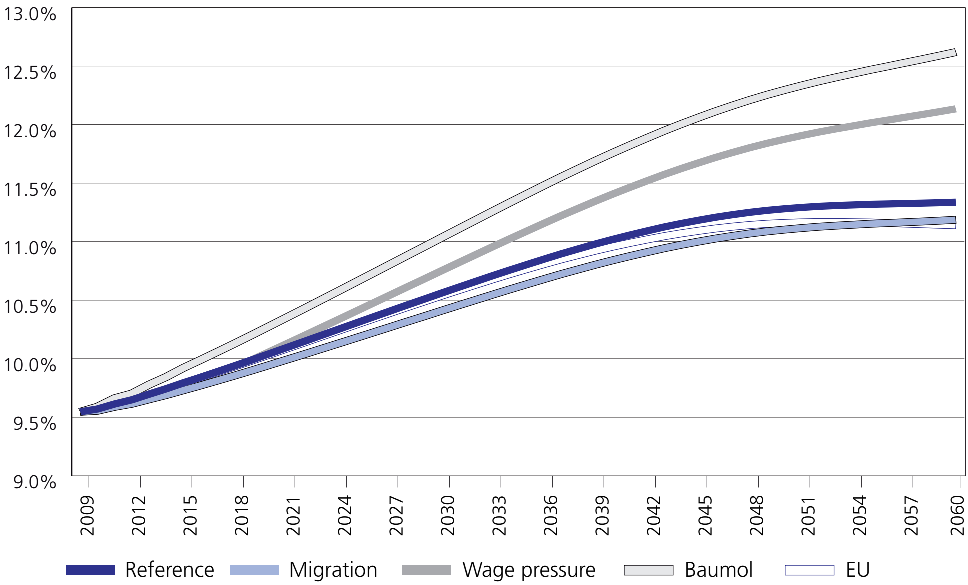
An analysis of expenditure development in Figures 10a and 10b shows that the rise in expenditure in most scenarios slows from around the mid-2030s onwards. This is explained by the fact that demographic pressures recede sharply according to the applied demographic scenario A-00-2010, as the baby boomer generation born between the end of the 1940s and the middle of the 1960s gradually dies out. Accordingly, there is also a slowdown in the increase in the old-age dependency ratio – measured as the population

Figure 10a: Morbidity scenarios – Healthcare excluding long-term care, 2009–2060 (in GDP %)



1 Note that the value range scale does not begin at zero.

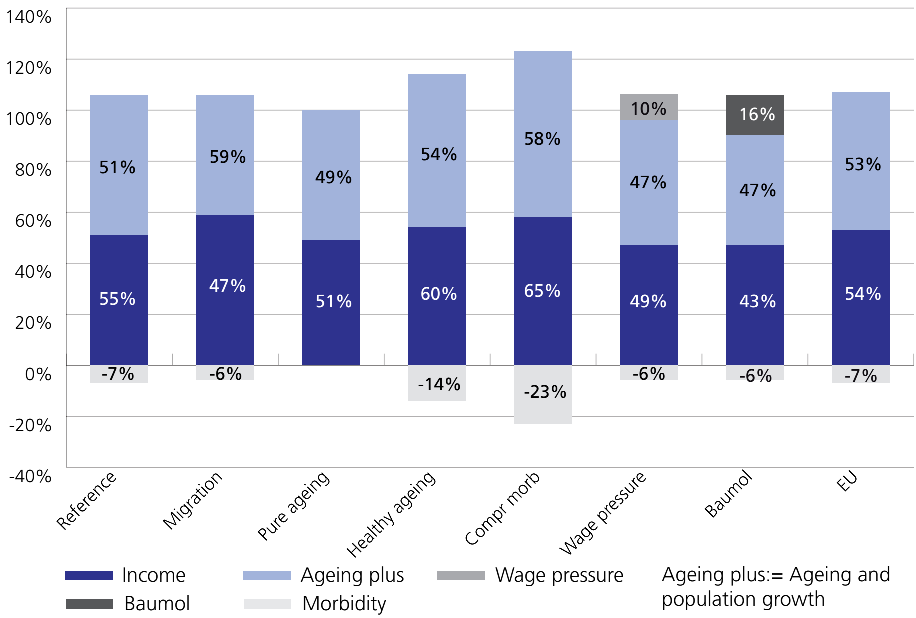
Figure 10b: Wage cost and migration scenarios – Healthcare excluding long-term care, 2009–2060 (in GDP %)



1 Note that the value range scale does not begin at zero.

aged 65 and over as a proportion of the working population aged between 20 and 64 in full-time equivalents (FTE) – of ¾ of a percent per year in the period 2036–2060 compared to the period 2009–2035. This development is particularly evident in the EU scenario, as here it is assumed that the pressure of non-demographic cost drivers will also recede. As a result, the highest level of expenditure of 11.2 % of GDP will be reached in 2053, before this rate declines to 11.1 % of GDP by 2060.

Figure 11 Percentage contribution of cost drivers to price-adjusted rise in healthcare expenditure, 2009–2060 (in %)[1]



1 Note that a linearisation of the expenditure rise with the help of the natural logarithm was undertaken in order to ascertain growth contributions.

The breakdown of the price-adjusted rise in expenditure after the contribution of the various cost drivers reveals that income development and ageing (including population growth) are the most important factors (see Figure 11). For example, income development accounts for 55 % and ageing 51 % of the price-adjusted rise in expenditure in the "Reference scenario" between 2009 and 2060. In contrast to the "Pure ageing" scenario, however, a part of the effect of ageing in the "Reference scenario" is offset by the fact that the population's state of health improves as life expectancy rises, reducing the explanatory contribution of the demographic cost drivers (ageing plus morbidity) by 7 %. In the "Compression of morbidity" scenario, the decline in the morbidity rate reduces the demographic cost contribution by as much as 23 %. Accordingly, the contribution of the demographic cost drivers to the rise in expenditure is just 25 % in the "Compression of morbidity" scenario, significantly lower than in the "Pure ageing" scenario (49 %). An increase in wage costs, be it as a result of the Baumol Effect or due to a shortage in healthcare personnel, likewise has a sharp impact on the extent of the cost increase. One striking aspect is that the significance of ageing as a cost driver increases in line with higher immigration. This is attributable to the fact that higher net immigration results in a rise in demand for healthcare services.

5.2 Long-term care from the age of 65

The expenditure for LTC includes expenditure on inpatient services in care homes and the outpatient services of external care services (Spitex). It should be recalled that the definition of long-term care applied here relates solely to expenditure for persons aged 65 and upwards.

As mentioned in Section 5, the LTC area is more strongly affected by the ageing of society than other areas of healthcare. The ageing of the generation born between the end of the 1940s and the middle of the 1960s (baby boomer generation) and a further increase in life expectancy will lead to strong growth in the age cohorts above 80 over the next few decades. This in turn will mean an average annual growth rate of 4.6 % per year (nominal) in expenditure on LTC, which is far greater than the growth in HeL expenditure. The annual average nominal growth rate for the latter amounts to just under 3.0 %. Overall, expenditure on LTC in the base year of 2009 amounts to some 1.5 % of GDP. In the "Reference scenario", this expenditure rises to 4.3 % of GDP by 2060, which is almost equivalent to a tripling of expenditure in the LTC area (see Table 8).

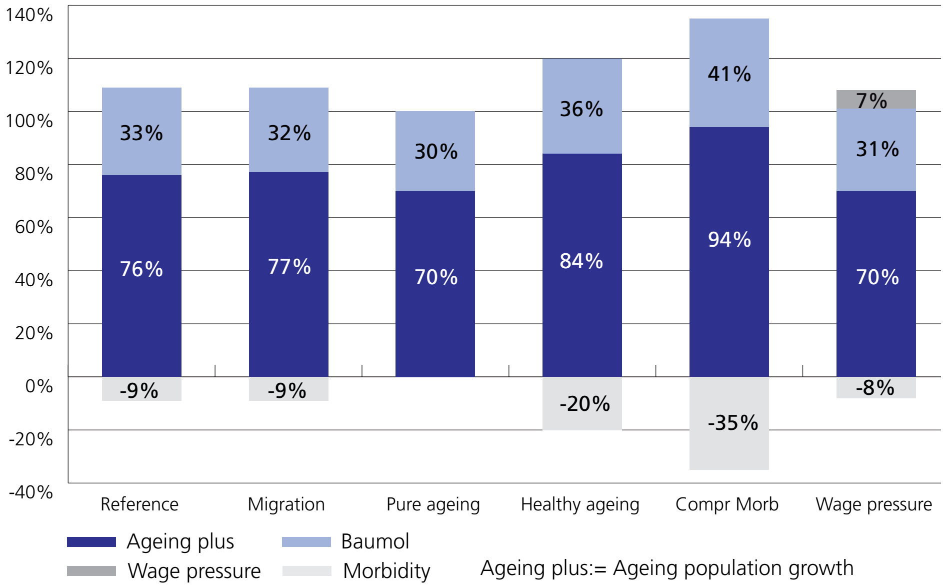
Table 8: Expenditure for long-term care from 65 and upwards (in GDP %)

Scenario	Base year 2009	2060	Change 2009–2060	Difference to reference scenario
Reference		4.3	+2.7	
Morbidity				
Pure ageing		4.9	+3.4	+0.6
Healthy ageing	1.5	3.7	+2.1	-0.6
Compression of morbidity		3.2	+1.6	-1.1
Wage pressure		4.8	+3.3	+0.6
Migration		4.1	+2.5	-0.2

A breakdown of costs between care homes and Spitex shows that the increase in expenditure on the former is the primary driver of cost growth. However, the development of costs is very strong in both areas: Expenditure on Spitex undergoes a 2.5-fold rise from 0.2 % to 0.5 % of GDP, while that on care homes virtually triples from 1.3 % to 3.8 % of GDP. In other words, the already high proportion of expenditure accounted for by care homes, which currently stands at just under 87 %, rises by a further 1.5 percentage points.

The cost-driving impact of demographics on LTC expenditure is further accentuated by wage cost development: As already mentioned, the LTC scenarios assume that no productivity gains are achieved and that the Baumol Effect is therefore felt in full. This means that the LTC area experiences cost growth caused by the wages of healthcare staff rising in step with wage levels in the remainder of the economy, despite lower rationalisation potential.

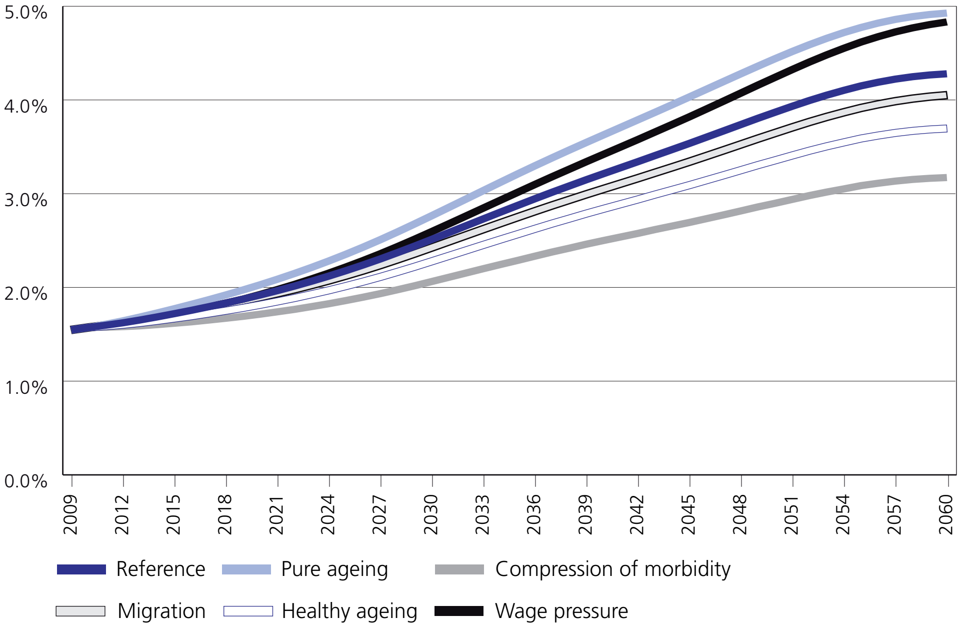
Figure 12: Percentage contribution of cost drivers to price-adjusted rise in expenditure for long-term care from the age of 65, 2009–2060 (in %)[1]



1 Note that a linearisation of the expenditure rise with the helpl of the natural logarithm was undertaken in order to ascertain growth contributions.

Depending on the scenario, between 30 % ("Pure ageing") and 41 % ("Compression of morbidity") of the price-adjusted rise in expenditure between 2009 and 2060 can be explained by the Baumol Effect (see Figure 12). Ageing and the morbidity rate have a strong impact on LTC, just as they do on HeL. As in the "Compression of morbidity" scenario, ageing can explain up to 94 % of the price-adjusted rise in expenditure by 2060. The "Pure ageing" scenario aside, however, the cost-driving ageing effect is partially offset in all scenarios by a decline in the requirement for care. In the case of the "Compression of morbidity" scenario, the explanatory contribution of the demographic cost drivers (ageing plus morbidity) therefore amounts to 59 %, rather lower than the 69 % that applies in the "Pure ageing" scenario. The sensitivity with which expenditure on LTC (as a proportion of GDP) reacts to changes in the care requirement assumption is explained below.

Figure 13: Scenarios for long-term care from the age of 65, 2009–2060 (in GDP %)



The change in the extent of care requirements (morbidity rate) is one of the greatest levers for influencing expenditure development in the long-term care area (see Figure 13). For example, the rise in expenditure on long-term care by 2060 is at its lowest in the "Compression of morbidity" scenario (+1.6 % of GDP to 3.2 % of GDP), whereas it is at its highest in the "Pure ageing" scenario (+3.4 % of GDP to 4.9 % of GDP).

A similarly strong impact on long-term care expenditure ("Wage pressure" scenario: +3.3 % of GDP to 4.8 % of GDP by 2060) is the accelerated increase in real wages, which could be triggered by a shortage of specialist care staff. By contrast, a higher net immigration rate ("Migration" scenario) does little to bring down the rise in expenditure compared to the "Reference scenario" (difference: -0.2 % of GDP).

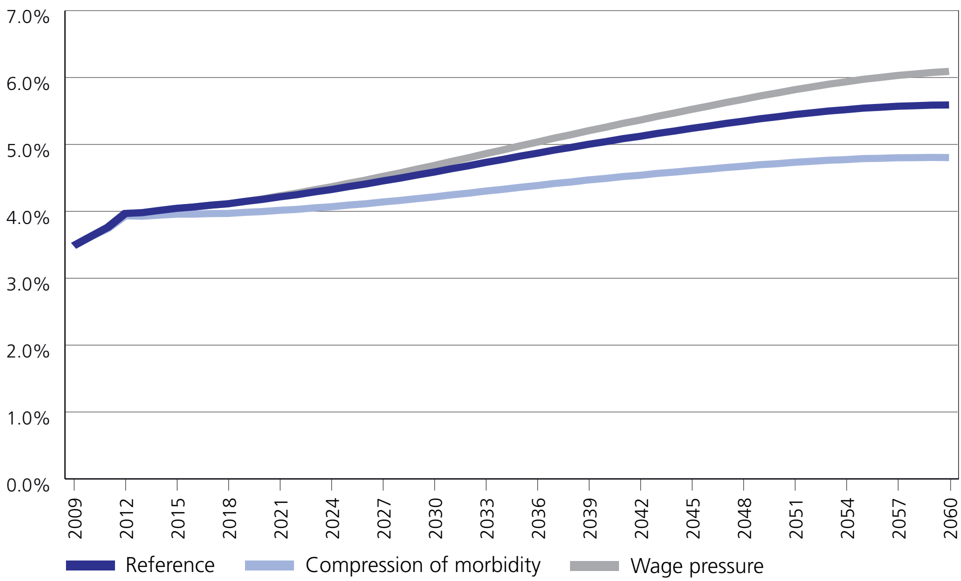
6 Public healthcare expenditure

Public healthcare expenditure includes all contributions made by the Confederation, cantons, communes and social security funds to the financing of healthcare. In the case of the former three levels of government, all expenditure which appears in the government finance statistics under the "Health" function is included. Also included are government transfers to private households for the purposes of financing healthcare benefits, such as individual premium reduction (IPR) and cantonal supplementary benefits to AHV (EL AHV). Where the social security funds are concerned, the relevant areas are those which belong to the government sector and receive payments from the government as per the national accounts. This essentially limits the funds in question to AHV and IV. Just as in the case of overall expenditure, public expenditure on healthcare is likewise broken down into the HeL and LTC areas (see Figure 2). Section 6.1 and 6.2 explore these areas in more detail. As the expenditure of IV affects the financing of long-term care for people under 65 years of age, the contributions of IV to healthcare are extrapolated in line with the expenditure development projections for IV in the context of the long-term outlook for the public finances (Geier and Zahno, 2012). Other contributions to healthcare by the public sector, such as those for prevention and administration, are extrapolated in line with GDP.

The first thing to be borne in mind where the projections for public healthcare expenditure are concerned is the fact that two special effects have an impact on the years up to 2013. These relate to the introduction of the new arrangement of care financing at the new hospital financing regime (see Federal Act on the New Arrangement for Care Financing of June 1, 2008; Section 8.1). As a result of the new arrangement for care financing, the proportion of care costs borne by the public sector is due to rise from 2011 onwards. According to these projections, which are based on the estimates of the Federal Office of Public Health for the repercussions of care financing, this will lead to a one-off increase of just under 0.1 % of GDP in the proportion of financing to be borne by the public sector. In addition, it should be observed that the introduction of the new hospital financing regime from 1 January 2012 prescribes a new financing ratio for inpatient services between the cantons and the OKP (55 % to 45 %), the overall result of which will be to impose an additional burden not only on the cantons but also on the OKP, and therefore ultimately on the public sector (FFA, 2010). For the purposes of the projections, it is assumed (on the basis of an estimate by the Federal Office of Public Health) that cantonal expenditure will rise by just under 0.2 % of GDP in 2012.

The steep rise in public healthcare expenditure between 2009 and 2013 which is apparent in Figure 14 is primarily attributable to these special effects.

Figure 14: Public expenditure on healthcare 2009–2060 – best and worst case[1]
(in GDP %)



1 Best and worst case of the scenarios elaborated.

Table 9: Public expenditure on healthcare (in GDP %)

Scenario	Base year 2009	2060	Change 2009–2060	Difference to reference scenario
Reference		5.6	+2.1	
Morbidity				
Pure ageing		6.0	+2.6	+0.4
Healthy ageing		5.2	+1.7	-0.4
Compression of morbidity		4.8	+1.3	-0.8
Wage costs	3.5			
Wage pressure		6.1	+2.6	+0.5
Baumol		6.0	+2.5	+0.4
Migration		5.5	+2.0	-0.1
EU		5.5	+2.1	-0.05

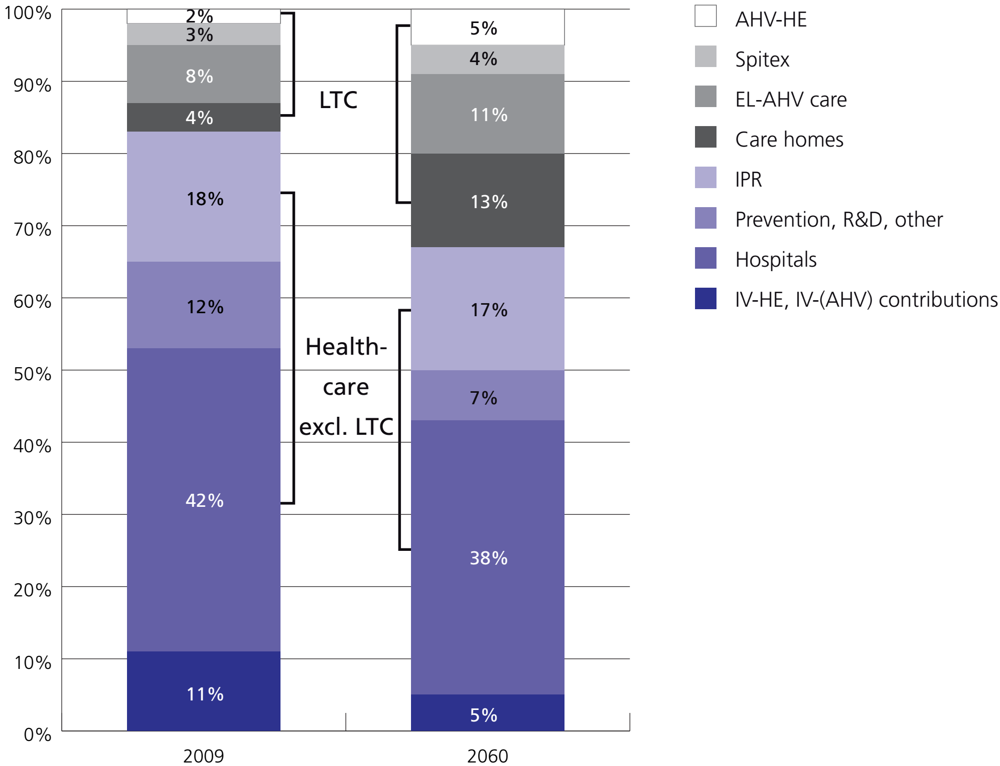
In the "Reference scenario", the public expenditure which encompasses the expenditure of the three levels of government as well as the AHV and IV fund contributions to healthcare rises from 3.5 % of GDP to 5.6 % of GDP (see Table 9). The AHV and IV contributions include expenditure on the helplessness allowance, medical services and therapeutic equipment, for example. As the projections for public expenditure are based on the projections for overall healthcare expenditure, the same cost drivers predominate. Just like total healthcare expenditure, government expenditure reacts most sensitively to a change in the state of the population's health ("Compression of morbidity": increase in expenditure of 1.3 % of GDP) and a disproportional development in healthcare wage costs ("Wage pressure": increasing expenditure of 2.6 % of GDP) (see Figure 14).

Table 10: Public expenditure on healthcare by government level in reference scenario

	2009	2060 in GDP %	Change 2009–2060	in %
Total healthcare	11.3	15.8	+4.5	+40
Govt. (incl. social welfare)	3.5	5.6	+2.1	+60
Confederation	0.4	0.6	+0.1	+50
Cantons	2.3	3.9	+1.7	+70
Communes	0.3	0.6	+0.3	+100
Social security funds	0.4	0.5	+0.1	+25
AHV-HE	0.1	0.3	+0.2	+200
IV and other AHV contributions	0.3	0.2	-0.1	-33

If public expenditure is broken down by government level and social security fund, it emerges that the cantons provide the lion's share of the financing of public healthcare expenditure in the base year, namely 66 %, which equates to 2.3 % of GDP (see Table 10). This is particularly attributable to the cantonal contributions to hospitals, which account for just under 60 % of all cantonal expenditure on healthcare. Accordingly, the rise in expenditure is most keenly felt by the cantons at 1.7 % of GDP. This development reflects the current breakdown of tasks between the Confederation and the cantons in the area of healthcare and hospital policy, as well as in the financing of care services. By contrast, the greatest cost dynamism is evident in the case of the communes, whose expenditure doubles from 0.3 % to 0.6 % when measured as a proportion of GDP. This is primarily driven by the surge in expenditure on long-term care (see Section 4.2). At 0.1 % of GDP, the rise in federal expenditure up to 2060 turns out to be comparatively modest. This is almost exclusively driven by expenditure on IPR. Where the social security funds are concerned, the additional burden of the AHV helplessness allowance – which is due to expenditure growth in the care area – is almost wholly compensated for by a fall in IV contributions for the care of persons under 65 years of age. Among other things, the latter is explained by the anticipated decline in the working population from 2020 onwards. Overall, this leads to a shift in the proportions of public healthcare financing to the detriment of the cantons and the communes. Their combined share rises from 75 % in 2009 to 80 % in 2060, with 80 % of this increase borne by the cantons. This too is a consequence of the changes approved by the Swiss parliament in hospital and care financing, with the corresponding additional burdens borne by the state and in particular by the cantons. These changes took effect in 2011.

Figure 15: Breakdown of public expenditure by function in reference scenario (in%)



A breakdown of tasks by function shows that the financing of public hospitals currently accounts for the largest proportion of public sector expenditure at 42 % (see Figure 15). The financing of IPR accounts for the second-highest proportion of public expenditure (18 %). However, the projections show that expenditure on these two functions, which are counted under HeL in the current projections, decline in the "Reference scenario" from a 54 % share in the base year to 45 % in 2060. This is attributable to the fact that the proportion of financing accounted for by functions in the LTC area rises from 17 % in the base year to 33 % in 2060, as a the result of a strong surge in costs in the LTC area and the new arrangement for the financing of care.[37] As a result of the reform of care financing, government contributions to care homes rise particularly strongly in proportion to other expenditure on LTC, namely from 4 % to 13 %. Other expenditure on LTC includes contributions to Spitex, supplementary benefits for the AHV to LTC (EL-AHV) and the AHV helplessness allowance (AHV-HE). Finally, expenditure on the IV helplessness allowance (IV-HE) and IV(AHV) contributions to healthcare services will weigh less heavily on public finances.

6.1 Healthcare excluding long-term care

Public healthcare expenditure excluding long-term care includes the expenditure functions listed in the government finance statistics under the "Health" function, with the exception of the "Nursing and care homes" and "Outpatient nursing care" positions (FFA, 2011). In addition, expenditure on IPR, which is classified in the government finance statistics under the "Social welfare", function, is also taken into account. The inclusion of IPR is justified on the basis that expenditure on IPR is strongly influenced by healthcare expenditure, particularly healthcare expenditure excluding long-term care. For the sake of simplicity, expenditure on IPR is subsumed under government healthcare expenditure. According to this demarcation, public sector healthcare expenditure comprises the three positions of hospitals, expenditure on IPR, and other healthcare expend-

37 Strictly speaking the proportion of expenditure accounted for by LTC is rather higher still, as a proportion of care is financed via the IPR. If this is taken into account, the LTC share of GDP rises from 19.5 % to 36.5 % in the "Reference scenario".

iture such as prevention expenditure (see also Section 6).

Where the expenditure projections are concerned, the government finance statistics data is also taken into account for the base year of 2009, as are (for federal expenditure) the figures of the Legislature Financial Plan 2013–15 (see FFA, 2011; FC, 2012; Appendix A3, Table A3). Here it is assumed that the proportion of cantonal expenditure on IPR, which currently amounts to around 45 %, will rise to 50 % in the longer term. In other words, the Confederation and the cantons will each contribute a half share to the IPR. In addition, it is assumed for simplicity's sake that the number of inhabitants benefiting from IPR as a proportion of the Swiss population will not change. This assumption is made as the cantons have considerable discretionary freedom of manoeuvre when it comes to the allocation criteria for IPR benefits, which makes a reliable forecast of a number of IPR beneficiaries virtually impossible. A rough calculation based on the assumption of a uniform social objective on the part of all cantons, whereby the premium burden should not exceed 8 % of the gross income of a household, reveals that the increase in the number of IPR beneficiaries over a period of 45 years would result in an additional increase in expenditure on IPR of 0.1 percentage points of GDP (see FC, 2008, Appendix 7, Box 3). Accordingly, taking into account a change in the number of IPR beneficiaries would barely affect overall public healthcare expenditure.

Public expenditure on hospitals is linked to the development in overall hospital expenditure, while other healthcare expenditure is linked to the development of nominal GDP (see Figure 2). The development of expenditure on IPR is dependent on the expenditure dynamics of the OKP. This means that expenditure on the OKP has to be projected first (see Section 7). The OKP finances not only benefits in the HeL area but also those in the LTC area, with the former currently accounting for the lion's share of services at roughly 90 %. In addition, the proportion of care costs accounted for by the OKP has been capped following the introduction of the new arrangement for care financing (see Section 6.2). For the expenditure projections of the OKP and IPR, the scenarios for HeL and LTC have to be combined (see Section 7, Table 15).

All three public sector expenditure positions are projected with different dynamic growth rates, which means that the expenditure structure of the base year may shift by 2060. Another aspect to be taken into account where the projections are concerned is the fact that the introduction of the new hospital financing regime (which entered into force on 1 January 2009) envisages a new financing split between the cantons and the OKP from 2012 onwards.[38] According to this regime, the cantons should bear a maximum of 55 % of the costs of inpatient services, while the insured should pay a maximum of 45 % (Art. 49a Para. 2 HIA). An extra cost burden for the OKP and a corresponding alleviation of the burden of the cantons occurs due to the investment costs of public hospitals and publicly subsidised hospitals, which are now taken over by the OKP as a result of the introduction of flat-rate payments per case (Swiss DRG). With the introduction of free choice of hospital throughout Switzerland (Art. 41. Para. 1(new) HIA), additional burdens are incurred by the cantons, whereas the inclusion of additional private hospitals in the hospital lists and the takeover of the HIA costs of private hospitals by private supplementary insurance results in a cost burden for both the cantons and the OKP. On the basis of estimates drawn up by the Federal Office of Public Health for the repercussions on the budgets of the cantons and the OKP, a one-off increase in cantonal expenditure on hospitals of CHF +1 billion is assumed for 2012. The equivalent figure for the OKP is CHF + 0.5 billion.

38 For a detailed explanation see FFA (2010).

Table 11: Public expenditure on healthcare excluding long-term care (in % of GDP)

Scenarios	Total		Hospital		IPR	
	2060	Delta 2009–60	2060	Delta 2009–60	2060	Delta 2009–60
Reference	3.5	+1.0	2.1	+0.7	1.0	+0.3
Morbidity						
Pure ageing	3.7	+1.2	2.3	+0.8	1.0	+0.4
Healthy ageing	3.3	+0.8	2.0	+0.5	0.9	+0.3
Compression of morbidity	3.2	+0.7	1.9	+0.4	0.9	+0.3
Wage costs						
Wage pressure	3.8	+1.3	2.3	+0.8	1.0	+0.4
Baumol	3.9	+1.4	2.4	+1.0	1.1	+0.5
Migration	3.4	+1.0	2.1	+0.6	1.0	+0.3
EU	3.5	+1.0	2.1	+0.6	1.0	+0.3
Base year 2009	**2.5**		**1.5**		**0.6**	

The projections show that cost pressures are greater for the public finances than they are for the remaining areas of HeL. Within the public finances, it is the cantons that are the most affected. In the "Reference scenario", government expenditure rises by just under 40 % between 2009 and 2060, from 2.5 % of GDP to 3.5 % of GDP (see Table 11). The biggest single contributor to this increase is the area of contributions to hospitals, which are primarily financed by the cantons (just under +0.7 % of GDP). A small proportion of some 6 % of hospital expenditure is financed by the communes. A smaller proportion of this increase (+0.3 % of GDP) is accounted for by the IPR, the expenditure on which is assumed to be met by the Confederation and the cantons in equal proportions. It should be borne in mind that the underlying development in expenditure on the OKP, which is what underlies the IPR projections, is also influenced by the higher growth in expenditure in the area of long-term care described above.

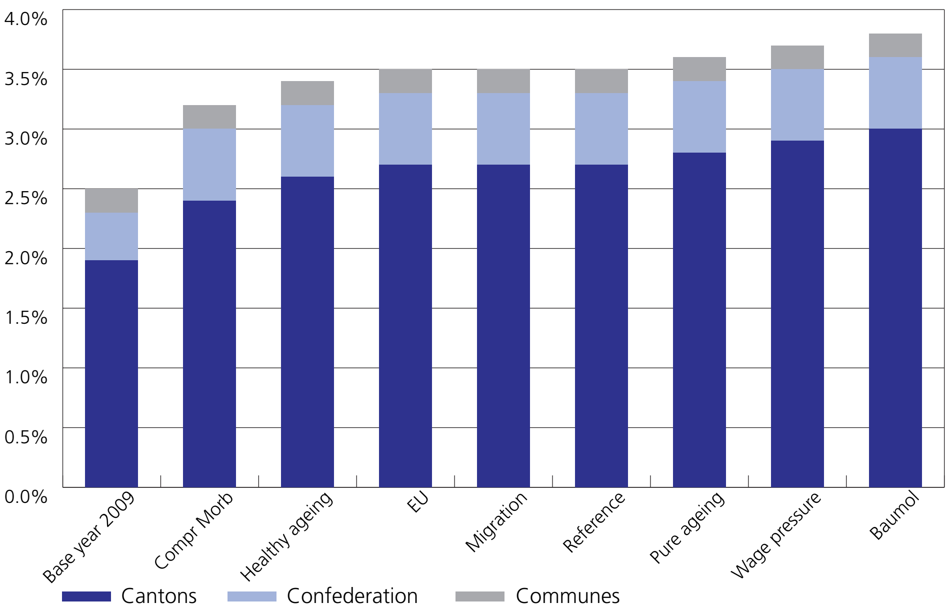
With both income development and demographic developments shaping the development of government expenditure, a change in the population's state of health (morbidity) and disproportionate wage developments in the healthcare industry both have a strong impact (see Table 11). For example, the rise in expenditure by 2060 is 0.2 % of GDP higher in the "Pure ageing" scenarios than it is in the "Reference scenario". In the two wage cost scenarios, namely "Wage pressure" and "Baumol", expenditure by 2060 exceeds that of the "Reference scenario" by as much as 0.3 % of GDP and 0.4 % of GDP respectively. This dynamic growth in government expenditure could be limited if – as assumed in the "Compression of morbidity" scenario – the state of the population's health were to improve sharply in line with the increase in life expectancy (difference to "Reference scenario": -0.3 % of GDP). This is particularly evident in the area of hospital expenditure. As the same factors are at work for both public expenditure and overall expenditure, the higher net immigration rate hypothesised in the "Migration" scenario has virtually no impact where public expenditure is concerned (see Section 6). The sensitivity of expenditure development to gradually converging income elasticity over the projection period (1.1 to 1.0) is likewise very low. This explains why the rise in expenditure in the EU scenario is just 0.05 % of GDP lower than the rate of growth in the "Reference scenario".

Table 12: Expenditure on healthcare excluding long-term care by government level in reference scenario

	2009	2060 in GDP %	Change 2009–2060	 in %
Healthcare excluding long-term care	9.5	11.4	+1.8	+19
Government	2.5	3.5	+1.0	+40
Confederation	0.4	0.6	+0.1	+25
Cantons	1.9	2.7	+0.8	+97
Communes	0.2	0.2	+0.03	+15

The level of state expenditure as a proportion of GDP rises twice as strongly as the proportion of expenditure for the entire HeL area, namely 40 % compared to 19 % (see Table 12). On the one hand, this is attributable to the fact that hospital financing (60 %) accounts for almost twice as high a proportion of public expenditure as it does in overall healthcare. At the moment, hospital financing accounts for around a third of healthcare expenditure. As nominal hospital expenditure, which is exhibiting an average annual growth of some 3.0 %, is growing more strongly than expenditure on outpatient treatment (just under 2.9 %), the cost pressure is felt more keenly in the public sector. In addition, a one-off additional burden for the cantons arises as a result of the new hospital financing regime (see above). At the moment, around three quarters of government expenditure is borne by the cantons, and the projections do not envisage this changing even by 2060, as the strongest cost pressure in the HeL area is felt at cantonal level (see Figure 16).

Figure 16: Public health expenditure excluding long-term care in 2009 and 2060, by scenario and government level (in GDP %)



The burden on cantonal finances is heavily influenced by the development of wage costs and morbidity (see Figure 16). For example, the increase in expenditure as a result of an improvement in the population’s state of health assumed in the “Compression of morbidity” scenario result works out as 0.3 % of GDP lower than in the “Reference scenario”, which is equivalent to a reduction of one third in percentage terms. If part of the HeL area were to suffer from Baumol’s cost disease, the financial burden on the cantons would rise by the same amount. By way of comparison, the sensitivity of the expenditure of the Confederation and the communes to a change in the assumptions of the “Reference scenario” is low at a maximum of just under 0.1 % of GDP (“Baumol” scenario).

6.2 Long-term care from the age of 65

According to the government finance statistics, public expenditure in the LTC area comprises the proportion of the expenditure of the cantons and communes allocated to nursing and care homes, as well as expenditure on outpatient nursing care (Spitex) provided to individuals aged 65 and upwards (FFA, 2011). Here it is assumed that the proportion of public expenditure accounted for by the age group of 65 and upwards is the same as that for overall care. According to our estimates, this currently amounts to just under 90 % of expenditure on overall long-term care. Public expenditure on LTC also includes a proportion of cantonal supplementary benefits for the AHV (EL AHV), which is assigned to the “Social security” function in the government finance statistics, and the helplessness allowance of the AHV.

This legislation for the new arrangement of care financing, which was passed in June 2008 has led to a new division in the financing of long-term care between private households, the OKP, and the state (Federal Act on the New Arrangement for Care Financing of June 1, 2008). Among other objectives, this new arrangement of care financing, which entered into force on 1 January 2011, seeks to prevent the burden of care costs on the OKP from exceeding its current level of just under 21 % (see FC, 2005, 19). Furthermore, where the financing of care costs is concerned, the proportion of persons requiring care should amount to a maximum of 20 % of the care contribution of the OKP laid down by the Federal Council (see Art. 25a Para. 5 HIA). The remaining financing care costs are regulated by the cantons, which have the discretion to reduce the contribution met by the persons requiring care themselves (see Art. 25a Para. 5 HIA). As well as this additional burden on cantonal budgets, which may – depending on the cantonal resolution in question – also affect the communes, the introduction of a lesser degree of helplessness for the AHV and an increase in the exempt amount for the EL AHV will lead to further additional burdens to the cantons.

At the time the projections were drawn up, there was still no data available as to how the new arrangements for care financing would affect the breakdown of costs between the sources of financing. These projections therefore rely on an estimation for the year 2002 produced by the FOPH for this purpose. According to the FOPH estimates, under the new care financing arrangement the public sector would have had to cover 38.6 % of the costs of care homes in 2002 rather than 32.5 %, with the remaining 61.4 % met by the OKP (19.9 %), private households (40 %), and other private financing sources (1.6 %). The proportion met by the public sector breaks down into 12.0 % for supplementary benefits to the AHV, 6.4 % for the AHV helplessness allowance, 18.5 % for contributions of the cantons and communes, and 1.7 % for social welfare. Where the financing of care in the home (Spitex) is concerned, the public sector would account for a share of 64.4 % rather than 63.7 % (contributions of OKP 25.3 %, AHV 14.9 %, cantons and communes 49.3 %, social welfare 0.2 %, private households 0.4 %, other private financing sources 7.1 %, accident insurance 1.3 %). According to the FOPH estimates, the new arrangement for care financing will lead to the overall share of costs in the area of long-term care borne by the public sector rising from around a third to a good 40 %.

The FOPH estimates form the basis for the expenditure projections from 2011 onwards. Also taken into account here is the change in the financing proportions of the cantons, communes and AHV-HE between the estimation year of 2002 and the base year of 2009. For the years 2009 and 2010, the healthcare statistics of the SFSO and an estimate of the breakdown of care financing from 2002 have been used (FC, 2005). Based on the “no policy change” assumption, it is assumed that the proportions of long-term care financing accounted for by private households, the state and health insurers will remain constant from 2011 onwards. For the sake of simplicity, the low financing proportion accounted for by social welfare is counted as part of the EL AHV.

According to our projections, around 30 % of subsidies to care homes will be provided by the communes from 2011 onwards, with the remaining 70 % provided by the cantons. Where outpatient care is concerned, the subsidy costs will be borne more or less equally by the cantons and communes. According to the estimates underlying this study, the new arrangement of care financing will lead to the proportion of costs in the LTC area borne by the public sector rising by five percentage points to 43 % between 2009 and 2011. This financing proportion of the public sector equates to 0.6 % of GDP in the base year of 2009, and rises to 0.7 % of GDP in 2011.

Table 13: Public expenditure on long-term care (in % of GDP)

Scenario	Base year 2009	2060	Change 2009–2060	Difference to reference scenario
Reference		1.9	+1.3	–
Morbidity				
Pure ageing		2.1	+1.5	+0.3
Healthy ageing	0.6	1.6	+1.0	-0.3
Compression of morbidity		1.4	+0.8	-0.5
Wage pressure		2.1	+1.5	+0.2
Migration		1.8	+1.2	-0.1

The projections reveal that the cost pressures for the public finances in the LTC area are just as high as they are in the LTC area overall. As in the HeL area, the greatest proportion of the financing burden is borne by the cantons. According to the "Reference scenario", the public sector financing requirement in the LTC area rises from 0.6 % of GDP in 2009 to 1.9 % of GDP in 2060 (see Table 13). Just as for the overall LTC area, the expenditure of the public sector reacts particularly sensitively to change of the requirement of care on the part of the population (morbidity rate). The expenditure increase by 2060 is felt most keenly in the "Pure ageing" scenario (a good 1.5 % of GDP), whereas the increase is at its lowest in the "Compression of morbidity" scenario (+0.8 % of

GDP). Public expenditure on long-term care is also exposed to significant pressure as a result of wage cost developments ("Wage pressure" scenario). By contrast, a higher net rate of immigration has virtually no impact on the change in public expenditure ("Migration" scenario).

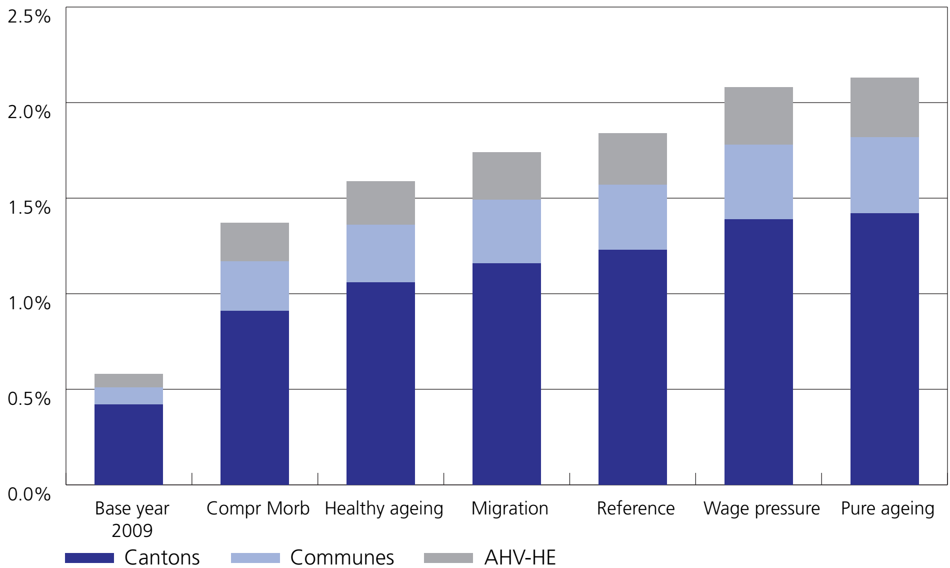
Table 14: Expenditure on long-term care from the age of 65 and upwards by government level and function in reference scenario

	2009	2060	Change 2009–2060	
	in GDP %			in %
Long-term care from 65	1.5	4.3	+2.7	+180
Government	0.6	1.9	+1.3	+220
Cantons	0.4	1.2	+0.8	+200
Communes	0.1	0.3	+0.3	+250
AHV-HE	0.1	0.3	+0.2	+240
Function[1]				
Care homes	0.1	0.7	+0.6	+400
Spitex	0.1	0.2	+0.1	+120
EL AHV	0.3	0.6	+0.3	+130

1 For purposes of simplification, the AHV-HE function has been left out, as this expenditure heading already appears under the breakdown of expenditure by government level.

The cantons bear the principal burden where public expenditure on LTC is concerned, accounting for more than two thirds. Between 2009 and 2060, the cantonal financing burden rises threefold from 0.4 % of GDP to 1.2 % of GDP (see Table 14). Even greater cost pressure is put on the finances of the communes and the AHV helplessness allowance (AHV-HE). As a result, the relative significance of the LTC financing burden for the cantons declines slightly, from 70 % in 2009 to 67 % in 2060. The breakdown of the financing burdens between the different levels of government develops independently of the hypothesised scenario (see Figure 17).

Figure 17: Public expenditure on long-term care from the age of 65 in 2009 and 2060, by scenario and government level (in GDP %)



Moreover, it is striking that the contributions of the cantons and communes for care homes, expressed as a proportion of GDP, rise significantly more strongly (400 %) than the contributions of these levels of government for Spitex (see Table 14). In addition to the new arrangement for the financing of care, this is attributable to the greater increase in spending on services for care homes. For example, nominal average expenditure on care homes rises by 4.6 % annually, thereby growing 0.3 percentage points more strongly than expenditure on Spitex services.

7 Mandatory basic healthcare insurance (OKP)

The expenditure of the OKP in the HeL and LTC area is broken down into outpatient and inpatient services for the projections. The breakdown of expenditure for the base year is taken from the OKP statistics. In order to avoid double counting with government expenditure, the expenditure of the OKP is presented excluding IPR expenditure. In this sense, the net OKP expenditure is taken into account for the extrapolation.

The OKP expenditure is extrapolated with the projected expenditure developments for HeL and LTC. Accordingly, the different expenditure developments in the HeL and LTC areas feed through into the OKP projections. Here it should be noted that the OKP proportion of expenditure spent on LTC is projected with the same dynamism as for public expenditure on LTC.

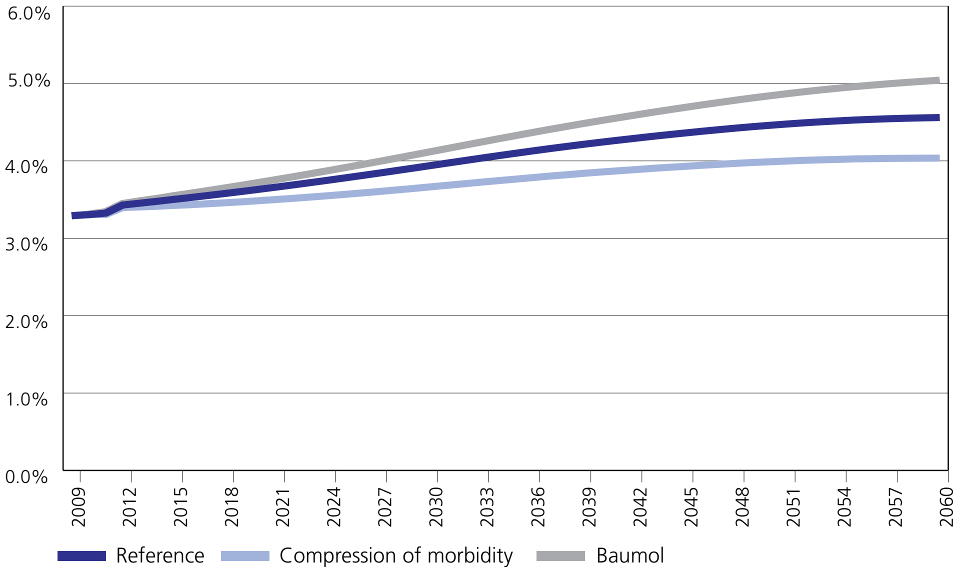
Table 15: Scenarios for the projection of OKP and IPR[1]

Healthcare (HeL)	**Long-term care from 65** (LTC)	**OKP / IPR scenario**
Reference	Reference	Reference
Migration	Migration	Migration
Pure ageing	Pure ageing	Pure ageing
Healthy ageing	Healthy ageing	Healthy ageing
Compression	Compression	Compression
Wage pressure	Wage pressure	Wage pressure
Reference	Productivity advances	Productivity advances
Efficiency scenarios	Reference in each case	As per HeL Efficiency scenarios

1 For the productivity advances scenario and the efficiency scenarios see Section 8.

As a result, the proportion of financing of LTC accounted for by the OKP remains constant. As with the overall expenditure, the expenditure for the OKP comprises the scenarios for both HeL and LTC. The composition of scenarios for the OKP is provided in Table 15.

Figure 18: Mandatory basic healthcare insurance (OKP), 2009–2060 – best and worst case[1] (in GDP %)



1 Best and worst case of the scenarios elaborated.

The change in expenditure for the OKP is similar to that for overall expenditure, which means the OKP share of healthcare expenditure in the "Reference scenario" remains at around 29 % between 2009 and 2060 (see Figure 18). Two countervailing effects are responsible for this development. On the one hand, the proportion of expenditure on LTC accounted for by the OKP, namely just under 10 %, is slightly lower than in overall healthcare, at just under 14 %. On the other hand, the OKP expenditure rises by just under 0.1 % of GDP on a one-off basis as a result of the new hospital financing regime introduced at the beginning of 2012 (see Figure 18).

Table 16: Expenditure on mandatory basic healthcare insurance (excl. IPR) (in GDP %)

Scenario	Base year 2009	2060	Change 2009–2060	Difference to reference scenario
Reference		4.6	+1.3	–
Morbidity				
Pure ageing		4.9	+1.6	+0.3
Healthy ageing		4.3	+1.0	-0.3
Compression of morbidity		4.0	+0.7	-0.5
Wage costs	3.3			
Wage pressure		5.0	+1.7	+0.4
Baumol		5.0	+1.8	+0.5
Migration		4.4	+1.2	-0.1
EU		4.5	+1.2	-0.1

In the "Reference scenario", the OKP expenditure rises from 3.3 % of GDP in the base year to 4.6 % in 2060 (see Table 16). The gross OKP expenditure (including IPR expenditure) increases from 3.9 % of GDP to 5.0 % of GDP. As the OKP currently spends more than 90 % on the HeL area, the same cost drivers of income and ageing predominate (see Figure 11). In this respect, ageing is rather more important as a driver of OKP than for the HeL, as a small proportion of OKP expenditure is channelled into LTC. Just like HeL expenditure, the OKP expenditure reacts with similar sensitivity to any change in morbidity and wage costs. In the "Compression of morbidity" scenario, the rise in expenditure is reduced by 0.5 % of GDP or 38 % compared to the "Reference scenario" (see Table 16). If productivity were to rise by 25 % less than in the overall economy ("Baumol" scenario), expenditure would rise by the same amount compared to the "Reference scenario". There is therefore a difference in expenditure of 1 % of GDP between the best-case scenario ("Compression of morbidity") and the worst-case scenario ("Baumol"), which is equivalent to 30 % of expenditure in the base year (3.3 % of GDP).

8 Repercussions of reform measures

8.1 Efficiency scenarios

The status quo scenarios presented so far are based on a "no policy change" assumption. By contrast, the efficiency scenarios presented in this section take into account the potentially cost-containing effects of healthcare policy measures. However, the results of the efficiency scenarios are subject to the following reservations. As already discussed in Section 2.2.1, the projection methodology applied here has the drawback that any behavioural responses on the part of patients, doctors, etc. cannot be replicated in the model. In other words, the impact of reform measures on expenditure development in healthcare cannot be ascertained within the model itself. For that reason, assumptions as regards the extent of the impact of these measures need to be fed into the model. As the following explanations will make clear, however, these repercussions are difficult to quantify.

In the efficiency scenarios for the HeL area, it is assumed that the following healthcare policy measures have a cost-containing effect.

- The flat-rate payments per case in Swiss hospitals that have applied as part of the **new hospital financing regime** since the beginning of 2012 (diagnosis-related groups, Swiss DRG):[39] In addition to the flat-rate payments per case, the distinction between listed hospitals and contractual hospitals (another newly-introduced phenomenon) is also likely to have a cost-containing effect. The magnitude of these effects is very difficult to evaluate, however. Only the cost of listed hospitals is financed by the dual financing system of cantons (a share of at least 55 %) and the OKP. In order to make it onto a cantonal list, hospitals have to fulfil various economic efficiency and quality criteria. Other key elements of the new hospital financing regime

39 For a comprehensive review of the reform of hospital financing see the following website of the FOPH: http://www.bag.admin.ch/themen/krankenversicherung/00305/04104/06668/index.html?lang=de (German, French and Italian only, version as of June 2012).

such as the introduction of free choice between hospitals on the cantonal list throughout Switzerland for OKP insured persons and a refined risk-sharing mechanism between the health insurers also have an impact on costs, but above all lead to a shift in the burden borne by the various sources of financing healthcare (see Section 6).[40]

- The "**eHealth**" Switzerland strategy approved by the Federal Council on 27 June 2007: This is designed to improve the use of information and communication technologies (ICT) in the healthcare industry ("eHealth").[41] Key elements include the establishment of electronic patient files, online services to promote personal healthcare competencies, as well as telemedicine and telemonitoring. The Swiss Conference of Cantonal Healthcare Directors has also signed up to the objectives of this strategy.

- The intended partial revision of the Federal Health Insurance Act (HIA), which was the object of the 2B bill passed by the Federal Council to promote **managed-care models** (MC models): However, following the conclusion of the calculations put forward in this study, the partial revision of the HIA on MC was rejected in a public referendum of 17 June 2012. As a consequence, the savings potentially achievable as a result of MC models are overestimated in the efficiency scenarios assumed here. MC models apply if insured persons restrict their freedom of choice to select a doctor and accept a specified doctor, typically their local GP or a group of doctors as a door opener for admission to outpatient healthcare provision. Within the OKP, the most common variants are the group practice (Health Maintenance Organisation or "HMO") and the family doctor/GP model ("HAM").

40 In the risk-sharing mechanism, it is now not only the age and gender of a group of insured that are taken into account, but also any inpatient stays in hospitals and care homes exceeding three days.

41 For detailed information on the "eHealth" strategy see the following website of the FOPH: http://www.bag.admin.ch/themen/gesundheitspolitik/10357/index.html?lang=de (German, French and Italian only, version as of June 2012).

As a general rule, the introduction of DRG in Switzerland should provide hospitals with incentives to cut costs. Put simply, DRG is a classification of illness types into so-called case groups. These case groups are then subject to further specifications as to what treatment is appropriate for a patient in view of their specific condition, e.g. an operation or a more conservative type of therapy. The case groups are designed in such a way that they are as homogeneous as possible according to medical and economic criteria. For each of the cost groups, a flat rate payment (service-related flat-rate sum) is stipulated. This is the sum reimbursed to a hospital for the treatment of a patient who is assigned to the case group in question. The assignment to a case group is undertaken following treatment at a hospital. The DRG system should give hospitals the incentive to treat a patient as cost-effectively as possible. In contrast to flat-rate day payments or individual invoices, which provide an incentive to retain patients at a hospital for an unnecessary length of time or to carry out unnecessary medical procedures, the DRG system offers an incentive to release patients from hospital as early as possible. In this way, the DRG is expected to have a cost-containing impact. However, a number of critics have objected that the DRG system will give rise to "revolving door effects" (see Kirchgässner and Gerritzen, 2011, 28 [52]). The revolving door effect is where patients are released from hospital before they are fully well, and then need to be readmitted to hospital within a short period of time. Furthermore, releasing patients prematurely from hospital leads to a transfer of costs to other areas of the healthcare system.[42] Furthermore, the DRG system can provide hospitals with an incentive to assign patients to the most treatment-intensive (and therefore most expensive) case groups. This would mean that the case group assignment process is no longer governed by strictly medical criteria. Moreover, the experience of other countries such as the USA suggests that the flat-rate payment invoicing system provides an incentive to maximise revenues (see Brügger, 2010, 20 et seq.). Hospitals can pursue this objective by treating as many high-risk or highly profitable cases as possible (risk selection and "cream skimming"). This then gives rise to costs that would otherwise be avoidable, for example if a greater

42 For a more detailed overview of the possible impact of DRG on hospital behaviour see Brügger (2010, 19 et seq., Table 1).

number of operations are undertaken than is medically appropriate due to information asymmetry between patient and doctor. As a result, the introduction of DRG could also give rise to an increase in costs.

Accordingly, a very mixed picture emerges when one analyses previous experiences of DRG in other countries such as the USA and Germany (see Kirchgässner and Gerritzen (2011, 28 [52]). For example, when comparing figures for inpatient treatment such as the development of the average patient stay in hospitals between Germany (which introduced DRG in 2004) and Switzerland, Kirchgässner and Gerritzen (2011, 30 et seq.) identified no clear differences. However, a number of public hospitals were invoicing on a flat-rate per cost basis even in the past. Yet a comparison between these hospitals and hospitals applying other invoicing systems for the period 2001 to 2008 likewise reveals that the invoicing system has virtually no impact on the duration of a patient's stay in hospital or the number of rehospitalisations (revolving door effect) (see Widmer and Weaver, 2011, 29 et seq.). On the other hand, Widmer and Weaver (2011, 29) emphasise that the Swiss DRG system introduced across the country at the start of 2012 differs substantially from the DRG system applied by a number of Swiss hospitals in the past, which therefore makes it impossible to draw any empirical conclusions as to the effects of the Swiss DRG. In a comprehensive evaluation of empirical studies on the cost, quality and distribution repercussions of DRG, Brügger (2010, 73) arrives at the conclusion that it is possible to identify saving effects as a result of DRG, even though the expectations of the cost-containing repercussions of DRG have not been fully met. This does therefore put forward a degree of evidence for saving effects.

The aim of the implementation of the "eHealth" strategy is designed to achieve greater efficiency, better quality, and greater security in the healthcare industry. An assessment of regulatory consequences conducted by Dobrev et al. (2010) on behalf of the FOPH and Seco investigates the costs and benefits of the introduction of electronic patient files. According to Dobrev et al. (2010, 35 et seq.), the costs of an electronic patient filing system include in particular the procurement, operating and maintenance costs for the hardware and software in question. On the benefits side, the introduction of electronic patient files is expected to simplify and accelerate processes in medical practices and hospitals alike. Such a system is also expected to reduce the number of laboratory and radiology investigations. Alongside these tangible benefits, which clearly make themselves felt in the form of cost savings, there are also a number of intangible benefits and drawbacks to be considered. These include the well-being of patients, for example reassuring their fears thanks to the opportunity to access their own patient file directly, and the working satisfaction of staff, for example a feeling of greater professionalism. Immaterial benefits can feed through into cost savings indirectly, if for example a sense of greater well-being on the part of the patient leads to an improved state of health. However, these potentially real cost savings are not taken into account by Dobrev et al. (2010), who limit themselves to a monetisation of immaterial benefits and losses. According to Dobrev et al. (2010, 40) a good CHF 250 million (or around 0.4 % of all healthcare expenditure) can be saved over the next 20 years with even low cost savings. The greatest benefit of introducing electronic patient files lies in the growth in the immaterial net benefits, the value of which is quantified by Dobrev (2010, 40) at CHF 1.4 billion. If these immaterial net benefits were to feed through into an improvement in the population's state of health, for example, the cost-saving potential would be considerable, as the projections of the status quo scenarios illustrate (see Section 5). Further cost savings as part of the "eHealth" strategy could result from the development of an online information portal on health and from telemedicine and telemonitoring. Where the former is concerned, an improvement of the population's level of understanding could promote health-oriented behaviour. Where the latter is concerned, the number of home visits by doctors could be reduced, for example.

Concrete findings for Switzerland have only been produced so far for the MC models. According to the estimates of Beck et al. (2009), in the case of a CSS group of around 55,000 insured persons under the MC model system, the gross costs in 2007 were on average some 8.7 % below the costs of a comparable group of insured persons whose members were insured under the standard model involving free choice of doctor. In a more recent study, Beck et al. (2011) use an expanded set of data and apply three different methods to calculate the average saving of MC models – compared to the standard model involving a free choice of doctor – in the OKP for the years 2006–2009. Depending on the calculation method in question, the annual savings for a group of insured persons in a doctor's network (compared to a comparable group with a free choice of doctor) work out at between just under 12 % and just under 21 % (see Beck et al. 2011, 22, Table 8). It should be borne in mind, however, that these estimates are subject to certain uncertainties. Depending on the method employed, for example, different estimates are used as to how greatly the (health) risk profile of insured persons in a doctor's network differs from that of persons with a free choice of doctor, the so-called risk selection through MC models (see Beck et. Al, 2011, Table 9). Moreover, the repercussions of MC for treatment quality are not taken into account in this comparison. Finally, major differences have been identified in the level of cost savings generated between the doctors' networks themselves (see Trottmann et al., 2012, 3). This suggests that MC in itself is no guarantor of cost savings compared to a system involving the free choice of doctor. Instead, cost-efficient networks of doctors are distinguished by other features.

On the basis of empirical analyses of MC models and an evaluation of potential saving effects of the three above-mentioned reforms carried out by the FOPH, efficiency scenarios have been drawn up for the HeL area. As already mentioned earlier, when constructing the efficiency scenarios it was assumed that the partial HIA revision to include MC would be accepted in the referendum on 17 June 2012. As the Swiss electorate rejected the bill, however, the previous estimate of the FOPH – that the proportion of the OKP insured in the MC models would rise from an estimated current 10 % to around 60 % in 2020 – now looks rather unrealistic. Accordingly, the contribution of MC to cost savings reflected in the efficiency scenarios is likely to be exaggerated. Nonetheless, the efficiency scenarios provide a number of indications of how great the cost savings could be if MC were to be significantly expanded. If the current estimate of the FOPH on the development of MC is taken as a basis, and if it is further hypothesised that around 10 % of costs could be saved through this model compared to the free choice of doctor model, a cost saving of around 5 % would result by 2020. A further 5 % saving is assumed to be achievable through efficiency increases as part of the new hospital financing regime and the "eHealth" strategy. Additional savings could be achieved if, as part of the "eHealth" strategy, more health-conscious behaviour on the part of citizens were encouraged and the number of visits to doctors were reduced. These assumptions form the basis for the so-called "Moderate efficiency scenario". As great uncertainties exist with respect to the cost-saving effects of reforms, an alternative efficiency scenario is taken into account alongside the "Moderate efficiency scenario". This so-called "High-efficiency scenario" is more optimistic, and follows Beck et al. (2011), whereby the cost-saving potential of MC compared to the free choice of doctor model works out significantly higher than it does in the earlier study by Beck et al. (2009) (see above).

Irrespective of the hypothesised savings, these efficiency scenarios are based on the "Reference scenario" for HeL. In addition, it is assumed that the above-mentioned reform measures will influence expenditure development in healthcare only temporarily up to 2020. The assumptions of the described efficiency scenarios are as follows:

- Moderate: steady rise in cost savings by 2020 thanks to reforms; 2020 saving 10 %; assumption after 2020: amount saved remains fixed, i.e. the relative saving declines.

- High: steady rise in cost savings by 2020 thanks to reforms; 2020 saving 20 %; assumption after 2020: amount saved remains fixed, i.e. the relative saving declines.

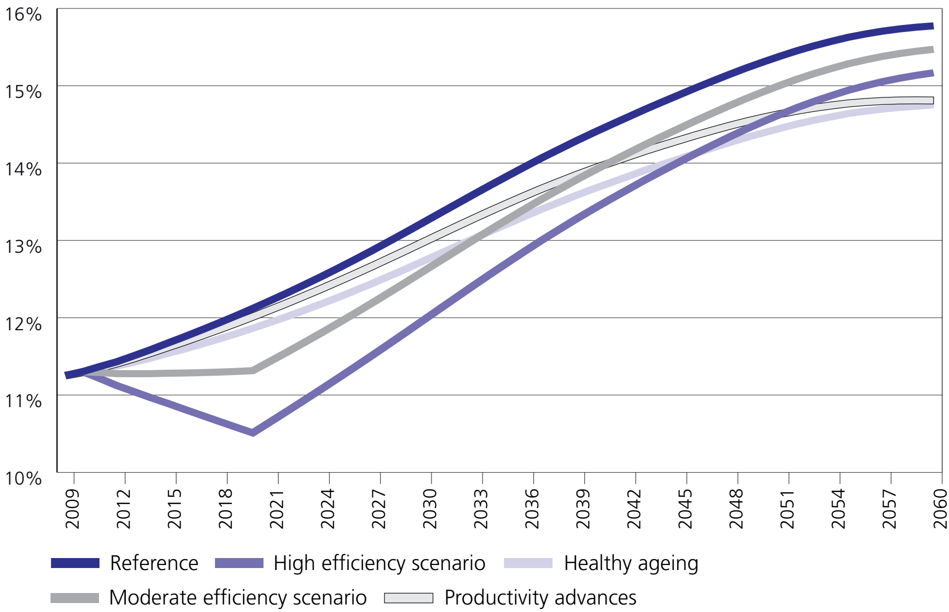
According to a study carried out by Obsan, productivity gains can also be achieved in the care area through measures which promote innovation, technological advances, and the reorganisation of care processes (change in the capability profile of staff and telemedicine), (see Jaccard Ruedin and Weaver, 2009, 12). This potential is illustrated in an efficiency scenario for LTC, namely the Productivity advances scenario. This assumes – in contrast to the "Reference scenario" – that the Baumol effect in LTC can be reduced by a half through productivity-enhancing measures. It should be borne in mind that this scenario is only aimed at illustrating how significant the leverage of productivity-enhancing measures in long-term care could be. The notion that the Baumol Effect can be halved is likely to be a thoroughly optimistic assumption. In view of the high labour intensity that characterises the care sector, implementing measures to encourage productivity is likely to prove difficult.

8.2 Results

On the basis of the underlying assumptions, the results of the efficiency scenarios show that measures to encourage productivity in LTC (reduction of the Baumol Effect) in particular can have the effect of containing the rise in healthcare expenditure. Compared to the impact of an improvement in the population's state of health, as is hypothesised in the "Healthy ageing" scenario, the cost-containing effects of reforms in HeL turn out to be moderate. Greater savings can be achieved with the OKP.

The rather moderate overall effect of reform measures in HeL is attributable to two factors. First, it is assumed a priori that while reforms do lead to a reduction of healthcare expenditure by 2020, they are unable to contain the dynamics of expenditure over the long term.

Figure 19: Cost saving through reforms 2009–2060[1] (in GDP %)



1 Note that the value range scale does not begin at zero.

As a consequence, expenditure in the "Moderate efficiency scenario" and "High efficiency scenario" converges towards the projected expenditure development of the "Reference scenario" over the long term (Figure 19). In addition, the reforms are concentrated in the HeL area, which according to our projections is exposed to significantly lower cost pressures than the LTC area (see Section 5). Accordingly, expenditure on LTC develops similarly in the "Moderate efficiency scenario" and "High efficiency scenario" as it does in the "Reference scenario". As a result of the two factors referred to above, the development of expenditure in both these efficiency scenarios approximates to that of the "Reference scenario" after 2020 (see Figure 19). In a comparison of the saving effects of reforms in the health industry as a whole, in the state sector, and in the OKP, it emerges that the alleviation of the burden (compared to the "Reference scenario") is most pronounced for the OKP and least pronounced for the state (see Table 17). This is primarily attributable to the fact that the proportion of OKP expenditure accounted for by LTC (just over 10 %, base year 2009), is significantly lower than in the healthcare industry as a whole (14 %) and for the public sector (just under 20 %, including IPR proportion for LTC). Moreover, according to our projections the rise in expenditure on inpatient services in HeL is higher than on outpatient services, and the public sector bears a disproportionately large share of these services at 42 % (base year 2009). By contrast, expenditure on hospitals accounts for 28 % of overall health care expenditure. Only 19 % of expenditure is currently spent by the OKP on inpatient services in HeL.

Table 17: Expenditure in 2060 in the efficiency scenarios (in GDP %)

Scenarios	**Level**			**Difference to reference scenario**		
	Total	**Govt.** (incl. soc. sec. funds)	**OKP**	**Total**	**Govt.** (incl. soc. sec. funds)	**OKP**
Moderate	15.5	5.6	4.5	-0.3	-0.04	-0.1
High	15.2	5.5	4.3	-0.6	-0.1	-0.2
Productivity advances	14.8	5.2	4.4	-1.0	-0.4	-0.2
Healthy ageing (status quo scenario)	14.8	5.2	4.3	-1.0	-0.4	-0.3
Base year 2009	**11.3**	**3.5**	**3.3**	–	–	–

For the healthcare system as a whole, the rise in expenditure by 2060 in the "High efficiency scenario" and "Moderate efficiency scenario" is lower than that of reference scenario by 0.6 % of GDP and 0.3 % of GDP respectively (see Table 17). By contrast, the "Healthy ageing" scenario alone is capable of reducing the rise in expenditure by 1 % of GDP compared to the "Reference scenario". Nevertheless, roughly the same effect as the "Healthy ageing" scenario is produced by ongoing advances in productivity in the LTC area ("Productivity advances" scenario).

Where public expenditure is concerned, the reform measures deliver savings of just 0.1 % of GDP by 2060 compared to the "Reference scenario", even in the most optimistic efficiency scenario ("High efficiency scenario") (see Table 17). With the "Moderate efficiency scenario", the saving is as little as 0.05 % of GDP. This also feeds through into the growth rates of nominal expenditure, which in the "High efficiency scenario" amount to an average of around 3.4 % a year, barely below those of the "Reference scenario" (just under 3.5 %). By way of comparison, the improved state of the population's health hypothesised in the "Healthy ageing scenario" would on its own result in a cost reduction of 0.4 % of GDP compared to the "Reference scenario", limiting growth in nominal expenditure to an average of 3.3 % a year. Similar cost savings to the improvement in the population's state of health in the "Healthy ageing" scenario could also be produced by ongoing productivity gains in long-term care ("Productivity advances" scenario).

Given the relatively small share spent by the OKP on the financing of LTC, the savings effect of the reform measures in the "High efficiency scenario" – which results in a reduction in expenditure of 0.2 % of GDP by 2060 compared to the Reference scenario – is greater here than in the public sector (see Table 17). The cost saving under the "High efficiency scenario" is just as high as with the assumption of ongoing productivity advances in LTC, and amounts to as much as two thirds of the cost saving achieved with the "Healthy ageing" scenario. In the "Moderate efficiency scenario", the cost saving amounts to just 0.1 % of GDP compared to the "Reference scenario".

9 Comparisons with other studies

This section undertakes comparisons between healthcare development scenarios produced to date (Section 9.1) with other recent studies for Switzerland (Section 9.2) and with EU projections (Section 9.3). When undertaking a direct comparison between studies, it should be borne in mind that conclusions cannot easily be drawn as to which expenditure projections are more pessimistic or optimistic with respect to the cost effects of certain factors such as the ageing of the population. It is more the case that there are a number of reasons for the different results arrived at, such as the choice of database in question, the time horizon or base year selected, and the projection methodology.

9.1 2008 development scenarios

A comparison with the results of the first expenditure projections as part of the 2008 development scenarios reveal that the demographic pressures on healthcare expenditure have actually increased.[43] When comparing the results of this study with those of the first expenditure projections back in 2008, however, it should be recalled that the selected timeframe for this study (2009–2060) is not the same as that for the study of 2008 (2005–2050). Moreover, a base year effect can be observed which is attributable to forecast errors regarding economic development and healthcare expenditure between 2006 and 2009. As a result, directly comparing the Reference scenario from 2008 ("2008 reference scenario") with the current "Reference scenario" is an inappropriate way of extracting information on the different impacts of cost drivers in both scenarios. To enable meaningful information to be extracted, the "2008 reference scenario" has been updated to take account of the actual development of the Swiss population between 2005 in 2009 and the new demographic scenario drawn up by the SFSO (A-00-2010). On this basis, the expenditure for this so-called "Adjusted scenario" can be projected for the period 2009 to 2050. At the same time, a structural break in the data due to a revision of the government finance statistics in 2008 and various assumptions on income elasticity have been taken into account in this "Adjusted scenario".

43 The 2008 development scenarios were drawn up as part of the Legislature Financial Plan 2009–2011 (FC, 2008). For a more detailed illustration of the results, see Colombier snd Weber (2008).

For example, in the "2008 reference scenario" it is hypothesised that income elasticity will converge from 1.1 towards 1.0 between 2005 and 2050 (see Colombier and Weber, 2008, 15). In the "Reference scenario" of this study, a constant income elasticity of 1.1 is assumed (see Section 4.1).

Table 18: Comparison with 2008 reference scenario

Scenarios	**Total**			**Government** (incl. soc. sec. funds)[1]		
	2009	2050	Change 2009–2050	2009	2050	Change 2009–2050
Current values	11.3	–	–	3.1	–	–
Reference 2008	11.6	15.5	+3.9	5.0	7.0	+2.0
Adjusted scenario	11.5	15.9	+4.5	5.0	7.3	+2.3
Reference	11.3	15.3	+4.1	3.1	5.4	+2.3

1 Government expenditure does not include expenditure on long-term care for those aged under 65.

The "Adjusted scenario" results in an additional expenditure burden of more than 0.5 % of GDP higher than the "2008 Reference scenario" between 2009 in 2050 (+4.5 % of GDP compared to +3.9 % of GDP) (see Table 18). This greater growth dynamism is first and foremost attributable to the new demographic scenario (A-00-2010), which envisages a higher number of older persons as a proportion of the overall population than the scenario of four years earlier (A-00-2005). Less than 0.1 % of GDP, or 15 % of the additional burden, can be explained by the adjusted assumption for income elasticity.

Nonetheless, overall expenditure in the current "Reference scenario" is projected to rise to a lesser extent by 2050 than in the 2008 reference scenario (15.3 % of GDP versus 15.5 % of GDP) (see Table 18). This is explained by the fact that economic growth in the years prior to 2009 turned out to be higher than expected, while the rise in healthcare expenditure was assumed to be lower than in the "2008 reference scenario". As a result of this base year effect, short-term expenditure development in the "2008 reference scenario" was slightly overestimated (+0.3 % of GDP).

Where public healthcare expenditure is concerned too, a comparison between the "2008 reference scenario" and the "Adjusted scenario" reveals a higher growth dynamism in the latter (+0.3 GDP percent), which is attributable to new data on demographic development and methodological adjustments. However, the level of public expenditure on healthcare in 2050 is projected to be lower in the current "Reference scenario" than in the "2008 reference scenario" (5.4 % of GDP versus 7.0 % of GDP). This downward correction is attributable to the base year effect (forecasting errors on expenditure and GDP development) and the above-mentioned revision of the government finance statistics in 2008.

9.2 Swiss healthcare expenditure projections

Alongside this study, a number of other analyses have grappled with the question of how Swiss healthcare development will develop in the future, particularly against the background of an ageing population. The key difference between other studies in this area on the one hand, and this study and its predecessor study from 2008 (Colombier and Weber, 2008) on the other, is that the former focus less comprehensively on Swiss healthcare as a whole, and for the most part focus on projections in certain areas on healthcare, e.g. LTC (Weaver et al., 2008). The OECD study aside (Oliveira Martins et al., 2006), the time horizon of these studies only extends to 2030, which means that the cost effect resulting from the ageing of the "baby boomer" generation cannot be fully captured. Furthermore, there are a number of methodological differences in the way non-demographic cost drivers are captured (see Section 2.2.2, Table 3). As already mentioned at the beginning of Section 9, a direct comparison of the results of the different studies is also complicated if the time horizon and the databases used do not concur. As a consequence, it cannot be established to what extent the differences in the results are attributable to a base year effect, for example, and to intriguing cost drivers. As the other studies rely on the older demographic scenario of the SFSO (A-00-2005) and predominantly take 2005 or 2004 as the base year, only the results of the predecessor study to this study (Colombier and Weber, 2008) are drawn on to ensure better compatibility. In addition, the way the results of this predecessor study compare to the current study, and therefore how the new demographic scenario of the SFSO (A-00-2010) influence health-care expenditure projections, can be seen in Section 9.1.

Table 19: Comparison of various expenditure projections with the 2008 development scenarios

Study	Area[1]	Time horizon, scenario	Rise in expend. (GDP %)	CW 2008[2] Scenario (base year 2005)	Rise in expend. (GDP %)	Possible reason for difference to CW 2008
Oliveira Martins. et al (2006)	Public HeL	2005–50, expansion of morbidity	+2.2	Pure Ageing	+1.8	Database, non-demographic factors
	Public LTC	2005–50, cost pressure	+1.4	Trend towards formal care	+0.9	Database, non-demographic factors
Weaver et al. (2008)	LTC	2005–30, référence (borne inféreure)	+0.7	Healthy Ageing	+0.7	Expenditure profile, Baumol Effect
Vuilleumier et al. (2007)	Total	2004–30, référence, morbidité retardée,	+3.9	Healthy Ageing	approx. +1.7	Non-demographic factors
Steinmann et al. (2007)*	HeL	2000–30, consistent approach	approx. +0.4*	Death-related costs	+0.4*	Expenditure profiles, base year, demographic scenario
Steinman & Telser (2005)*	OKP	2000–30, dynamised ageing	approx. +0.7*	Pure Ageing	+1.1*	Expenditure profiles, base year, demographic scenario

1 Total: = Total healthcare expenditure; HeL:= Healthcare excluding long-term care; LTC:= Long-term care from 65 and upwards; OKP:= Mandatory basic healthcare insurance.

2 CW 2008:= Colombier & Weber (2008).

* Only demographic cost drivers are taken into account here. In order to be able to provide the demographically-driven rise of expenditure as a percentage of GDP, however, these studies simulate expenditure growth in line with GDP as a result of non-demographic cost drivers. Furthermore, the time horizon is limited to the period 2005–2030 for reasons of better comparability.

When comparing the results of the 2008 development scenarios with other studies, the scenarios used are those which provide the greatest degree of overlap in the assumptions made (see Table 19).[44] Furthermore, the same time horizon is selected for the comparison. To illustrate why the comparability of the results may be limited, potential explanations of any differences in the results are provided in the final column of Table 19 in the form of a few key words. Overall, it emerges that differences in the results are frequently attributable to the choice of database and the projection methodology used for the non-demographic cost drivers.

Oliviera Martins et al. (2006) present healthcare expenditure projections for 30 OECD countries, including Switzerland. This study also uses the same timeframe as the 2008 development scenarios (Colombier and Weber, 2008). A comparison reveals that a higher expenditure increase of around 0.4–0.5 % of GDP is expected by the OECD study in both the areas of HeL and LTC. The reasons for these sharp deviations may be the database used and the application of different methods to capture advances in medical technology (see also Section 2.2.2). For example, there are differences in the demarcation of public healthcare expenditure, which results in the OECD study (Oliviera Martins, 2006, 56 and 65, Tables A2.3–A2.4) giving a public sector expenditure proportion for GoL and LTC in the base year of 6.2 % and 1.2 % of GDP respectively, which is significantly higher than Colombier and Weber (2008, 54, Table A6), who arrive at 4.4 % and 0.5 % of GDP respectively. As a proportion of GDP, however, the expenditure under the 2008 development scenarios develops more dynamically than that in the OECD study. For example, the percentage rise in expenditure as a proportion of GDP according to the 2008 development scenarios is a good 40 % in the HeL area and 180 % in LTC, whereas the equivalent rises in the OECD study are 35 % and 120 % respectively. Furthermore, the differing results may also be explained by the fact that the OECD study relies on an estimate for expenditure profiles by age, gender and services, whereas the projections of the 2008 development scenarios are based on data from the SFSO statistics.

44 For methodological comparisons see Section 2.2.2, Table 3.

A study conducted by Obsan focuses on the projection of expenditure in the area of long-term care from the age of 65 and upwards over the period 2005-2030 (Weaver et al., 2008). In a scenario comparable to the "Healthy ageing" scenario in this study, Weaver et al. (2008, 66, Tableau 7) arrive at the same figure for expenditure growth as the 2008 development scenarios, namely 0.7 % of GDP. At the same time, the projections differ in two key respects. On the one hand, the data is available in the LTC area for the care requirements (morbidity) of persons who use the services of care homes and Spitex. This data is incorporated into the projections of Weaver et al. (2008, et seq.). Instead of the expenditure per capita of population used here, therefore, this study can rely on expenditure per individual care case. On the other hand, the Baumol Effect is determined in a wholly exogenous way using past data for the EU and Switzerland (see Weaver et al. 2008, 55 et seq.).[45] By contrast, in the projection model of the FFA, the Baumol Effect is influenced by the assumption regarding overall economic advances in productivity (see Appendix A1). Despite these differing approaches, the extent of the Baumol Effect in both studies is comparable, which may be one reason why the results tally.

The greatest difference to the 2008 development scenarios can be found in the results of the study by Vuilleumier et al. (2007). According to their "Référence morbidité retardée" scenario, overall healthcare expenditure increases by 3.9 % of GDP over the period 2004–2030 (Vuilleumier et al., 2007). In the comparable scenario of Colombier and Weber (2008, 51, Table A1), namely "Healthy Ageing", the projected rise in expenditure is significantly lower at 1.7 % of GDP. The difference is attributable to the fact that, unlike Colombier and Weber (2008), Vuilleumier et al. (2007) extrapolate the cost trend for the non-demographic drivers from the past (see Section 2.2.2, Table 3). On the one hand, this major difference is reflected in great uncertainty regarding the cost impact of non-demographic drivers. On the other, a naive extrapolation of a cost trend presents serious drawbacks, as has already

45 This approach can lead to a contradiction within the projection model, if the assumption on productivity advances in the overall economy is not aligned with the assumption regarding the Baumol Effect.

been explained in section 2.2.2. In particular, such an approach neglects the correlation between demographic development, economic development and the development of expenditure in healthcare.

Finally, the studies of Steinmann et al. (2007) and Steinman and Telser (2005) focus on the cost effects of an ageing population in the area of GoI and for the OKP with a time horizon of 2030. Both these studies include proximity to death as a cost driver. In addition, the second study considers age-specific cost effects in the "Dynamised ageing" scenario (see Steinmann and Telser, 2005, Section 5). This scenario involves extrapolating the trend for the period 1996-2003, whereby in the OKP the per capita expenditure for the older population rises more strongly than for the younger population.[46] The "Death-related costs" scenario in the 2008 development scenarios, which likewise considers proximity to death, arrives at roughly the same expenditure growth (0.4% of GDP) as Steinmann et al. (2007, 17). An explanation of the age-specific cost effect could be that the state of health of the older population in particular has deteriorated. In this sense the most comparable scenario to that of Steinmann and Telser (2005) is the "Pure ageing" scenario, which assumes a deterioration in the state of health for the entire population. According to the "Pure ageing" scenario, the demographically-driven effect alone is significantly greater than in the "Dynamised ageing" scenario, even though the latter additionally captures cost-specific ageing effects (see Table 19). This difference is hardly likely to be attributable to the fact that the "Pure ageing" scenario neglects the issue of proximity to death (see Section 3.6). A more likely explanation is the fact that the base year and the expenditure profiles differ considerably. Added to this is the fact that, unlike all other Swiss studies, the studies of Steinmann et al. (2007) and Steinmann and Telser (2005) do not rely on the medium base scenario of the SFSO (2006, A-00-2005), but on alternative demographic scenarios drawn up by Münz and Ulrich (2001).

46 In a comparison of per capita expenditure between 1997 and 2009, however, it emerges that the cost of the very aged segment of the population (around 90 and upwards) has actually declined. This means that the age-specific cost effect in the "Dynamised ageing" scenario drawn up by Steinmann and Telser (2005) has been overestimated from today's perspective.

9.3 EU healthcare expenditure projections

The Ageing Working Group of the EU investigates at regular intervals how the ageing of the population influences demographic-dependent government expenditure such as expenditure on healthcare. For purposes of comparison, we look at the EU study from 2009 (AWG, 2009) and the very recently published EU study from 2012 (AWG, 2012). Just like this study, both the EU studies have a projection horizon of 2060, although each has a different base year, namely 2007 (AWG, 2009) and 2010 (AWG, 2012). When undertaking a comparison with the expenditure projections of this study for Switzerland, it should be borne in mind that the projections may differ with respect to the assumed demographic and economic development of the individual countries in question. Further important differences can be found in the extent of healthcare expenditure in the base year, the expenditure profiles applied, and institutional regulations for national healthcare systems.

When comparing expenditure projections for any other country with Switzerland, it is important to remember that the proportion of expenditure on healthcare in Switzerland accounted for by the public sector is low at 31 %. In the 17 EU countries in the eurozone, the public sector accounts for an average share of around 75 % of all healthcare expenditure. Among other reasons, this discrepancy is attributable to the fact that in Switzerland – unlike in other European countries – the OKP is offered solely by private insurers, and is therefore not assigned to the government sector in the national accounts. If the expenditure of the OKP were assigned to the government sector, the resulting financing proportion accounted for by the state would amount to some 60 % of all healthcare expenditure. Furthermore, a constant income elasticity of 1.1 is hypothesised in the "Reference scenario for Switzerland", whereas in the EU projections it is assumed that the elasticity hypothesised in the base year will converge from 1.1 towards 1.0 by 2060. However, this methodological difference has virtually no impact on the end results, as the higher projected expenditure increase it implies amounts to just 0.1 % of GDP (see Table 20a, "Reference scenario" and "EU" scenario).

Table 20a: Public expenditure on healthcare excluding long-term care in reference scenario[1] (in % of GDP)

	AWG (2009)		AWG (2012)**		Change	
	2007	2060	2010	2060	2007–2060 AWG (2009)	2010–2060 AWG (2012)**
Switzerland*						
Reference			2.5 (5.3)	3.5 (7.0)		+1.0 (+1.7)
EU scenario			2.5 (5.3)	3.5 (6.9)		+1.0 (+1.6)
Eurozone	6.7	8.1	7.3	8.4	+1.4	+1.1
Netherlands	4.8	5.8	7.0	8.0	+1.0	+1.0
Germany	7.4	9.2	8.0	9.4	+1.8	+1.4
Austria	6.5	8.0	7.4	9.0	+1.5	+1.6
Denmark	5.9	6.9	7.4	8.4	+1.0	+0.9

1 Figures for the EU are taken from the reports of the AWG (2009, 2012).

* Base year 2009. Figures in brackets = Public expenditure + OKP.

** Plus results for Switzerland.

Table 20b: Public expenditure on long-term care from the age of 65 in the reference scenario[1] (in % of GDP)

	AWG (2009)		AWG (2012)**		Change	
	2007	2060	2010	2060	2007–2060 AWG (2009)	2010–2060 AWG (2012)**
Switzerland*			0.6 (0.9)	1.9 (2.7)		+1.3 (+1.8)
Eurozone	1.3	2.7	1.8	3.4	+1.4	+1.7
Netherlands	3.4	8.1	3.8	7.9	+4.7	+4.1
Germany	0.9	2.4	1.4	3.1	+1.4	+1.7
Austria	1.3	2.5	1.6	2.9	+1.2	+1.2
Denmark	1.7	3.2	4.5	8.0	+1.5	+3.5

1 Figures for the EU are taken from the reports of the AWG (2009, 2012).

* Base year 2009. Figures in brackets = Public expenditure + OKP.

** Plus results for Switzerland.

As the assumptions of the Reference scenario are largely based on those of the EU projections, the results of the reference scenarios of both projections can be compared with one another.[47] In order to improve comparability with the EU projections even further, the "EU" scenario is additionally taken into account for the HeL. This scenario involves the assumption of income elasticity converging toward 1.0 over the projection period. A comparison with the EU projections from 2009 reveals that a greater rise in public healthcare expenditure as a percentage of GDP is expected for Switzerland (including the OKP) than for the eurozone (see Tables 20a and 20b). In a comparison with the latest EU projections, however, the picture changes. Here a distinction needs to be made between the HeL and LTC areas. According to the latest EU projections, the public expenditure which the average eurozone country devotes to HeL rises much less than in the older projections, so that the additional burden on the public finances of the eurozone works out significantly lower (-0.5 % of GDP) than is the case for Switzerland (state plus OKP) (see Table 28). According to the EU (AWG 2012, 185), the strong decline in dynamism compared to the projections of 2009 relates to the assumption of greater growth in the younger population and changes in the expenditure profiles. This could also explain the difference vis-à-vis the results of Switzerland.

According to the latest EU projections, the additional burden on the public finances of the eurozone as a result of LTC rises just as much as it does for the Swiss public finances (incl. OKP) (see Table 20b). The anticipated rise in expenditure on LTC for the eurozone states is estimated to be sharply higher than in 2009. This is primarily explained by the fact that the new calculations are based on a

47 It should be emphasised, however, that the probability of requiring care (care requirement ratio) is taken into account for the extrapolation of expenditure on long-term care in the EU projections (see Section 2.1). Even so, given otherwise similar assumptions the projection results should not differ if the expenditure per person requiring care is not influenced over the projection period by a change in care requirement ratios. The concordance of the results of Weaver et al. (2008) and Colombier and Weber (2008) for the case of Switzerland indicates that this latter prerequisite is met (see Section 9.2, Table 19).

higher rate of expenditure for the older population in the base year (see AWG, 2012, 219). Finally, it is striking that the public expenditure of the EU states, measured as a proportion of GDP, is in some cases much higher in the new base year of 2010 than in the old base year of 2007. According to the EU, this is attributable to the financial and economic crisis of 2009, which was followed by a sharp decline in value added in the EU.

10 Conclusions

The projections show that the ageing of the population has a strong influence on the development of healthcare expenditure, as expected. Compared to the development scenarios of 2008, the demographic effect is even more pronounced. But the significance of the phenomenon of ageing varies according to the area of healthcare being observed. Particularly affected by this phenomenon is the area of long-term care for those aged 65 and upwards. According to the projections, for example, the proportion of expenditure on long-term care will treble as a proportion of GDP between 2009 and 2060. Above all, pressure emerges from cost developments in the inpatient area of long-term care, in other words care homes. The demographic pressure building up in this area could be reduced by a strengthening of long-term care in the home, in other words through Spitex. The ageing of the population is also an important cost driver in the area of healthcare excluding long-term care, but the supply-side and demand-side cost drivers triggered by the assumed income growth are more significant here.

Compared to other sources of finance for the Swiss healthcare system, namely the OKP and private households, it is the healthcare expenditure financing share accounted for by the public sector that rises disproportionately. This is on the one hand attributable to the relatively high share that the public sector has to spend on long-term care. On the other hand, the new hospital financing regime and the new arrangement for care financing is also leading to a shift in the financing burden to the detriment of the cantons in particular. The cantons are the most heavily affected of any level of government, as their contributions to healthcare already account for some 66 % of all public spending in this area. Moreover, the projections reveal that the growth surge in long-term care will be heavily felt by the communes and the helplessness allowance of the AHV.

Above and beyond these findings, the efficiency scenarios indicate that long-term cost savings will be generated by reforms such as the "eHealth" strategy of the Confederation and cantons, the new hospital financing regime (Swiss DRG), and the promotion of managed care models in the OKP. The strongest cost savings in this respect are expected for the OKP. It should be remembered, however, that the cost effects of reforms in the projection approach pursued in this study have had to be largely fed in exogenously, which limits the meaningfulness of their hypothesized impact. The creation of a microsimulation model for the Swiss healthcare system is therefore worth considering. A model of this kind would be superior to the project approach used here with respect to the replication of reform measures.

A comparison with other studies on the long-term development of Swiss healthcare expenditure makes it clear that diverging results are first and foremost attributable to differences in the modelling of non-demographic cost drivers. Where the approach taken is comparable, as applies in the case of Weaver et al. (2008), the results are fairly concordant. A further comparison with the latest projections of the EU shows that significantly greater cost pressures are expected for the Swiss public finances (incl. the OKP) in the area of healthcare excluding long-term care than is the case for the eurozone states. Among other reasons, this may be attributable to differences in the demographic scenarios and the cost structure in the base year. In the area of long-term care from the age of 65 and upwards, the projected expenditure growth for the Swiss public finances (incl. the OKP) is of a similar magnitude to that of the eurozone states.

As the projections show, healthy ageing on the part of the population would significantly reduce cost pressures in healthcare. According to a study by the World Health Organisation (WHO), up to 50 % of chronic, non-communicable medical conditions could be avoided by people adopting a healthy lifestyle in the middle years of their life. A policy of prevention which encourages healthy behaviour on the part of the population in a targeted way, by trying to influence key determinants of health such as nutrition, movement, tobacco consumption and alcohol consumption, could therefore make a substantial contribution to alleviating the cost burden.

Furthermore, the projections indicate that substantial cost increases are looming as a result of a shortage of healthcare personnel. In the area of long-term care in particular, a substantial need for labour resources is anticipated in the medium to long term. The wage pressure triggered by a shortage of personnel would also intensify the price effects anticipated in long-term care as a result of Baumol’s cost disease (“Baumol Effect”). Forward-looking personnel planning is required if cost pressures as a result of a shortage of personnel are to be avoided. Simple measures here include not just further training and development, but also attracting and retaining staff in the healthcare industry. Another important aspect of forward-looking personnel planning is close cooperation between the Confederation and the cantons. In view of the high cost pressure expected on public and private finances as a result of developments in long-term care for those aged 65 and upwards, the proposal put forward by Schips and Abrahamsen (2002) for covering the collective risk of care requirements is worthy of consideration.

The question of immigrant labour is also closely linked to the anticipated scarcity of healthcare personnel. However, the projections of this study show that higher net immigration would hardly yield any tangible benefits in terms of alleviating cost burdens in healthcare. The resulting higher economic growth would be almost wholly offset by the associated income effects, such as increased demand for healthcare services. In the rather unlikely case that immigration were largely restricted to specialist healthcare workers, the savings would probably be greater if this had the effect of reducing wage pressures in the Swiss healthcare industry.

Finally, it is the view of several healthcare economists that supply-side cost drivers – such as advances in medical technology, supply-induced demand, and risk selection – have a more important role to play where expenditure development in healthcare is concerned then the growing demands made by an increasingly prosperous society of its healthcare system (e.g. Hsiao and Heller, 2007; Vladeck and Rice, 2009). In the projections of this study, this is reflected insofar as supply-side cost drivers such as the Baumol Effect (and the increase in productivity in healthcare) have a strong impact on cost development. Accordingly, substantial cost savings can be achieved through efficiency increases in the healthcare system. These could be achieved in various ways, such as the more efficient use of new technologies, an integrated care model for chronically ill patients, or compensation systems which set incentives for cost-efficient behaviour.

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Appendix

A1 Formal representation of projection methodology

The projections of expenditure per capita for age cohort j for year t can be represented with the help of the following equation, the basic formula for the expenditure projections.[48]

$$\frac{E(t,j)}{Pop(t,j)} = \tag{A1.1}$$

$$\underbrace{\left(\frac{12-\lambda}{12} * \frac{E(0,j-\tau)}{Pop(0,j-\tau)} + \frac{\lambda}{12} * \frac{E(0,j-\tau-1)}{Pop(0,j-\tau-1)}\right)}_{\text{Morbidity}} * \prod_{i=1}^{t} \underbrace{(1+(1+\eta(i)) * y(i))}_{\text{Income elasticity}} * (1+\pi)^{t} * \underbrace{(1+\omega * \mu)^{t}}_{\text{Baumol / wage pressure}}$$

whereby:

t= 1,….,50 and 0:= base year.

- E(t,j):= Expenditure (nominal) on healthcare excluding long-term care and on long-term care (from the age of 65 and upwards) per capita of age cohort j in year t, divided by gender in each case.
- Pop(t,j):= Number of men or women of age cohort j in the year t according to the SFSO demographic scenarios A-00-2010 and A-17-2010 respectively.
- Morbidity parameter: Additional period of life of age cohort j in a better state of health (morbidity) in year t compared to age cohort j in base year.
  - τ(t,j): Number of years spent in better state of health.

48 It should be emphasised that the term representing morbidity change in the Equation (1) is only an approximation of the correct formula. The actual formula applied for the calculations is relatively complex, however, and therefore more difficult to comprehend intuitively. This is why a simple representation has been chosen for the explanation of the projection methodology.

- $\lambda(t,j)$: Period of life of less than one year spent in better state of health (measured in months).
- For the area of healthcare excluding long-term care an improvement in the state of health has been assumed from the age of 41, j>41, and for long-term care (over 65) from 66 and upwards, j>65.

- y(i):= Growth rate of real GDP per capita in year i, i≤t.

- $1+\eta(i)$:= "Income elasticity" in year i, $\eta(i) \geq 0$, i≤t.

- π:= Long-term inflation rate.

- ω:= Long-term growth rate of average real wages.

- µ:= Baumol or wage pressure parameter; µ=1: fully impacting Baumol Effect, i.e. no productivity advances in healthcare; µ=0: No Baumol Effect or wage pressure; µ>0, i.e. real wages in healthcare grow more strongly than in the overall economy (wage pressure) or a cumulative impact of Baumol Effect and wage pressure.

The right-hand side of the basic formula (A1.1) should be understood as follows:

- The **first coefficient** describes the correlation between increasing life expectancy and a change in the morbidity of age cohort j in the year t. Here it is assumed that, as life expectancy rises, the probability of falling ill or requiring care at a particular age will change compared to the base year. For example, let us assume that the life expectancy of 50-year-old women in 2040 is 1 year and 8 months more than in the base year of 2009, and that 50-year-old women will spend this additional period of life in better health than 50-year-old women in the base year ("Healthy ageing" scenario). For the purposes of simplification, we can then assume that 50-year-old women in 2040 are in the same state of health as women in the base year who are 1 year and 8 months younger, in other words women aged 48 years and 4 months. Accordingly the morbidity parameter is $\tau(31,50)=1$.[49] As only annual data is available for ex-

49 As the base year is 2009 (t=0), t=31 is equivalent to the year 2040.

penditure per capita, the annual expenditure for the age cohorts of 48 and 49-year-old women in the base year have to be weighted with the corresponding number of months. In this example, $\lambda(31,50)$ is equal to exactly eight. This results de facto in a shift of the expenditure profile in year t to the right as compared to the base year (see Figure 3). This approach is selected for healthcare excluding long-term care for all age cohorts from the age of 41 and upwards, and for long-term care for all age cohorts from the age of 66 and upwards.

- The **second coefficient** describes the demand and supply effects triggered by the rise in economic income which are only assumed to have an impact on the area of healthcare expenditure excluding long-term care. If $\eta>0$, it is assumed that an increase in real GDP per capita has a disproportionate impact on the expenditure per capita of an age cohort. As the figures for expenditure per capita are nominal, the inflation rate π is also taken into account. In both cases, the expenditure profile in any particular year t shifts upwards compared to the expenditure profile of the base year (see Figure 3).

- The **third coefficient** can firstly capture the Baumol Effect, a supply-side price effect.[50] For the Baumol Effect, it is assumed that real wage growth in healthcare (or in a sub-area of healthcare) mirrors that of the wider economy. In addition, average real wage growth in the economy reflects productivity advances. If there are no productivity advances in healthcare, the Baumol Effect is felt in full, and μ is equal to 1. Wage growth then feeds through fully into a price effect, and leads to an above-average rate of inflation in healthcare. If $0< \mu <1$, the Baumol Effect can be said to be manifesting itself incompletely, since as there may be productivity gains in healthcare these are lower than those in the wider economy. Accordingly, the growth in wages is not fully passed on to prices. Secondly, thanks to the parameter μ a price effect can be captured which is attributed to above-average wage growth rates in healthcare, such as that triggered by a shortage in healthcare personnel. In this case,

50 For a more detailed description of the Baumol Effect, see Section 3.4.

μ>0 applies. This parameter can even assume values of more than 1, because – unlike the Baumol Effect – the magnitude of this price effect is not limited to the difference between productivity advances in the wider economy and those in healthcare. If the parameter μ assumes the value of 1, this means that wage growth in healthcare is twice that of the wider economy. In this case, the resulting price effect is just as great as with the full Baumol Effect. If the two described effects are cumulated, μ must likewise assume a value greater than 0. In both cases, namely with the Baumol Effect and "Wage pressure" in healthcare, the expenditure profile of a particular year t shifts upwards compared to the profile of the base year (see Figure 3).

After ascertaining the expenditure per capita of an age cohort j for each year t, the overall expenditure is then calculated for the year t. In order to ascertain overall expenditure, the expenditure per capita of an age cohort is first multiplied by the number of population in each age cohort and then totalled up across all age cohorts (see Equation (A1.2). This is done separately by gender before subsequently illustrating total healthcare expenditure.

(A1.2)

$$A(t) = \sum_j \frac{A(t,j)}{Bev(t,j)} * Bev(t,j)$$

A2 Estimating income elasticity

Expenditure projections for healthcare involve considerable uncertainty regarding the impact of non-demographic cost drivers. In order to reduce this uncertainty, an empirical estimation has been carried out for Switzerland involving the most significant potential cost drivers in healthcare. Here the focus is on the analysis of the correlation between overall economic income development and healthcare expenditure. This correlation is described in this study – and theoretically not entirely correctly – as income elasticity (see Section 3.2). The empirical analysis reveals that both demand-side and supply-side cost drivers, particularly advances in medical technology, can be captured with the help of income elasticity. Moreover, as the cost effect of advances in medical technology can hardly be quantified, the approach selected for the projections, namely capturing such advances through income elasticity, appears to be a feasible route to take. Above and beyond this, the estimates indicate that Swiss healthcare expenditure cannot be characterised by a deterministic trend. This argues against hypothesising such a trend for non-demographic cost drivers in the expenditure projections (e.g. Vuilleumier et al., 2007).

Method and database

The estimations of income elasticity for healthcare expenditure have been run with a random sample of Swiss data for the years 1960 to 2009. This therefore makes it a time series analysis in which various supply-side and demand-side cost drivers are taken into account. The estimation equation is as follows:

$$h_t = \alpha + \text{Trend} + \beta_1 * y_t + \sum \beta_i * x_{i,t} + u_t \qquad \text{(A2.1)}$$

whereby:			
	h:	=	Real healthcare expenditure per capita,
	y:	=	Real GDP per capita,
	x_i:	=	Further cost driver i, i = 2,...,n,
	α:	=	Constant,
	Trend:	=	Deterministic trend,
	β_i:	=	Elasticity of healthcare expenditure with reference to cost driver i, i = 1,...n,
	u:	=	Residual,
	t:	=	Year.

As is generally the case in such estimations, the healthcare expenditure is expressed in per capita values and deflated with the GDP deflator (e.g. Oliveira-Martins et al., 2006). All stochastic variables are estimated in natural logarithms, which among other things permits the interpretation of the coefficient β_i as elasticity. In addition to real GDP per capita, which is used as a proxy for income, the potential cost drivers listed below are also factored into the estimations. As a proxy for advances in medical technology, the change in mortality rates for men and women are used, along with a deterministic trend and the proportion of GDP accounted for by research and development expenditure (R&D) in healthcare in the USA.[51, 52] The supply-side cost drivers are represented by the density of doctors (number of doctors per 100,000 inhabitants). For Baumol's cost disease, the difference between real wages and productivity is taken into account (so-called Baumol variable according to Hartwig (2008)), while for the ageing of the population the proportion of the overall population aged 65 and upwards is used.[53] In addition, a number of the regressions involve dummy variables for the introduction of the OKP in 1986 and for the structural break in the GDP series in 1980 due to the revision of the general government accounts as per the European System of Accounts 1998.

The data for the Swiss healthcare industry is taken from the healthcare statistics of the SFSO.[54] The R&D expenditure for healthcare in the USA is taken from the OECD Health Database. The GDP series up to 1979 comes from the SFSO, whereas data after 1979 has been downloaded from the Seco website. The Swiss population data is taken from the population statistics of the SFSO.

51 The OECD Health Database does not contain any data for R&D expenditure in Switzerland. The fact that spillover effects for R&D expenditure in healthcare are likely to exist is an argument in favour of using US data.

52 It is essentially difficult to quantify the effect of advances in medical technology (see Dybczak and Przywara, 2010, 6 et seq.).

53 Productivity is measured as GDP per gainfully employed person.

54 For more details on this database see Appendix A3, Table A3.

As all variables display a stochastic trend, there is a risk of spurious correlations (see Table A2.1). As such, it is unclear whether a correlation exists between healthcare expenditure and a cost driver if the coefficient of the cost driver is statistically significant. If both variables reveal a stochastic trend, the significance may be coincidental. However, statistical significance is more meaningful if the regressors and the target variables are cointegrated. A cointegration points to a long-term correlation between the tested variables. For a cointegration, it needs to be established whether or not the variables have a unit root. For that purpose, a robust unit root test is used which is less sensitive towards structural breaks than a conventional unit root test, e.g. the augmented Dickey-Fuller test (for example, see Franses and Lucas, 1997, 106).

Table A2.1: Robust unit root test: order of integration of variables

Variable	Robust M test
Real healthcare expenditure per capita	I(1)** with drift
Real GDP per capita	I(1)*** with drift
Real GDP per gainfully employed person	I(1)*** with drift (I(0)* with drift)
Real gross wage	I(0)*** with drift
65plus	I(1)*
Density of doctors	I(1)* with drift
Mortality rate	
Men	I(1)*** with drift
Women	I(1)*** with trend
Baumol variable (wage productivity)	
Baumol variable in real figures	I(1)*** with drift
R&D expenditure on health of USA/GDP USA	I(1)** with drift and trend

Notes: I(1):= order of integration 1; robust unit root test after Thompson (2004),
H0: stationary time series, t- test statistic; *:= 10 % significance level, **:=5 % significance level, ***:= 1 % significance level.

As already explained above, the results show that all the considered variables are first-order integrated and therefore reveal a stochastic trend (see Table A2.1). This means that a necessary condition for cointegration between healthcare expenditure and the cost drivers is met. The cointegration tests applied here are based on an error correction model with an individual equation. This requires that the regressors are weakly exogenous with respect to the parameter for long-term elasticity, namely β_i in Equation A2.1 (see Equation (A2.2)). The tests for weak exogeneity indicate that, with respect to healthcare expenditure, only the mortality rate for women is an endogenous variable (see Table A2.2). In other words, this variable is not appropriate for the cointegration tests applied. With an endogenous variable, there is a risk that the estimate for the corresponding coefficient will be biased. For that reason, the mortality rate for women is not factored into the regressions.

Table A2.2: Test for weak exogeneity

Target variable of level equation (see Notes)	**HEC**		**Real GDP p.c.**		**65plus**	
Tested variable	ECT(-1)	Adj. R^2 (%)	ECT(-1)	Adj. R^2 (%)	ECT(-1)	Adj. R^2 (%)
Real GDP per capita	0.05	2.5				
65plus	0.02	23.0	0.15	-14.0		
Density of doctors	0.08	-6.0	-0.15**	18.0		
Mortality rate						
– Men	-0.03	0.3	0.02	-6.0	0.71	-3.0
– Women	-0.28***	23.0				
Baumol var. in real figures	0.01	5.4	-0.27**	31.0		
R&D expenditure USA/ GDP USA	0.02	-2.0	0.03	-8.0	-0.03	2.0

Notes: HEC:= Real healthcare expenditure per capita, ECT:= Error correction term; test for weak exogeneity (e.g. Smith, 2007): First estimation of level equation Z(t) = a*X(t) + e(t), whereby e(t) = ECT(t), second estimation of error correction model: ΔX(t) = const. + b* ECT(t-1)+ c*ΔZ(t), H0: b =0, i.e. weak exogeneity, t-statistic; regressions with robust MM estimator and robust Newey-West HAC, *:= 10 % significance level, **:=5 % significance level, ***:= 1 % significance level.

The first cointegration test selected is a procedure taken from Banerjee, Dolado and Mestre (1998) (BDM). The second is a bounds test developed by Pesaran et al. (2001). Unlike the BDM test, the latter can also be meaningful if there are several cointegration relationships between the regressors. In order to carry out the cointegration tests, an error correction model in the following form has been estimated with the assistance of the least squares method (see also Equation (A2.1)):[55]

$$\Delta h_t = \alpha_0 + \gamma\, u_{t-1} + \sum\lambda_j \Delta y_{t-j} + \sum\mu_{i',j}\Delta x_{i',t-j} + v_t \qquad \text{(A2.2)}$$

whereby:	j:	=	0,..,m_i,
	m_i:	=	Number of lags of a regressor,
	Δ:	=	First difference,
	u_{t-1}:	=	Error correction term.

Statistical proof of a cointegration between the target variables, Δh_t, and the regressors exist if the cointegration test shows that the value of the error correction term (u_{t-1}) differs from zero to a statistically significant degree.

55 For the robust MM estimator, no critical t values are available for the applied cointegration tests.

Results

Table A2.3: Factors influencing real per capita healthcare expenditure

Equation	i	ii	iii	iv	v	vi	vii	viii	ix	x
Regressors					Long-term elasticity β_i					
Real GDP per capita	0.82 (0.78)	0.86*** (0.16)	0.86*** (0.16)	0.99** (0.30)	0.99*** (0.31)	0.56 (0.38)	1.17*** (0.31)	-0.36 (0.29)	2.54*** (0.12)	
65plus	2.00 (1.56)	1.94*** (0.40)	1.97*** (0.31)	2.01*** (0.46)	2.02*** (0.50)					
Density of doctors						0.85*** (0.13)				1.15*** (0.39)
R&D expenditure USA	0.26 (0.086)									
Trend		0.10* (0.05)					0.01 (0.009)	0.03*** (0.006)		
Dummy OKP		0.009 (0.05)	0.10* (0.05)			0.06 (0.05)	0.006 (0.03)	-0.04 (0.06)		
Dummy national accounts				0.003 (0.06)			0.11 (0.10)			
Adj. R^2 (in %)	99	99	99	98	99	98	98	91	97	97
Rob. FPE	4.59	3.88	5.25	-30.5	37.4	-0.01	9.95	9.70	4.15	14.1
Box-Ljung test	58***	88***	86***	120***	119***	86***	108***	167***	75***	68***
Shapiro-Wilk test	0.97	0.97	0.97	0.94**	0.94**	0.96	0.89***	0.70***	0.98	0.98
Cointegration tests:										
BDM-test (t-stat.)	-1.80	-1.92	-2.13	-1.86	-2.16	-3.06	-2.96	-2.89	-4.57***	-2.77
Bounds test (F-stat.)	4.34*	5.33**	4.55*	5.88**	5.67**	4.35**	5.21*	5.25*	11.6***	7.67**

Notes: Regression with robust modified M-estimator (MM-estimator); all variables in natural logs; t-tests: figures in brackets are Newey-West HAC standard errors; FPE:= Final Prediction Error; Box-Ljung test, H0: no autocorrelation, Box-Ljung statistic; Shapiro-Wilk test on normal distribution, H0: normal distribution, W test statistic; cointegration tests: Banerjee, Dolado, & Mestre (1998) (BDM), H0: no cointegration (γ=0, see Eq. (A2.2)) , t-test statistic; bounds testing approach as per Pesaran, Shin & Smith (2001) and critical values for small random samples as per Nayaran (2005), H0: no cointegration, F-test statistic; *:= 10 % significance level, **:=5 % significance level, ***:= 1 % significance level.

Apart from the results of the cointegration tests, only the results of the level equations are given in Table A2.3 (see also Equation (A2.1)). The presentation focuses on those equations for which at least one of the cointegration tests rejects the hypothesis of a spurious correlation at the 10 % significance level at least. No cointegration can be demonstrated in any of the estimation equations in which Baumol's cost disease or the mortality rate of men is taken into account as an explanatory variable. For this reason, the corresponding results are not listed in Table A2.3. According to the results, neither the introduction of the OKP nor the revision of the national accounts has had any significant impact on healthcare expenditure (see Table A2.3, equations ii–iv, vi–viii). The results also present little evidence for the thesis that the development of expenditure can be explained by a deterministic trend (see Table A2.3, equations ii, vii–viii). The results concerning the deterministic trend and the mortality rate of men can be interpreted in two ways. Either advances in medical technology have no significant impact on healthcare expenditure, or the proxies used only reflect advances in medical technology to a limited degree.

Even for the third proxy of advances in medical technology, namely R&D expenditure on healthcare in the USA, there is no clear statistical proof initially of any influence on Swiss healthcare expenditure (see Table A2.3, Equation i). The bounds test shows a cointegration at a 10 % significance level, although none of the regressors is statistically significant. Nevertheless, this result would appear to back up the widely held consensus among healthcare economists that advances in medical technology represent a key cost driver in healthcare (e.g. Smith et al. 2009).

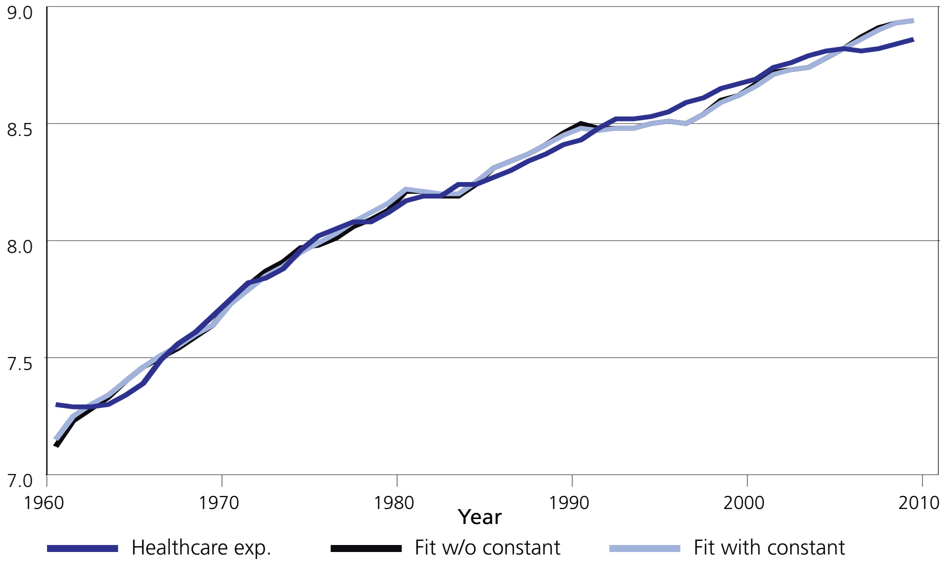
A long-term correlation can be seen in particular between the ageing of the population, real GDP per capita, and real healthcare expenditure per capita. For example, with one exception the bounds test reveals a cointegration at a 5 % significance level in all equations of this constellation (see Table A2.3, equations ii-v). Moreover, the coefficients of both variables in these equations are statistically very significant. In the equations involving the density of doctors too, a cointegration with healthcare expenditure can be demonstrated at the 5 % level (see Table A2.3, equations vi and x). If the density of doctors is included in estimation equations with real GDP per capita, the coefficient of the latter becomes statistically insignificant. However, it emerges that the density of doctors is not exogenous with respect to GDP per capita (see Table A2.2). It should therefore be assumed that the development of density of doctors is coupled to economic development and therefore GDP per capita. In the following regressions the density of doctors is therefore not taken account of.

One striking aspect is that in the model which includes real GDP per capita and the old-age dependency ratio, and in the model which also takes into account the R&D expenditure for the USA, the constant in the estimation equation is statistically insignificant.[56]

This is well illustrated by Figure A2.1. Accordingly the difference of fit of model i – which contains a constant – is negligible compared to the same model without a constant. For that reason, the constant is not taken into account in any other estimations of models i and v.

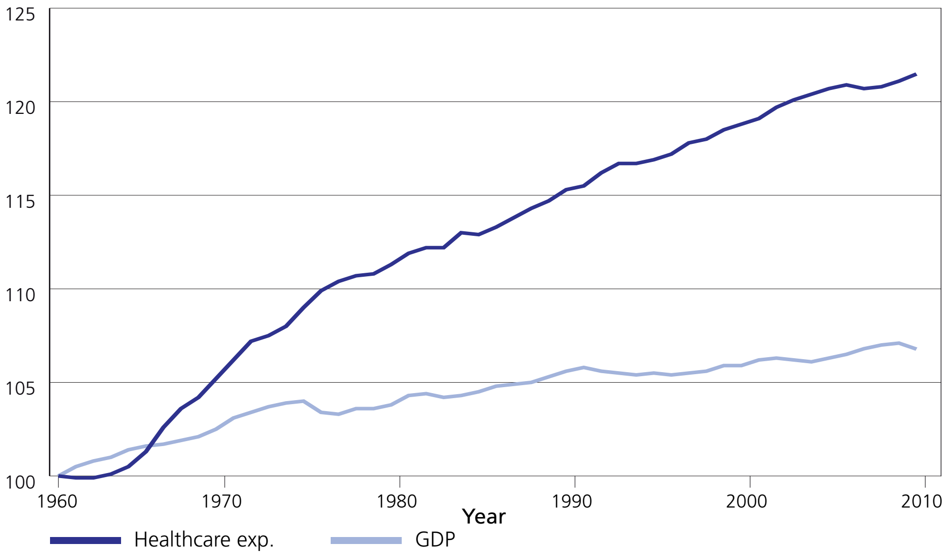
56 The results for the constants are not provided in Table A2.3.

Figure A2.1: **Real per capita healthcare expenditure and estimates with R&D USA, 1960–2060** (log scale)



Source: OECD, SFSO, own calculations.

Figure A2.2 **Inflation-adjusted increase in per capita healthcare expenditure and GDP, 1960–2060** (Index 1960=100)



Source: SFSO, Seco

For the other estimations of models i and v without a constant, various timeframes are observed which are divided according to possible structural breaks in healthcare expenditure. In addition to the introduction of the OKP in 1996, Figure A2.2 indicates a possible structural break in the mid-1970s. The expenditure trend has flattened off since then. The very dynamic development from the mid-1960s to the mid-1970s could be attributable to the growing demands made of the healthcare system in line with rising prosperity (healthcare as a luxury or superior product). The halt to this development could be attributable to the slowdown in the trend of GDP growth in the mid-1970s. The reasons for this decline can almost certainly be found in the oil crisis and exchange rate adjustments following the collapse of Bretton Woods.

Table A2.4: Elasticity in various timeframes

Equation	Target variable: real healthcare expenditure per capita [a]								
	xi				xii				
Regressors	Real GDP p.c.	65plus	Bounds F test	Adj. R^2	Real GDP p.c.	65plus	R&D USA	Bounds F test	Adj. R^2
1960–2009	1.10***	1.87***	7.47***	99	1.10***	1.69***	0.24	6.50***	99
	(0.02)	(0.13)			(0.07)	(0.18)	(0.32)		
1975–1995	1.09***	1.76*	9.58***	91	1.04***	1.04***	0.57***	6.03***	97
	(0.18)	(0.98)			(0.03)	(0.15)	(0.11)		
1975–2009	1.14***	2.08***	10.48***	95	1.02*	0.96	0.53	5.70***	97
	(0.13)	(0.66)			(0.58)	(3.74)	(0.59)		
1996–2009	0.96***	0.99***	5.56**	84	0.82***	-0.16	0.45***	1.50	98
	(0.04)	(0.27)			(0.02)	(0.12)	(0.02)		
	Estimations with Cochrane-Orcutt-method[b]								
1975–1995	1.14***	2.05***	9.58***	99	0.99***	0.71*	0.64***	6.03***	93
	(0.02)	(0.12)			(0.05)	(0.39)	(0.13)		
1975–2009	1.16***	2.16***	10.48***	99	0.92***	0.34	0.59***	5.70***	78
	(0.01)	(0.07)			(0.04)	(0.28)	(0.08)		
1996–2009	1.00***	1.21***	5.56**	84	0.84***	-0.06	0.43***	1.50	99.5
	(0.04)	(0.25)			(0.01)	(0.09)	(0.03)		

Notes: Statistical regression with robust modified M-estimator; all variables in natural logs; t-tests: figures in brackets are Newey-West HAC standard errors; bounds testing approach as per Pesaran, Shin & Smith (2001) and critical values in small random samples as per Nayaran (2005), H0: no cointegration ($\gamma = 0$, s. Eq. (A2.2)), F test statistic; *:= 10 % significance level, **:=5 % significance level, ***:= 1 % significance level.

a Estimate without constant, as this is statistically insignificant in these estimation equations (see also Figure A2.1).

b For the use of Newey-West HAC standard errors, the random sample should not be too small (<< 40 observations) (see Gujarati, 2003, 484). As autocorrelations can be demonstrated in all the level equations (see Table A2.3), the Cochrane-Orcutt method has been additionally applied to validate the regression with a small sample.

The estimates for various time windows, which are geared around the above-mentioned possible structural breaks in the time series of real healthcare expenditure per capita, broadly show that income elasticity lies at 1.1 if advances in medical technology are excluded (see Table A2.4). By contrast, elasticity reverts more towards 1.0 if advances in medical technology are considered (see Table A2.4). For the period following the introduction of the OKP (1996–2009) a clear weakening of the correlation between the considered cost drivers and healthcare expenditure is evident. For equation xii, it is no longer even possible to demonstrate a cointegration statistically. One explanation for this could be the period of stagnation experienced by the Swiss economy in the 1990s, which did not feed through into the dynamics of healthcare expenditure. However, the dynamics of healthcare expenditure can hardly be expected to become decoupled from economic developments over the longer term. Furthermore, it should be observed that there is only a very small number of data points (14) available for the period after the introduction of the OKP, which impairs the reliability of the estimator (small sample bias).

Overall, the results show that taking into account advances in medical technology through income elasticity is justified for the expenditure projections, particularly as advances in medicine are difficult to quantify. The analysis of the data for Switzerland suggests that a plausible value for income elasticity defined in this way is around 1.1.

A3 Database

Table A3: Database for projections in healthcare

Publisher	Source	Data	Period
Swiss Federal Statistical Office	Demographic scenarios 2010	A-00-2010, A-17-2010 (http://www.bfs.admin.ch/bfs/portal/en/index/infothek/onlinedb/stattab.html; as at: June 2012)	2010–2060
Swiss Federal Statistical Office	Demographic statistics	Population data by age and gender; working population (hyperlink see above)	2009
Swiss Federal Statistical Office	Costs and financing of healthcare 2011	Total healthcare expenditure, healthcare expenditure by age, gender and services; OKP expenditure, IV/AHV contributions to health, IV helplessness allowance (http://www.bfs.admin.ch/bfs/portal/en/index/themen/14/05.html; as at: June 2012)	1960–2009, 2009
Swiss Federal Statistical Office/Seco	National accounts	GDP, GDP deflator (data before 1979 necessitates enquiry to SFSO) (http://www.seco.admin.ch/themen/00374/00456/00458/index.html?lang=en; as at: June 2012)	2009–2010; 1960–2009
Swiss Federal Council	Legislature Financial Plan 2013–15	Key figures for GDP, GDP deflator (http://www.efv.admin.ch/d/dokumentation/finanzberichterstattung/finanzplaene.php; (German, French and Italian only; as at: June 2012)	2011–2015
Swiss Federal Council	Legislature Financial Plan 2013–5, federal government accounts	Confederation (same hyperlink as above & (http://www.efv.admin.ch/e/dokumentation/finanzbericht erstattung/index.php as at: June 2012)	2010–2015
Federal Finance Administration	Financial statistics 2009	Confederation, cantons, communes (http://www.efv.admin.ch/e/dokumentation/finanzstatistik/berichterstattung.php; as at: June 2012)	2009
Federal Office of Public Health	Statistics of OKP 2010	Breakdown of OKP by HeL and LTC (http://www.bag.admin.ch/themen/kranken versicherung/01156/index.html?lang=en; as at: June 2012)	2009
OECD	OECD Health Database	Healthcare expenditure of various OECD countries; healthcare R&D of the USA (http://www.oecd.org/document/41/0,3746,en_2649_37407_37982441_1_1_1_37407,00.html; as at: June 2012; not all data freely accessible)	2008; 1960–2009

Tables Appendix

Table A1: Expenditure on healthcare in reference scenario by area and source of financing

Level	2009	2060	Change 2009–2060	
		in % of GDP		in %
Total healthcare	**11.3***	**15.8**	**+4.5**	**40**
Healthcare excluding long-term care	9.5	11.4	+1.8	19
Long-term care (from the age of 65)	1.5	4.3	+2.7	180
Government (incl. social welfare)	**3.5***	**5.6**	**+2.1**	**60**
Confederation	0.4	0.6	+0.1	50
Cantons	2.3	3.9	+1.7	70
Communes	0.3	0.6	+0.3	100
AHV-IV	0.4**	0.5	+0.1	25
Healthcare excluding long-term care	*2.5*	*3.5*	*+1.0*	*40*
Confederation	0.4	0.6	+0.1	25
Cantons	1.9	2.7	+0.9	47
Communes	0.2	0.2	+0.03	0
Long-term care (from the age of 65)	*0.6*	*1.9*	*+1.3*	*215*
Confederation	–	–	–	–
Cantons	0.4	1.2	+0.8	200
Communes	0.1	0.3	+0.3	300
AHV-HE	0.1	0.3	+0.2	200
Mandatory basic healthcare insurance (OKP)	**3.3+**	**4.6**	**+1.3**	**39**
Healthcare excluding long-term care	2.8	3.5	+0.7	25
Long-term care (from the age of 65)	0.3	0.9	+0.5	167
Other expenditure	**4.5**	**5.6**	**+1.1**	**24**
Private households	*2.8++*	*4.0*	*+1.2*	*43*
Mandatory accident insurance, supplementary insurance, private foundations	1.7	1.6	-0.1	-6

* Including expenditure on care for persons under 65. Social welfare excluding OKP and SUVA.

** Helplessness allowance, contributions to medical services and therapeutic equipment.

\+ Excluding expenditure on individual premium reduction; including expenditure on administration, prevention, dental treatment

++ Cost contribution of OKP and out-of-pocket payments (OOP); excluding transfers of social security funds for OOP. Cost contribution extrapolated according to OKP expenditure predictions; the breakdown of expenditure from 2008 formed the basis of the extrapolation of OOP, i.e. 35 % for outpatient healthcare excluding long-term care, 30 % for inpatient long-term care and 35 % other expenditure extrapolated according to GDP, e.g. dental treatment (see SFSO, 2011, 31 Table TA12).

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