Shaping the Societal Bill: past and future trends in education, pensions and healthcare expenditure

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Abstract

Education, pensions and healthcare are the main components of the Societal Bill in Europe. Here we analyse the principal trends and trend breaks that will shape the bill in the next decades. Population ageing, changes in household structure, technological progress, new organisation of work and leisure, changes in market labour structure and regulation and increasing migration flows are the main factors that will call for a reform of social systems in Europe. Understanding how all these variables relate each other is a complex challenge that needs to be tackled with both quantitative and qualitative forecasting methods.
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1. Introduction[4]

In Europe the debate about how to redesign and finance social protection systems is high on the political agenda. These systems were established at the aftermath of the Second World War, in a period of high growth, low and essentially cyclical unemployment, standardised production processes carried out by a relatively

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unskilled workforce, one breadwinner per household and female workforce mainly dedicated to childcare and housekeeping. With these conditions, the main goal was to support the first and last part of workers' life (guaranteeing education and pensions) and temporary unemployment spells (through subsidies) by withdrawing taxes from the active employed population [1]. In the last decades, however, European economy and society changed dramatically: more flexible and customised production, growth of service sector, ageing of population, higher and persistent unemployment, lower productivity growth, growing female employment, rising family instability. In addition, the European Union gradually increased the number of its member states up to 15—with high probability of future further enlargement to east—and improved substantially the internal mobility of people and capital. All these changes influence the effectiveness of social protection systems, and the appropriateness of their design is widely questioned. Understanding how and how much the new conditions will affect the societal bill is crucial to better tackle the financial crisis that several analysts envisage.

In the EU social protection expenditure traditionally represents an important share of public spending. In 1995 it accounted for almost one third of the GDP and half of total government expenditure. The ratio of social protection expenditure to GDP shows, however, a strong North–South differentiation, being lower in Southern countries and Ireland (around 20%) and higher in Northern countries (around 35%). The same happens if considering the values of social protection expenditure per capita.

Demographic transition is widely recognised as mainly responsible for the foreseen financial crisis of social protection systems. Decline in birth rates and increase in life expectancy are modifying the structure of the European population and its consequences will directly affect health, pension and education systems, traditional pillars of the European welfare state. In particular, the ageing of the baby-boom generations will have a significant impact on financial resource allocation from about 2010 to 2030, when these generations will reach the retirement age and will exert their pressure on pension and healthcare services and facilities. At the same time, households are changing their structure and becoming, in general, more fragmented. The higher proportion of single-parent and lone-parent households, and the general reduction in size, means that a growing number of families may, in the future, face economic problems and consequently there is a need for more and specifically tailored social protection services, especially for women, the elderly and the ill. Education expenditure is also expected to be reallocated from primary and secondary schooling, due to the declining share of younger people, to the establishment of new systems of lifelong learning and training, to allow higher workforce flexibility through all ages.

At the same time, new technologies are expected to create deep changes in patterns of living, working and learning with serious consequences on size and structure of the societal protection services. The diffusion of information and communication technologies will have a strong impact on education and educational systems as well as contributing to the emergence of new healthcare systems based on hospital decentralisation—telemedicine—and a wider access at home to medical information. Important breakthroughs in life science technologies, such as the mapping of the human genome, will contribute to improving the population's general health status

and increasing life expectancy, with direct effects on demography structure and trends.

The rise in European living standards is responsible for the continuous growth of the demand for social protection services. These services are subject to the 'Baumol's disease' that affect labour-intensive services whose productivity grows less than the overall economy, determining a continuous increase in their relative costs [2]. The coexistence of rising demand and costs as well as the political willingness to preserve European welfare philosophy, guaranteeing universal rights to basic health and educational services and an adequate level of intergenerational redistribution, determines an increasing pressure on public budget. A pressure that may lead to higher taxes or to a new spiral of rising deficits and debt, endangering the limits fixed by the Stability and Growth Pact [3].

This paper intends to focus on the principal trends and trend breaks that will influence the main systems of social expenditure in Europe, namely education, pensions, and health. Understanding these trends is useful in order to implement correctly the needed reforms. In addition, although frequently these systems are analysed in isolation, their dynamic is reciprocally influenced through the action of common variables such as the demography or the labour market structure and legislation. Several examples may confirm that interrelationship. A change in the retirement age affects, for example, the total amount of pension needed, but also it affects the demand for life-long learning and workforce retraining programmes. In the same way, an increase in female labour participation positively affects the pension fiscal burden, but also it modifies the need for healthcare and childcare facilities. This complex situation adds more difficulties to any forecasting and modelling attempt of the societal bill.

2. Spending in education: the importance of the investment in human capital

Education and training policies have long played a critical role in preserving and reinforcing the social, cultural and economic fabric of society in developed countries. They have contributed to a virtuous circle with higher levels of educational attainment driving economic and social progress that have in turn raised the economic and social demand for still more learning. For years there has been accumulating a large body of micro-economic evidence on rates of return to investment in education and training that demonstrates that investments in education and training pay for themselves for individuals as well as society at large [4]. Recent macro-economic analyses have demonstrated a robust relationship between average years of schooling and economic performance, with a one year increase in average schooling being associated with a 4–7% increase in GDP per capita. Indeed, the OECD reports evidence to support the view that human capital rivals trade exposure as the most important determinant of changes in output per capita during the 1980s and 1990s [5]. The emergence and growth of the 'knowledge economy' and the 'learning society' are enabled by and propel still higher levels of investment in human capital as part of government strategies to sustain economic and social progress.

The pressure for further investment in learning is made more intense by the *downside* of the transition to more knowledge- and learning-intensive economic activity: the relative deterioration of opportunity for those who *lack* skills, competencies, knowledge and know-how and the access to opportunities for acquiring them. Poorly qualified persons are penalised increasingly by relatively lower wages, higher likelihood of unemployment; the fact they are less likely to participate in further education and training as adults means that they are doomed to fall further behind [6]. Children from economically disadvantaged families enter school less well-prepared to learn and face are higher risk of repeating the patterns of exclusion of their parents [7].

In the 1990s developed countries embraced 'lifelong learning' as an overall strategy for ensuring that individuals, enterprises, and societies keep their skills, competencies, knowledge and know-how up to date. Though much of what is referred to as lifelong learning occurs in the home and the workplace, the overall strategy highlights the pivotal role that formal education and training policy plays in human capital development. Rather than displacing the role of formal policy and institutions, lifelong learning increases its importance while intensifying pressures to re-define the role.

All of this would suggest that in modelling future expenditure on education and training, the past factors that have influenced such expenditure might not be entirely relevant. The discussion below considers possible implications of these developments for future expenditure on education and training.

2.1. Current expenditure and educational attainment level

Education expenditure in developed countries now comprises nearly 6% of GDP. In 1998, direct and indirect public expenditure on educational institutions by OECD Member countries averaged 5% of GDP. In Denmark, Iceland, New Zealand, Norway, and Sweden, public spending exceeded 6%; in Greece and Turkey it was less than 3.5%. Private expenditure adds two/thirds of a percentage point; in the United States private spending equal 1.6% of GDP; in Korea it is nearly 3% of GDP [8].

Broadly speaking, the trends in education expenditure reflect the importance attached to education at both the policy level, where it is viewed as an instrument for economic and social progress, and at the individual level where there has been in increase in the social demand for education. Such trends can be evaluated in a number of ways. Between 1990 and 1998 real spending increased by 50% or more in half the countries for which data are available. When viewed relative to other forms of public spending, the importance attached to education is especially marked. An analysis of recent trends in public spending on education shows that between 1995 and 1998, public spending on education fared better than public spending overall in 17 of the 18 countries for which data are available [8]. Trends in education expenditure as a percentage of GDP also show long term increases in many countries [9]; however this kind of trend data can be distorted due to cyclical variations in the level of GDP.

What has been gained for the substantial and growing expenditure on education over the recent decades? Perhaps the most important gain has been the steep fall in

the number of persons leaving the education system with very low levels of qualifications. In 1998 the proportion of the adult population aged 25–64 with less than upper secondary education averaged 38% for the OECD countries. One way of evaluating the change over time is to compare cohorts. In that same year, the proportion of 55–64 year olds with less than an upper secondary education averaged 55%; this was double the percentage for 25–34 year olds. In countries that, historically, have had very low levels of educational attainment, the proportion of young persons finishing upper secondary education has more than tripled. As a result of these gains, mean upper secondary graduation rates in OECD Member countries now stand at 79%, and equal or exceed 90% in nearly a third of those countries. There have been important gains at the tertiary level as well.

Another gain that can be attributed to the expenditure and participation trends has been the sharp reduction in the qualifications gap between males and females. Among 25–34 years old people, males and females were equally likely to have completed upper secondary education. Among 55–64 year olds, 51% of males had completed upper secondary education, compared to only 39% of females. In a few countries the ratios exceed 2. At the tertiary level gains for women have been even greater. In 1998 the proportion of women 25–34 years old that had completed at least a type A (academic) tertiary programme exceeded the percentage of males that had done so (27% vs 25%).

These gains suggest that the long-term trend in education and training expenditure has been well aligned with social demand for skills and competencies, as well as the economic demand referred to in the preceding section. But, are those trends likely to continue in the future and align with future demands? After all, formal education participation rates are reaching a saturation level in upper secondary education, and the number of young persons of an age to enter school and/or tertiary education is falling in many countries. The concluding discussion below considers factors that are likely to drive demand and expenditure for education and training in the future.

2.2. Factors driving future expenditure

If human capital matters more for economic and social trajectories of society, does it follow that expenditure for education and training must necessarily increase? The question is more difficult to answer now than it might have been 20 years ago owing to uncertainties around enrolment levels in the formal education sector, unit costs, and the timing over the life-cycle of learning activities. The directions of developments around these questions also are likely to affect the eventual *public* share of total expenditure.

2.2.1. Future enrolment levels

Increases in participation in formal education and training have been noticeable for decades; the emphasis on lifelong learning in the 1990s reinforced those trends and drew policy attention to the fact that some groups in society were not benefiting as much as others. However, the implications of such increases for overall enrolment levels and expenditure have been clouded by demographic declines in the number

of young persons entering school and tertiary education. Thus it has been possible for education systems in many countries to absorb increases in participation rates with little change in overall expenditure (or unit cost), thanks to declines in the size of the school age population.

Is it possible to anticipate more precisely the direction and magnitude of future enrolment levels? The OECD tried to do this as part of its efforts to evaluate the resource and financial implications of implementing lifelong learning. The analysis projects enrolment levels in the year 2005, on the basis of demographic trends (excluding the effects of migration), and policy scenarios that corresponded to modest and more ambitious targets for lifelong learning [10]. The analysis covers three age groups and their corresponding education sectors: 0–5 year olds (in early childhood education and care); 15–19 year olds (in upper secondary education); and, 20–24 year olds (in tertiary education). The results are strikingly consistent. The number of young children is declining in all but two of the countries for which data are available. The number of 15–19 year olds is declining in half of the countries; and the number of 20–24 year olds is declining in four-fifths of all countries. However, when one factors in the effect of policy and individual preferences that tend to raise participation rates from the base rate, that observed in 1995, the drop-off in enrolments diminishes, disappears, or reverses altogether, depending on the country and the scenario.

Estimates of increases in enrolments for adults are more difficult because they depend on a wider field of parameters, including different definitions of need to be used for defining the target group, and varying duration of interventions. The OECD has developed estimates for a few countries based on numbers of persons with low educational attainment levels and low literacy levels (as measured by the International Adult Literacy Survey) [10]. The exercise would suggest that the best that modelling of enrolment levels can hope for is to provide boundaries of estimates under different assumptions.

2.2.2. Unit cost

The second factor to consider in modelling education and training expenditure is the likely development in unit costs. Expenditure per student, as calculated from aggregate expenditure and enrolment data, consistently shows tertiary education to be far more costly. Per student expenditure (full-time equivalent) at the tertiary level is, on average, 50% higher than at the upper secondary level, 130% higher than at the primary level, and 150% higher than at the pre-school level [8].

The direction and magnitude of unit costs when enrolment levels change—i.e., the *marginal costs*—are not so clear, according to available data. One evaluation of the relationship between per student expenditure and enrolment levels for the period 1990–1995 found that in most countries per student expenditure increased with rising enrolments at the pre-school level, were very mixed at the secondary level, and decreased in slightly more countries. Within countries the direction of marginal cost varied depending on the level of education [10]. Unfortunately these estimates are based on aggregate expenditure data that, in fact, may reflect budget decisions about total spending envelopes more than the dynamics of institutions adjusting to changes

in enrolment levels. They also cover a limited period of time. Thus the credibility of models of expenditure levels for formal education may be limited until and unless more extensive time series data and more institutional level data are available.

2.2.3. *Timing of learning over the life-cycle*

A final consideration in modelling education and training expenditure in the future is shifts in the timing of learning over the life-cycle. One of the most visible *new* thrusts that lifelong learning adds to education and training policy is to facilitate updating and upgrading of skills and competencies of adults after they have left the formal education system. However, this is part of a more general goal that countries pursue in their lifelong learning policies: that of making it easier to spread learning over the life-cycle. The underlying idea is that by spreading learning over the life-time, it may be possible to trade-off learning at one stage against learning at another stage. Certainly one of the key arguments behind early childhood education and care has been that investing at this stage reduces the risk of school failure later on. In a related vein, it is argued that the systematic availability of learning opportunities for adults may reduce the level of investment required in initial education [6].

Such shifts, if they occur, could affect expenditure in three ways. First, they could alter the timing of expenditure. Second, if, experience bears out the assumptions that, for example, sound early interventions reduce the cost of subsequent failure, such shifts in the timing of expenditure could also reduce the *level* of expenditure. Finally, one effect of spreading learning over the lifetime, particularly into the work-ing years, is to change the likely allocation of financing responsibility between public and private sources. Thus, it is conceivable that as lifelong learning becomes more widely practised, the public share of net new expenditure might decline from its present share of total expenditure on education and training.

3. Intergenerational solidarity: the future of pension systems

At European level, pensions represent almost 11% of GDP and have the lion's share in social protection expenditure, with 42% of the total in 1995. This percentage, except for the cases of Italy (63%) and Ireland (25%), does not differ substantially across Europe [9]. On the contrary, per capita pensions differ significantly between European countries: from less than 1000 Euro per year and per person in Greece, Ireland and Portugal to more that 3000 Euro in Luxembourg, Austria and Denmark. Recent projections of the current situation, in the absence of any corrective action, foresee a public expenditure growth of about 3–4 percentage points of GDP by 2030 and up to 5 in 2050 [11].

Pension expenditure is highly dependent on demography and future changes in population age structure are often considered mainly responsible for the above-men-tioned increase of the pension burden on public budgets. The European total popu-lation rose from 315 millions in 1960 to 374 millions in 1995, but projections show that it will go down to 367 millions in 2050. This trend is mainly due to the sharp fall in fertility rates, from 2.56 per women in 1950 to only 1.45 in 1995. Declining

fertility is somehow related to women's higher educational attainment, their entry into paid employment and enhanced economic independence. However the cause–effect relationship maybe is not so straightforward. In fact, countries such as Sweden have both high female participation and relatively high birth rates and, conversely, Southern European countries show a low performance in both sides. Insufficient welfare policies such as childcare, delayed entry in the job market and youth unemployment are in fact strong disincentives to family formation and new births [12].

The slowdown of the European population is coupled with the increase of life expectancy, which between 1970 and 1997 rose from 68.6 to 74.9 years for males and from 74.9 to 81.2 years for females (within the EU). The two trends strongly affect the demographic structure of European countries, determining the increase of the share of older people in the total population. The European age pyramid shows in fact that the center of gravity of population is moving upwards with time, due especially to the passing of the baby-boom generations that were born from the late 1940s till the middle 1960s. The share of people aged 65 and over will increase from 15.4% in 1995 to 17.9% in 2010 and up to 22% in 2025 [13].

The ageing of the population is widely considered as the major threat for the sustainability of European pension systems. Projections estimate that the old-age dependency ratio, i.e. the ratio of people aged 60 and over to the working age population, will increase constantly, from 37 in 1995 to 51 in 2020 to 72 in 2050. In terms of pension funding, this situation is used as justification to predict the doubling of the "pay-as-you-go" (PAYG) contribution rates in the next four decades [14].

Ageing, however, is not the only variable that will affect European pension systems. The financial status of the systems is determined in fact by the ratio between the number of pensioners and the number of the contributing population plus the ratio between average pension and labour productivity, as described by the following decomposition of the fiscal burden:

$$\frac{\text{Pension Expenditure}}{\text{GDP}} = \left(\frac{\text{No. Pensioners}}{\text{Population}}\right)\left(\frac{1}{\text{Employment Rate}}\right)\left(\frac{\text{Average Pension}}{\text{Average Productivity}}\right)$$

If demographic trends are difficult to be affected by policy, it is clear that several of these variables are influenced by the labour market structure and performance, and depend on the ongoing fiscal policy measures.

Early retirement and late entry into the labour market are two important trends of the last decades that are responsible for lower rates of labour force participation and, together with rising unemployment, result in shorter contribution periods. The age at which people retire from the labour market has been falling in all EU countries. While in the 1960s most people used to retire at the statutory age of 65 or over, by the early 1990s retirement age started to decrease dramatically: currently half of the EU countries barely reach the 60-year mark as the average age of retirement [9]. This trend is the result of two principal factors: the higher prosperity of people and

their desire to exchange income for leisure, and the effect of deliberate government policies. These policies are often justified as a way to reduce youth unemployment, under the hypothesis of fixed number of total jobs, so that retiring a older worker would make available the same job for a younger one. Statistical evidence, however, does not show the existence of a sufficient negative correlation between the exit from the labour force and the employment of people aged 21–30, proving the substitution hypothesis [15]. Early retirement schemes, on the other hand, represent easy options for employers, unions and workers to shift labour market problems onto pension schemes, enabling high workforce turnover without focussing on the necessary changes in age management [16]. This situation is typically associated with processes of industrial restructuring, especially during periods with a high pace of technological transformation, where the more rapid turnover of products and services corresponds to a more frequent need of renewal of workforce knowledge and skills [17].

Decisions on age retirement are deeply influenced also by the financial disincentives to continue working that are built into pension systems [18]. In fact, although in most EU countries early retirement involves a reduced pension, this reduction has resulted to be insufficient to prevent the exit of large numbers of older workers. At the same time, the additional rewards for postponing retirement beyond the official age are not inducing many workers to continue [19]. Reversing that trend would have a positive impact on public expenditure and a reduction of the old-age dependency ratio, due to the simultaneous increase in the number of tax-payers and reduction in the number of pensioners. The adoption of a later retirement age is a viable option because of the increased life expectancy and the generally better health conditions of older people. An increase of the de facto retirement age from 60 to 67, phased gradually over 20 years from 2010, is supposed to shift down the old-age dependency ratio at the peak (expected around 2035) by 30% [14].

4. Future challenges: more labour force participation rates and less generosity

Policies aiming at lowering unemployment rates, promoting higher levels of employment for women and allowing older workers to stay active longer are needed to increase labour force participation rates and contribute to disconnect the 'demographic time bomb' that burdens European pension systems.

Dissuading older people to opt for an early retirement means reducing their marginalisation and eventual exclusion from the labour market by providing more flexible working arrangements and appropriate job opportunities. In order to preserve and strengthen older worker employability it is important to invest in their skills, their motivation and their job mobility. Temporary contracts, part-time and short-term work, mainly in the service sector, represent good opportunities for promoting active ageing and gradual retirement. This process may be also facilitated by the diffusion of modern technologies and ergonomics that reduce stress and increase the productivity of older workers.

During the last 20 years Europe has experienced a growing participation of women

to the labour market. On average, female participation of the cohort aged 25–54 increased from 54% in 1980 to 69% in 1995, with countries like the Netherlands, Spain and Ireland showing an increase of about 30%. This trend should be sustained through the provision of better childcare facilities and the reduction in the gender bias towards female employment.

If higher participation rates are to be pursued to improve the financing of the pension system, the future functioning of the labour market gains a central position in the debate and it raises some questions. Will this strategy be just a temporary palliative, since higher participation rates today mean more pensions tomorrow? And will the labour market be able to absorb the additional supply of labour? Will new information technologies destroy jobs due to automation and rationalisation of production processes, more than create them by developing new markets and human capital? And what about the role that the immigrant labour force will play? What will be the effect of an eventual increase in an effective labour supply on real wages and labour productivity? And then what would be the final impact on total pension expenditure? All these questions show that the so-called 'demographic problem' of the pension systems turns, in reality, into a serious problem of employment and labour market dynamics.

At the same time, the future solvency of the system will depend on the eventual changes in the degree of generosity of pensions. In the last 15–20 years, outstanding pensions in most EU member states have grown at the same rate as average labour productivity and even after retirement pensioners de facto benefit from productivity increases [1]. This policy goes beyond the protection against inflation by indexing pensions to prices, in which case only new pensions should grow at the same rate of labour productivity. Coupled with the current demographic trend, this type of generosity may have very negative consequences on national budgets. In the future, cuts on pensions and tightening eligibility criteria therefore seem to be necessary to reduce the fiscal burden, and to increase labour participation by persuading people to opt for later retirement. The implementation of these changes, however, will not be easy due to the growing political power of the aged cohorts within an ageing society.

4.1. Broadening the picture: towards funded and mixed pension systems

In the search for sustainability of pension systems, several European member states are considering moving from pay-as-you-go (PAYG) to funded schemes. The former are financed by current contributions from employees and employers, while the latter are funded through private savings and capital accumulated during working life and provide benefits, dependent on the return on assets invested. Both options have their pros and cons. PAYG schemes have a better performance in poverty alleviation, but they are more vulnerable to population ageing and high unemployment rates. Conversely, funded pensions produce lower distortionary effect in the labour market and avoid political pressure on retirement age, but they entail higher exposure of citizens to inflation and financial markets' risks [1]. The diffusion of funded pension systems is also expected to enhance private savings and investments as well as to develop financial markets.

A future transition from PAYG to funded systems would raise a serious issue of intergenerational redistribution. The transition would, in fact, reduce living standards of the current working generations that should pay, through higher taxes or lower public expenditure in sectors such as health and education, both the outgoing pensions and their future pension by accumulating sufficient assets. The only way of not penalising the current generations is to issue new public debt in order to fund the remaining PAYG pensions. The latter option raises the question about who will bear the cost of the additional debt between current or future generations. As several commentators state, there are no free lunches.

The current situation, however, shows a gradual trend towards the adoption of a mixed system where privately funded schemes are gradually taking up the role of supplementary pensions—named *second pillar*—to integrate the basic pensions provided by the public primary system. Up to now, the diffusion of supplementary pensions is not very homogeneous across Europe, from a coverage up to 90% of the labour force in France, the Netherlands and Sweden to barely the 5% in Italy, Greece and Portugal. In particular, these pensions represent an important share of the replacement ratios, i.e. the retirement income relative to working income, for the households in the top quintile of income distribution due to their higher earnings and savings capacity [9].

5. Expenditure on health care: cautious projections for the future based on the past

Average health care expenditure in the European Union increased from 1970 to 1998 by 63% from 5.3% to 8.6% of GDP (varying from 5.9% in Luxembourg to 10.5% in Germany). While expenditure has been growing faster than GDP in all Member States, the increase varied between only 15% in Ireland and 18% in Sweden and as much as to 115% in Belgium and 179% in Portugal. Calculated on a yearly basis, the average annual increase of health expenditure in the EU was 1.7 percentage points higher than GDP growth. The annual increases were not homogenous over time but varied between decades, from 3.1 percentage points above GDP growth in the 1970s, to 0.8 in the 1980s and 1.2 between 1990 and 1998.[5]

At the same time, the health of the EU population has never been better. Infant mortality has fallen by 76% between 1970 and 1997. People are living longer: average life expectancy at birth has increased by more than six years (or 8.8%) to 78.1 years and further life expectancy at age 65 even by 23.5% (to 18 years) in the same period.

Leaving the issue of how much the increase in health care expenditure has contributed to the improvement in people's health, these trends raise a set of questions

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[5] Own calculations based on EU average health expenditure of 5.29% of GDP in 1970, 7.21% in 1980, 7.82% in 1990 and 8.61% in 1998 (Health for all database, 2001).

about past and future factors that influence health care expenditure. These questions are addressed in the following three sections.

5.1. Which factors had an impact on health care expenditure growth rates in the past?

When examining factors responsible for health expenditure, the 'usual suspects' are:

- demography/ageing
- economic growth/rising GDP
- health care resources (hospital beds, staff, high technology, etc.)
- new technologies and medical progress
- health care system (especially *Bismarck* vs *Beveridge*)

5.1.1. Demography and ageing

The belief that health care costs rise steeply with age is considered "common knowledge" by most clinicians, politicians, health care researchers, and lay people alike. It is apparently supported by cross-sectional data showing a relationship between age and (rising) costs. However there is a growing body of evidence in support of a more complicated picture. Fuchs [20] was the first to point to the fact that the relationship between age and health care utilisation or costs is biased by the fact that the percentage of people in their last year of life (which costs well above average) is increasing rapidly with age. He hypothesised that if mortality in all age groups above 65 would be assumed to be constant, health care costs with age would also be constant.

US Medicare data support this assumption. In addition, two further things complicate the picture: (1) health care costs for persons in their last year of life reach a maximum at about the age of 70 years and fall with higher age, and (2) health care costs for the group of survivors rise until the age of about 85, reach a maximum and fall with higher age [21]. The marginal increase in lifetime costs associated with an additional year of life decreases as the age at death rises [22]. However, Medicare data have several drawbacks, e.g. that the system of health care financing and provision in the USA has many characteristics, including a complex set of incentives, that limit its generalisation to Europe. Meanwhile, however, a number of studies from other countries such as Canada [23,24], the Netherlands [25], Switzerland [26] and Germany [27] have demonstrated that the conclusions are generally valid.

A model calculation with the German data showed that the number of days spent in hospital over the whole life-span is directly proportional to the number of years lived, as the higher numbers of hospital days for (surviving) old people are compensated by lower numbers of hospital days in the last years of life (compared to younger deceased). Younger deceased do not only incur higher costs shortly before death, but the peak in hospital days for persons in their last year of life is actually shifting to younger age groups [24,28]. The data may be a hint towards a "compression of morbidity" with rising life expectancy [29]—at least for morbidity leading to hospital

treatment. An important caveat has to be mentioned: nursing care costs in the last year of life are rising with age and this rise almost compensates falling hospital care costs [24,30].

Not surprisingly, analyses of past trends in health expenditure by OECD [31–34] reveal that ageing explains only a very small part of the total increase in health expenditure over the period 1960–1990. According to OECD, the most important factors driving health expenditure were: GDP/income growth, technological development, growth in medical personnel and facilities, and increases in real health care prices. These findings are supported by national studies. For Sweden, Gerdtham [35] showed that changes in population ageing accounted for barely 13% of the total increase in health care expenditure during the period 1970–1985. He pointed out, however, that health care expenditure per capita in older age groups had risen much faster than for younger.

5.1.2. Economic growth

Many studies since the 1960s have examined the relationship between GDP and health care expenditure. Most of them have used a rather inadequate cross-sectional design, some other ones pooled data (i.e. from several countries and several points in time), and only a few truly longitudinal designs [36,37]. Most of them came to the conclusion that health is a 'luxury good' with income elasticity less than one. Some of the studies with methodologically sounder designs came, however, to more mixed results, pointing to the fact that—while GDP growth is closely related to health expenditure growth—it may not be the determining factor per se as it cannot explain the variations in health expenditure growth. On the other hand, Barros [38] was able to demonstrate that across OECD countries GDP was the only factor with a significant impact on health expenditure growth between 1960 and 1990.

5.1.3. Health care resources and medical progress

The correlation between health care structures (e.g. numbers of beds or physicians) or processes (e.g. length of stay) and health care expenditure is weaker than often believed. On the other hand, 'medical (or technological) progress' is usually made responsible for a large—if not major—part of majority of the increase. Newhouse [39] presented a health expenditure growth analysis for the US in which he concluded that about 50% of the increase in costs could not be explained by traditional factors, and attributed it to progress. Barros' estimation was 30% [38]. The construct of progress is, however, ill-defined and encompasses a wide range from new technologies/therapies via new indications for existing technologies to changing preferences.

5.1.4. The design of the health care system

Per-capita health expenditure of the EU's *Bismarckian* systems, i.e. those based on a Social Health Insurance model with sickness funds as payers for health care and typically a public–private mix of providers, rank 3, 4, 5, 6, 9 and 15 in the world while the other systems, i.e. mainly those based on the *Beveridge* model of tax-financed systems with public provision in a National Health Service, are at number 7,

8, 11, 18, 24, 25, 26, 28 and 30 [40], i.e. the design of the system has the major impact on the *level* of health care spending. It does, however, not explain differences in *growth* rates [38].

5.2. The impact of which factors will change in the future and how does this influence future health care expenditure?

The European population will age more rapidly. The population over 65 years is increasing—both as a percentage of the population and in absolute numbers—in all parts of Europe, with the increases likely to be particularly large in southern and western Europe. On average, the share of people aged 65 and over in the EU15 will increase from 15.4% in 1995 to 17.9% in 2010 (from 57 million to 69 million, or +1.25% p.a.). The trend will accelerate significantly in the years after 2010, with +1.45% p.a. growth between 2010 and 2025, when the size of the age group, with 85 million people, will be 50% above the 1995 level (22% of total population). The group of people aged 80 and over will increase even more rapidly, i.e. by 36%, for EU15 between 2000 and 2010, and close to 50% for several countries (B, F, GR, I and L), with figures below 10% only in DK and S. The number of people within this age group will rise to 18.3 millions in 2010 (almost +5 million compared to 1999) or 4.7% of population in 2010.

The development of medical technologies will provide new and improved therapies, medical treatments, diagnosis methods and techniques. Important innovations include genetic engineering, cloning, the production of new classes of pharmaceuticals, and the research on replacement tissues and organs [41]. A growing number of age-related pathologies (many forms of cancer, osteoporosis, Alzheimer's) are in the process of being successfully tackled. These developments will certainly push back the frontiers of life in the next decade and thus be a major factor in shaping the nature and scale of health-care expenditure.

The most revolutionary approaches to change medical therapy may very well come from the areas of pharmacogenetics and pharmacogenomics which deal with the genetic basis underlying variable drug response in individual patients. Current concepts in drug therapy often attempt treatment of large patient populations as groups, irrespective of the potential for individual, genetically-based differences in drug response. In contrast, pharmacogenomics may help focus effective therapy on smaller patient sub-populations which although demonstrating the same disease phenotype are characterised by distinct genetic profiles. With some hoping that this individual, genetics-based approach to medicine "will eventually make obsolete much of our current armada of crude 'halfway' technologies, and enable us to prevent most illness altogether" [42], it remains to be seen whether and to what extent it really results in improved, economically feasible therapy [43].

Both ageing per se and new treatment options will have a significant impact on the health needs of the population and on the patterns of disease contributing to it. They are likely to increase, and certain to change, demand for health services and to require changes to their organisation and structure. With more people living over 80 and 90 years, more people will need long-term health care services and specialised

social services. The trends in health at advanced age have mixed consequences. On the one hand there is a reduction in the cases of severe disability at advanced age. On the other, longer life expectancy might also increase the number of moderate disabilities resulting from the general ageing process.

Ageing poses a two-sided issue for *financing* the health care system giving rise to concerns about the financial sustainability—*funding* on one side and *utilisation/expenditure* on the other. The former is of concern since the total dependency ratio (the ratio of dependents to workers) will rise from its current levels, i.e. the share for funding the system will fall on fewer persons. On the other hand, with declining populations, and immigration not necessarily seen to be the solution, the retirement age is likely to go up which will ease funding problems.

Projections about health care utilisation and costs are more difficult. On the one hand, current per capita expenditure on health care increases with age, i.e. a larger proportion of aged people would substantially increase health care costs if this relationship remains unchanged. On the other hand, older people are now healthier than they were previously and they will most likely be even healthier in the future (that explains why they will live even longer). At any given age, being healthier than the previous generation might, however, very well decrease health care needs and consequently health care utilisation—or, at least, postpone health care needs and utilisation to higher age, i.e. shift the cost-by-age curve to the right.

Health services must also increasingly respond to *people's expectations and concerns.* The expectations of patients regarding the range of treatments and quality of services available have also increased in many European countries. It determines that health care professionals face high pressures to adopt the latest available medical techniques.

5.3. What is the expected future spending in the health sector?

Some specific features of the health sector make forecasting trends in health expenditure particularly difficult when compared with other sectors of public spending. The main reasons for this are the following [44]:

1. health care system regulation and decision-making is very complex, involving a large number of different and interacting agents: government bodies, insured/ patients, third-party payers and service providers;
2. the quantity and type of services provided is determined by the complex interaction of several different supply and demand factors. Morbidity rates, population structures, income levels, and behavioural and social factors influence *demand*. The demand for treatments is also substantially influenced by decisions taken by providers. Technology, the behaviour of providers, and the organisational features of the system (e.g. regulations, insurance structure, payment of providers) affect the *supply* of health care; and
3. most of these factors can change rapidly over time.

OECD [45] estimated three different scenarios for the development of health care

costs relative to GDP growth, namely 1) by 1% less than real GDP growth, 2) at the same rate as GDP growth, and 3) by 1% more than real GDP growth. Under the assumption that health expenditure profiles remain stable, and that the relative cost of health care is constant (i.e. scenario 2), the share of health expenditure to GDP for the EU was projected to increase by around 30% between 1995 and 2030. When the accumulation of costs shortly before death were calculated separately, the increase amounted only to 10%, i.e. only one third. This figure is in line with the calculation of Breyer and Ulrich [46] who estimated that the inclusion of the "death effect" reduces the increase due to ageing by 60% compared to using stable expenditure profiles. According to their calculations, an increase in average life expectancy of one year will increase health expenditure by 1.3% (instead of +3.3%). Depending on the further improvement in life expectancy over the coming decades, this would add around 7–8% to the health care bill if trends remain stable.

Under the (highly unlikely) OECD scenario 1, the ratio of health expenditure to GDP would decline by 20%. In the more realistic scenario 3 (with stable health expenditure profiles), it would increase by more than 70%, i.e. at around the same speed as between 1970 and 1998.

In summary, while ageing will increase health care costs modestly in the future, the other factors—especially medical progress—will continue to exert their impact on health care spending. Given all the uncertainties mentioned, every prognosis is obviously doomed to be wrong. However, under a conservative estimate that health care expenditure will continue to rise faster than GDP by one percentage point annually, it will increase from 8.6% of GDP in the EU in 1998 to 9.7% in 2010, 10.7% in 2020 and 11.8% in 2030. If the increase would be 1.5 percentage points higher, the respective values amount to 10.3, 12.0 and 13.9%, i.e. reaching the US expenditure level with a delay of 35 years.

6. Summing up

Education, pensions and healthcare represent the main components of the Societal Bill. From the analysis presented in the previous pages, it is evident how complex are these three systems and then how difficult is to assess the shape that the respective bills will have in the future. Variables such as demographic trends, economic changes, technological innovation interact with people's behaviours and the overall impact is really hard to be estimated. In addition, the picture that has been presented here would be even more complex if taking into account the other components of the Societal Bill, such as unemployment benefits and transfers for the poor. Although representing a percentage of the GDP smaller that the three systems here analysed, they have a strong impact on important economic structures, such as the labour market. As well little has been said on the mechanisms of the tax systems that will be needed to finance the bill; an issue that will indeed capture the attention of policy makers and public opinion in the next decades.

Understanding how the Societal Bill in Europe will look like is a tough challenge and it may be tackled with appropriate forecasting tools that translate parameterised

behaviours into economic flows, coupled with a smart analytical and interpretative capacity that is able to add the qualitative dimension of futures research studies.

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