Health Care Systems

EFFICIENCY AND POLICY SETTINGS

OECD

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Foreword

Household surveys show that being in good health is an important determinant of the well-being of people. Healthier people also tend to enjoy better access to the education system and to be more productive for a longer period of their life, thus supporting economic growth. Being in good health depends partly on life-style choices and socioeconomic factors. But treating illnesses in an effective way is also very important in this respect and a crucial determinant of longevity, which has risen rapidly – by four years on average in the OECD since 1990.

However, rising health care spending is already putting pressure on government budgets and the fiscal impact of the recent economic crisis has heightened the urgency of pursuing reforms. Furthermore, population ageing and costly developments in medical technology will put considerable upward pressure on health care spending over the longer term.

This book provides an in-depth assessment of health care spending performance and its links with policies in OECD countries. Until now, consistent cross-country information on health care policies has been missing, but a new and wide ranging OECD-wide data set on health care policies and institutions is now available. It allows the characterisation of health care systems and in combination with outcome indicators the identification of their strengths and weaknesses. The book also provides efficiency estimates for health care systems. It classifies countries into different groups of health systems and argues that there is no type of health care system that is superior to others. Big bang reforms, involving a shift from one type of health care system to another, are thus not warranted. Rather, countries should adopt best policy practices implemented by countries sharing the same type of health care system, while borrowing the most appropriate policy elements from countries with a different system. The policy environment for health care spending is of vital importance and potential efficiency gains are large in many countries. The book also shows that there is no trade-off between achieving more equal health outcomes within countries and raising the health status of the population. Indeed, the countries with the lowest inequalities tend to enjoy a high average health status.

This work was conducted in close co-operation with the Health Policy Division of the Directorate for Employment, Labour and Social Affairs. In its early stages, it benefited from contributions by Olivier Chatal, Thai-Thanh Dang, Robert Price and Arthur Sode. Susan Gascard provided excellent editorial support. As usual in our work, preliminary versions of the report were discussed by OECD government representatives. They provided many helpful comments, but the responsibility for the final product lies with the OECD Secretariat.

Pier-Carlo Padoan
Chief Economist

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Acronyms

ALOS	Average length of stay
AMI	Acute myocardial infarction
AU	Approximately unbiased
CHF	Congestive heart failures
COPD	Chronic obstructive pulmonary diseases
DALE	Disability adjusted life expectancy
DALY	Disability adjusted life years
DEA	Data envelopment analysis
DFLE	Disability-free life expectancy
DRG	Diagnosis related group
DTP	Diphtheria, tetanus and pertussis
ESCS	Index of economic, social and cultural status
GDP	Gross domestic product
GLS	Generalised least squares
GP	General practitioner
HALE	Health adjusted life expectancy
HCQI	Health care quality indicator
HMD	Human mortality database
HMO	Health maintenance organisation
LE	Life expectancy
MRI	Magnetic resonance imaging units
NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
NOx	Nitrogen oxide
OOP	Out-of-pocket payment
PCA	Principal component analysis
PHI	Private health insurance
PYLL	Potential years of life lost
PISA	Programme for international student assessment
PPP	Purchasing power parity
QALY	Quality-adjusted life year
SFA	Stochastic frontier analysis
SNA	System of national accounts
SS	Social security
THE	Total health expenditure
WHO	World Health Organisation

Country codes (ISO codes)

Australia	aus	Hungary	hun	Norway	nor
Austria	aut	Iceland	isl	Poland	pol
Belgium	bel	Ireland	irl	Portugal	prt
Canada	can	Italy	ita	Slovak Republic	svk
Czech Republic	cze	Japan	jpn	Spain	esp
Denmark	dnk	Korea	kor	Sweden	swe
Finland	fin	Luxembourg	lux	Switzerland	che
France	fra	Mexico	mex	Turkey	tur
Germany	deu	Netherlands	nld	United Kingdom	gbr
Greece	grc	New Zealand	nzl	United States	usa

Executive summary

Improving health care systems, while containing cost pressures, is a key policy challenge in most OECD countries. The recent economic and financial crisis has weighed heavily on fiscal positions – with gross government debt projected to exceed 100% of GDP in the OECD area by 2011 – and reinforced the need to improve public spending efficiency. Public spending on health care is one of the largest government spending items, representing on average 6% of GDP. Furthermore, health care costs are escalating rapidly, driven by population ageing, rising relative prices and costly developments in medical technology. Public health care spending is projected to increase by 3.5 to 6 percentage points of GDP by 2050 in the OECD area. Against this background, exploiting efficiency gains will be crucial to meet rapidly growing health care demand, without putting the public finances on an unsustainable path.

The OECD has assembled new comparative data on health care system performance and health policies. They allow the identification of strengths and weaknesses of each country's health care system and the policies that will boost efficiency. The first chapter of this book reviews existing measures of, as well as recent developments in, health care outcomes and spending. The second chapter presents two approaches to derive cross-country comparisons of health care spending efficiency and compare these indicators with existing performance indicators. The third chapter provides a brief overview of the main health policy instruments and institutional features which affect health care system efficiency and presents indicators built on the basis of a questionnaire completed by 29 OECD countries. The fourth chapter identifies empirically different types of health care systems. It then investigates the links between policy settings and health care system efficiency. The principal messages of each chapter are summarised below.

Assessing health care outcomes across OECD countries and over time

Health care spending per capita has risen by over 70% in real terms in the OECD area since the early 1990s. To what extent has this contributed to improve health care outcomes? Defining health care outcomes is challenging since health care policy pursues many objectives, in particular reducing premature mortality, the prevalence of diseases and disability as well as promoting equity. Health care outcomes can further be measured at the system level (*e.g.* longevity), at a disease level (*e.g.* survival rates for specific cancers) or at a sub-sector level (*e.g.* number of hospital discharges). And many factors

affect the health status of the population – including socio-economic and lifestyle factors. And these should be taken into account when assessing the efficiency of health care spending. This book shows that:

- The population health status has increased dramatically over the past decades in the OECD area. An illustration is the increase in life expectancy about one year every four years since the early 1990s. The reduction in premature and infant mortality has also been rapid and a similar conclusion holds when using mortality rates after specific diagnoses such as cancer or acute myocardial infarction.
- Significant cross-country variation in health status persists, however, and the countries that spend the most are not necessarily the ones that fare best. As an example, Japan spends less on health care per capita than the majority of OECD countries but the Japanese enjoy a very high health status. This suggests that there is scope to improve the cost-effectiveness of spending.
- There is generally no trade-off between achieving more equal health outcomes and raising the average health status of the population. Indeed, the countries with the lowest inequalities in health status also tend to enjoy the highest average health status – Iceland, Sweden and Italy are good examples.

Drawing cross-country comparisons of health care system efficiency

Spending on health care has risen steadily over the past decades but are all countries as efficient in transforming health care resources into better health status? Can best practice and potential efficiency gains be identified? One way of gauging the efficiency of health care spending treats life expectancy as the outcome of health spending. Life expectancy reflects not just health spending but also choices of lifestyles, such as tobacco and alcohol consumption and education levels. These factors have been taken into account when assessing the efficiency of health care spending. Various methods and assumptions about the effect of health care spending on life expectancy have been tested and the results are robust. Overall, they suggest that:

- Life expectancy at birth could be raised by more than two years on average in the OECD area, holding health care spending constant, if all countries were to become as efficient as the best performers. By way of comparison, a 10% increase in health care spending would increase life expectancy by only three to four months if the extent of inefficiency remained unchanged.
- Although estimates of health care spending efficiency are subject to considerable uncertainty, they suggest that Australia, Japan, Korea and Switzerland perform best in transforming money into health outcomes. Margins for improving outcomes while keeping spending constant are the largest in Denmark, Greece, Hungary, the Slovak Republic and the United States.
- In more than one third of OECD countries, exploiting efficiency gains in the health care sector would allow improving health outcomes as much as over the previous decade while keeping spending constant. Efficiency gains would

be large with estimates suggesting that public spending savings could amount to almost 2% of 2017 GDP on average for the OECD area and over 3% for Greece, Ireland and the United Kingdom.

Building indicators for health policies and institutions

To assess the influence of health policies and institutions on health care system efficiency, a unique set of information on health policies and institutions has been gathered from 29 OECD countries. This dataset covers incentives and regulations affecting the behaviour of producers, users and insurers, insurance coverage as well as the degree of decentralisation and approaches to contain spending. It reveals that:

- The basic insurance coverage – measured by the population covered, services included and the degree of cost-sharing – is substantial and fairly similar across OECD countries. Mexico, Turkey and the United States are the exceptions, with still a large share of the population not covered in 2009.
- Some OECD countries rely heavily on centralised command-and-control systems to steer the demand and supply of health care services while in a few countries regulated market mechanisms, such as fee-for-services, competition driven by user choice and private insurance, play a dominant role. But more and more countries rely on a mix of the two. While market-based and regulatory approaches are often presented as two distinct models, in practice incentives and regulations are more often combined than used in isolation.
- Some policy levers tend to be implemented simultaneously, signalling potential complementarities across them. For example, those countries relying extensively on private providers to deliver health care services also tend to implement activity-based compensation schemes for providers and offer users a choice among providers.
- In contrast, some policy instruments are used independently of the other regulatory and market features. The degree of reliance on out-of-pocket payments provides an example. This suggests that, when setting user fees, political economy, fiscal and equity considerations play a greater role than willingness to ensure consistency in policy settings.

Characterising health care systems and assessing the link between efficiency and policies

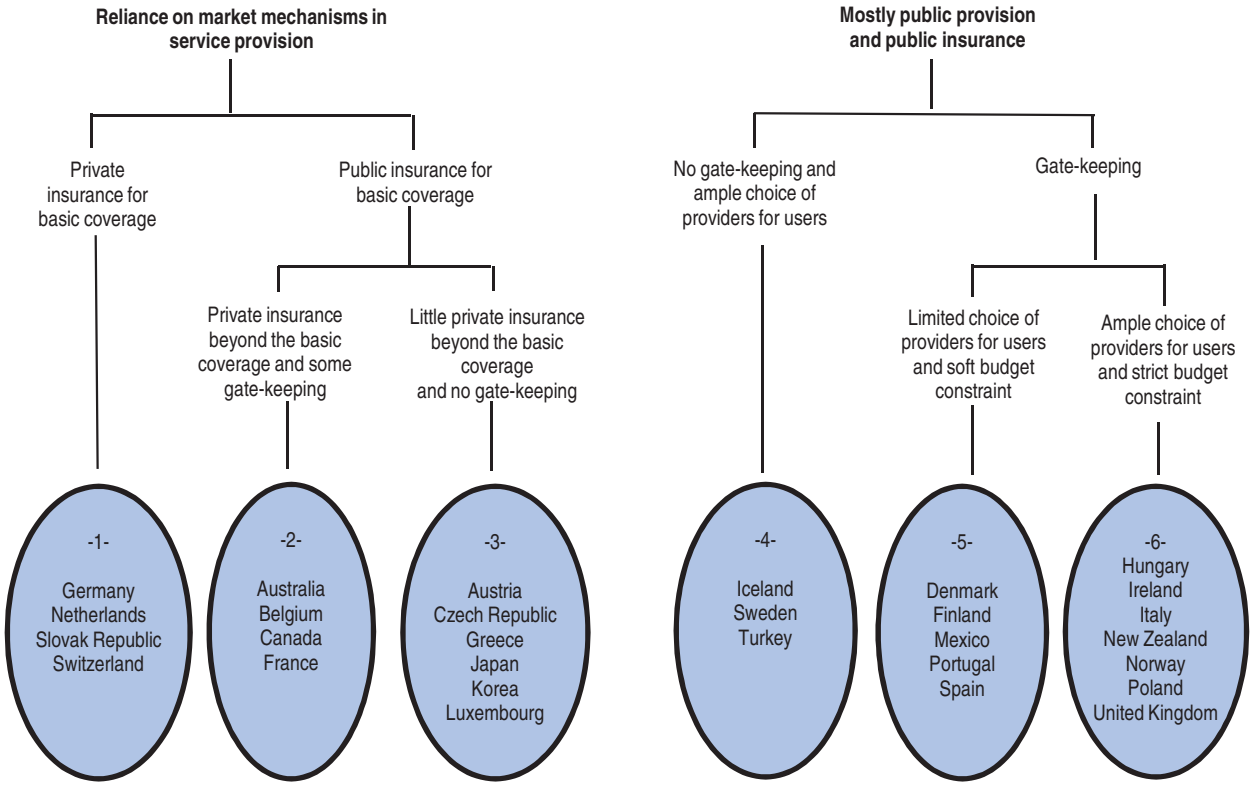
A key contribution of this book is to provide an empirical characterisation of health care systems, which goes beyond classifications based on a few institutional features and to recognise the complexity of institutional features and complementarities across them. Groups of countries sharing broadly similar institutions are identified and performance across and within groups is compared. Some suggestions for policy reform that could raise value-for-money in the health care sector are then derived for each country. The main conclusions can be summarised as follows:

- Six groups of countries sharing broadly similar institutions have been identified (Figure 0.1): one group of countries relies extensively on market

mechanisms in regulating both insurance coverage and service provision; two groups are characterised by public basic insurance coverage and extensive market mechanisms in regulating provision, but differentiated by the use of gate-keeping arrangements and the degree of reliance on private health insurance to cover expenses beyond the basic package; a group where the rules provide patients with choice among providers, with no gate-keeping but extremely limited private supply; and two groups of heavily regulated public systems, separated by differing degrees of the stringency of gate-keeping arrangements and of the budget constraint.

- Efficiency estimates vary more within country groups sharing similar institutional characteristics than between groups. This suggests that no broad type of health care system performs systematically better than another in improving the population health status in a cost-effective manner. Still, within-group comparisons allow the spotting of strengths and weaknesses for each country and identifying areas where achieving greater consistency in policy settings could yield efficiency gains.
- Some suggestions for policy reform apply to many countries, independently of their group. In particular, better priority setting, improved consistency of responsibility assignment across levels of government or agencies, better user information on the quality and price of health care services and better balanced provider payment schemes would be reform options to consider in many OECD countries.
- For some policy instruments, a "one-size-fits-all" approach to reform is not advisable as increasing consistency in policy settings entails implementing different approaches. As an example, regulations concerning the hospital workforce and equipment may need to be softened in some countries and hardened in others.
- Administrative costs tend to be higher in most of those countries relying on market mechanisms to deliver a basic insurance package (Germany, the Netherlands and Switzerland). However, they also exceed the average level by a considerable margin in a few others (Belgium, France, Luxembourg, Mexico and New Zealand), signalling a potential for reducing spending.
- Inequalities in health status tend to be lower in three of the four countries with a private insurance-based system – Germany, the Netherlands and Switzerland – indicating that regulation and equalisation schemes can help mitigating cream-skimming and the effects of other market mechanisms which can raise equity concerns.

Figure 0.1. **Groups of countries sharing broadly similar institutions**



The countries on the left such as Germany and the Netherlands tend to rely on market mechanisms to supply health care whereas those on the right such as Finland and the United Kingdom depend more on public command and control. Apparently diverse countries fit the same group; the rules in Iceland, Sweden and Turkey for instance all provide for ample user choice, even if in practice there are geographical and other constraints. Note that the United States did not participate in the survey.

Source: OECD.

Chapter 1

Health care outcomes and spending

This chapter presents the main trends in health status in OECD countries and discusses the advantages and drawbacks of using different indicators for health care outcomes. It then portrays recent developments and cross-country variations in resources invested in the health care sector, either measured in terms of spending or by using volume and activity indicators.

Introduction

Achieving value for money in the health care sector is an important objective in all OECD countries. Health care spending *per capita* has risen by over 70% in real terms since the early 1990s. This is reflected in a significantly healthier population as shown by longer life expectancy and lower mortality for diseases such as cancers. Indeed, life expectancy has increased by more than one year every four years on average since the early 1990s. But as a result of the run-up in outlays, total spending on health care now absorbs over 9% of GDP on average in the OECD, though with a wide cross-country variation. And the countries that spend the most are not necessarily the ones that fare best in terms of health outcomes, suggesting that there is scope to improve the cost-effectiveness of spending.

A significant improvement in health care outcomes over the last decades

A very challenging task is to find an appropriate measure for health care outcomes. Various indicators exist but all have drawbacks. Still, most of them tend to deliver consistent messages: the health status of the population has improved significantly over the last decades and cross-country comparisons are not overly dependent on the choice of indicator. Six groups of indicators are reviewed below:

- Raw mortality/longevity indicators – including life expectancy at various ages and by gender; infant mortality; premature mortality;
- Indicators of mortality that could have been avoided in the presence of timely and effective health care;
- Mortality indicators adjusted for the prevalence of diseases, disability and/or for the quality of life;
- Indicators of the volume of health care services (*e.g.* number of medical treatments);
- Survival rates after specific diseases;
- Other health related indicators, such as the amount of sick leave and the public satisfaction with the health care system.

Gains in health status have been widespread but significant cross-country variations persist

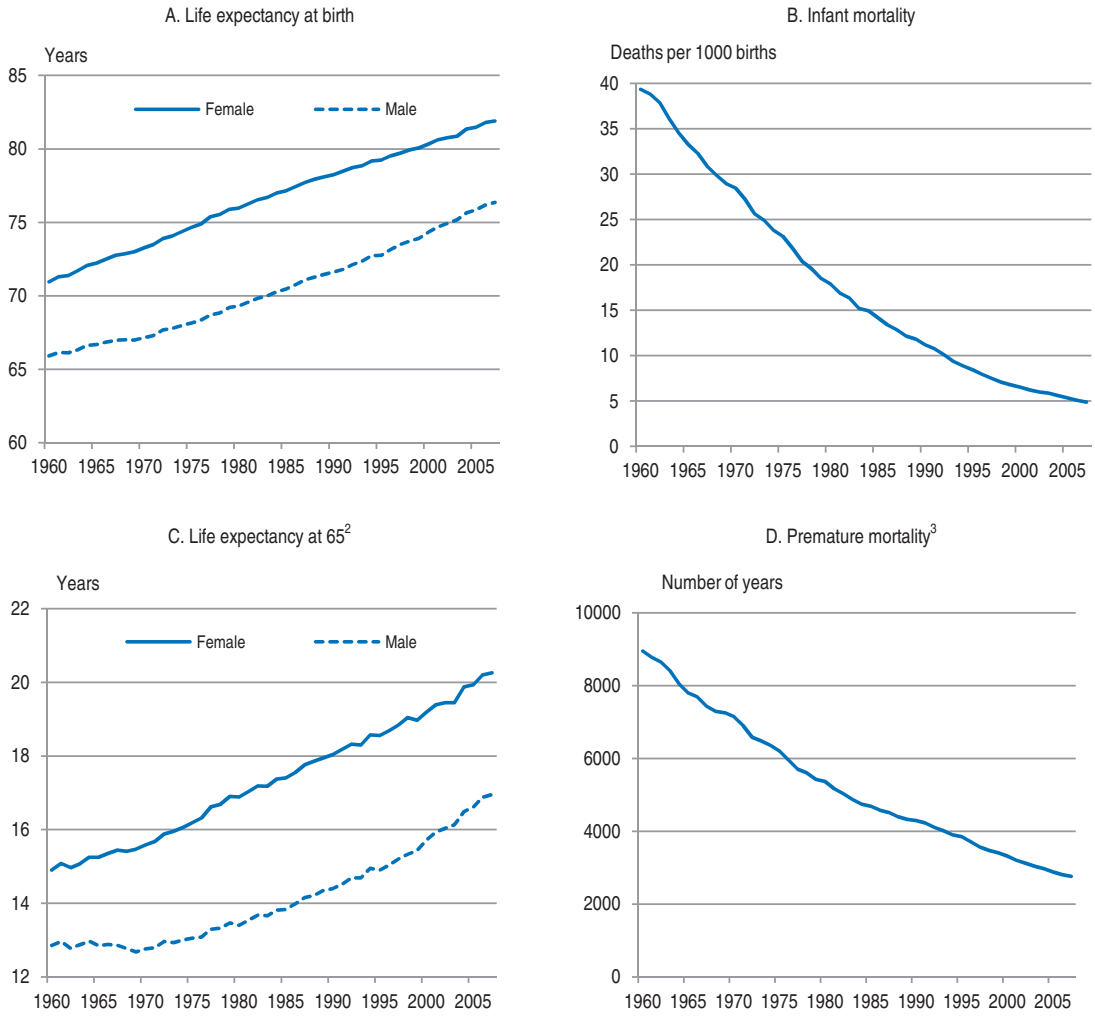
Indicators of longevity and mortality deliver broadly consistent messages

Progress in health status – as measured by gains in life expectancy or reduction in premature or infant mortality (Box 1.1) – has been substantial in the OECD area. Life expectancy at birth reached 79.1 years in 2007 on average in OECD countries, a gain of more than 10 years since 1960 (Figure 1.1). In 2007, Japan was the country with the longest life expectancy (82.6 years at birth) while Hungary and Turkey stood at the

opposite end of the spectrum. And women enjoy a longer life expectancy than men in all OECD countries. About half of the gain in the OECD area has resulted from the increase in life expectancy after 65. Still, infant mortality has been reduced by a factor of eight between 1960 and 2007 and premature mortality (*i.e.* before age 70) has continued on a downward trend. Another interesting feature is the rapid catch-up process of most countries which had a low relative health status in the 1960s, in particular Korea, Mexico and Turkey. Overall, dispersion in health status across OECD countries has narrowed down substantially. As an illustration, life expectancy at birth ranged from 73.3 years in Hungary to 82.6 years in Japan in 2007 (Table 1.1, Panel A) while in 1960 the range was much higher, with a difference of 25 years between the two extremes.

Figure 1.1. **Trends in different measures of health status**

OECD average[1]



1. Unweighted average for OECD countries.
2. Excluding Korea.
3. Potential years of life lost per 100 000 inhabitants aged between 0 and 69 excluding deaths which can be attributed to "external causes" (land transport accidents, accidental falls, assaults and suicides). This average does not include Belgium, the Czech Republic, Korea, Mexico, the Slovak Republic and Turkey.

Source: OECD Health Data 2009.

Table 1.1. **Measures of health status and country rankings**

2007 or latest year available[1]

Panel A. Levels

	Life expectancy at birth			Life expectancy at 65		Potential years of life lost (PYLL) adjusted [2]			Infant mortality	Health-adjusted life expectancy (HALE) at birth			Amenable mortality	In-hospital case-fatality rates within 30 days after admissions		
	Total	Females	Males	Females	Males	Total	Females	Males		Total	Females	Males		AMI	Ischemic stroke	Hemorragic stroke
	Years			Years		per 100 000 persons aged 0-69			per 1 000 births	Years			per 100 000 persons	Age-sex standardised rates		
Australia	81.4	83.7	79.0	21.6	18.5	2 531	2 007	3 051	4.2	74.0	75.0	72.0	59.2	..	..	..
Austria	80.1	82.9	77.3	20.8	17.4	2 500	1 832	3 181	3.7	72.0	74.0	70.0	59.8	4.5	3.7	10.8
Belgium	79.8	82.6	77.1	21.0	17.3	..	..	..	4.0	72.0	74.0	70.0	..	..	..	..
Canada	80.7	83.0	78.4	21.4	18.2	2 710	2 228	3 194	5.0	73.0	75.0	71.0	64.1	4.2	7.6	23.2
Czech Republic	77.0	80.2	73.8	18.5	15.1	3 262	2 163	4 385	3.1	70.0	72.0	68.0	106.3	5.3	6.2	24.0
Denmark	78.4	80.6	76.2	19.2	16.5	2 974	2 260	3 680	4.0	72.0	73.0	70.0	74.3	2.9	3.1	16.7
Finland	79.5	83.1	76.0	21.3	17.0	2 857	1 834	3 871	2.7	72.0	75.0	70.0	66.9	4.9	3.2	9.5
France	81.0	84.4	77.5	22.3	18.0	2 824	1 963	3 708	3.8	73.0	76.0	71.0	50.4	..	..	..
Germany	80.0	82.7	77.4	20.7	17.4	2 689	2 001	3 372	3.9	73.0	75.0	71.0	69.7	..	3.8	14.5
Greece	79.5	82.0	77.0	19.6	17.4	2 644	1 762	3 531	3.6	72.0	74.0	71.0	67.7	..	..	..
Hungary	73.3	77.3	69.2	17.3	13.4	5 611	3 641	8 358	5.9	66.0	69.0	62.0	167.2	..	..	..
Iceland	81.2	82.9	79.4	20.6	18.3	1 943	1 498	2 262	2.0	74.0	75.0	73.0	52.8	2.1	2.3	19.8
Ireland	79.7	82.1	77.4	20.1	17.1	2 585	2 061	3 099	3.1	73.0	74.0	71.0	69.8	5.1	6.6	19.4
Italy	81.4	84.2	78.5	21.8	17.9	2 261	1 688	2 841	3.7	74.0	76.0	73.0	56.2	4.0	3.7	17.2
Japan	82.6	86.0	79.2	23.6	18.6	1 998	1 494	2 505	2.6	76.0	78.0	73.0	56.5	..	..	..
Korea	79.4	82.7	76.1	20.5	16.3	2 644	1 764	3 530	4.1	73.0	75.0	71.0	74.5	8.1	2.4	11.0
Luxembourg	79.4	82.2	76.7	20.3	16.4	2 487	1 861	3 102	1.8	71.0	74.0	68.0	63.9	6.6	5.6	30.3
Mexico	75.0	77.4	72.6	18.2	16.8	5 760	4 683	6 873	15.7	67.0	69.0	65.0	121.9	..	..	..
Netherlands	80.2	82.3	78.0	20.5	17.0	2 398	2 060	2 729	4.1	73.0	74.0	72.0	59.1	6.6	5.9	25.2
New Zealand	80.2	82.2	78.2	20.7	18.1	2 737	2 257	3 224	4.8	73.0	74.0	72.0	73.1	3.3	6.3	23.8
Norway	80.6	82.9	78.3	20.8	17.5	2 398	1 852	2 929	3.1	73.0	74.0	72.0	59.8	3.2	3.3	13.7
Poland	75.4	79.7	71.0	18.9	14.6	4 744	2 939	6 653	6.0	67.0	70.0	64.0	117.7	4.5	..	..
Portugal	79.1	82.2	75.9	20.2	16.8	3 634	2 520	4 808	3.4	71.0	73.0	69.0	92.3	..	..	..
Slovak Republic	74.3	78.1	70.5	17.1	13.4	4 746	3 057	6 550	6.1	67.0	70.0	64.0	160.2	7.6	7.5	29.3
Spain	81.0	84.3	77.8	22.0	17.8	2 682	1 793	3 579	3.7	74.0	76.0	71.0	60.6	6.1	6.5	24.2
Sweden	81.0	83.0	78.9	20.7	17.8	2 129	1 703	2 543	2.5	74.0	75.0	72.0	58.2	2.9	3.9	12.8
Switzerland	81.9	84.4	79.5	22.2	18.6	2 276	1 814	2 736	3.9	75.0	76.0	73.0	..	..	..	..
Turkey	73.4	75.6	71.1	15.8	13.9	..	..	..	20.7	66.0	67.0	64.0	..	..	..	..
United Kingdom	79.5	81.7	77.3	20.1	17.4	3 010	2 405	3 621	4.8	72.0	73.0	71.0	74.0	6.3	9.0	26.3
United States	78.1	80.7	75.4	20.3	17.4	3 924	3 128	4 731	6.7	70.0	72.0	68.0	88.6	5.1	4.2	25.5
Average	79.1	81.9	76.4	20.3	16.9	3 097	2 224	3 880	4.9	71.7	73.6	69.7	78.7	4.9	5.0	19.8
Maximum/Minimum	1.13	1.14	1.15	1.49	1.39	2.96	3.13	3.69	11.5	1.15	1.16	1.18	3.32	3.9	3.9	3.2
Coefficient of variation	0.03	0.03	0.04	0.08	0.09	0.37	0.32	0.39	0.8	0.04	0.03	0.04	0.39	0.3	0.4	0.3

1. Life expectancy: 2006 for Canada, Italy, the United Kingdom and the United States. Potential years of life lost adjusted: 2003 for Portugal; 2004 for Austria and Canada; 2005 for Hungary, Luxembourg, New Zealand, the Slovak Republic, Spain and the United States; 2006 for Denmark, France, Germany, Italy, Korea, Mexico, Norway, Poland, Sweden and Switzerland. HALE: 2007 for all countries. Amenable mortality: 2003 for Portugal; 2004 for Australia and Canada; 2005 for Hungary, Luxembourg, New Zealand, the Slovak Republic, Spain and the United States; 2006 for Denmark, France, Germany, Italy, Korea, Mexico, Norway, Poland and Sweden. In-hospital case-fatality rates: 2006 for Austria, Italy, Luxembourg and the United States; 2005 for the Netherlands.
2. Potential years of life lost (PYLL) are calculated excluding deaths from land transport accidents, accidental falls, suicides and assaults. PYLL data are missing for Belgium and Turkey.

Source: OECD Health Data 2009; WHO, *World Health Statistics 2010.*

Table 1.1. **Measures of health status and country rankings** (continued)

2007 or latest year available[1]

Panel B. Rankings

	Life expectancy at birth			Life expectancy at 65		Potential years of life lost (PYLL) adjusted [2]			Infant mortality	Health-adjusted life expectancy (HALE) at birth			Amenable mortality	In-hospital case-fatality rates within 30 days after admissions		
	Total	Females	Males	Females	Males	Total	Females	Males		Total	Females	Males		AMI	Ischemic stroke	Hemorragic stroke
	Years			Years		per 100 000 persons aged 0-69			per 1 000 births	Years			per 100 000 persons	Age-sex standardised rates		
Australia	3	6	4	6	3	10	15	8	21	3	6	5	7	..	..	..
Austria	13	10	15	10	12	9	9	11	11	16	13	18	8	8	7	2
Belgium	15	15	17	9	17	..	..	..	17	16	13	18	..	..	..	..
Canada	9	8	7	7	5	16	19	12	24	8	6	10	12	7	19	11
Czech Republic	25	25	25	26	26	22	18	22	6	24	24	23	23	13	14	13
Denmark	23	24	20	24	23	20	21	19	17	16	21	18	19	3	3	7
Finland	17	7	22	8	19	19	10	21	5	16	6	18	13	10	4	1
France	6	2	12	2	7	18	13	20	14	8	2	10	1	..	..	..
Germany	14	13	13	12	12	15	14	14	15	8	6	10	15	..	8	6
Greece	17	21	18	23	12	12	5	16	10	16	13	10	14	..	..	..
Hungary	30	29	30	28	29	27	27	28	25	29	28	30	27	..	..	..
Iceland	5	10	2	15	4	1	2	1	2	3	6	1	2	1	1	10
Ireland	16	20	13	21	18	11	17	9	6	8	13	10	16	11	17	9
Italy	3	5	6	5	8	4	3	6	11	3	2	1	3	6	6	8
Japan	1	1	3	1	1	2	1	2	4	1	1	1	4	..	..	..
Korea	20	13	21	16	25	12	6	15	19	8	6	10	20	19	2	3
Luxembourg	20	17	19	18	24	8	12	10	1	22	13	23	11	17	12	19
Mexico	27	28	26	27	21	28	28	27	29	26	28	26	25	..	..	..
Netherlands	11	16	10	16	19	6	16	4	19	8	13	5	6	16	13	15
New Zealand	11	17	9	12	6	17	20	13	22	8	13	5	17	5	15	12
Norway	10	10	8	10	11	6	11	7	6	8	13	5	9	4	5	5
Poland	26	26	28	25	27	25	24	26	26	26	26	27	24	9	..	..
Portugal	22	17	23	20	21	23	23	24	9	22	21	22	22	..	..	..
Slovak Republic	28	27	29	29	29	26	25	25	27	26	26	27	26	18	18	18
Spain	6	4	11	4	9	14	7	17	11	3	2	10	10	14	16	14
Sweden	6	8	5	12	9	3	4	3	3	3	6	5	5	2	9	4
Switzerland	2	2	1	3	1	5	8	5	15	2	2	1	..	..	..	..
Turkey	29	30	27	30	28	..	..	..	30	29	30	27	..	..	..	..
United Kingdom	17	22	15	21	12	21	22	18	22	16	21	10	18	15	20	17
United States	24	23	24	18	12	24	26	23	28	24	24	23	21	12	10	16

1. Life expectancy: 2006 for Canada, Italy, the United Kingdom and the United States. Potential years of life lost adjusted: 2003 for Portugal; 2004 for Austria and Canada; 2005 for Hungary, Luxembourg, New Zealand, the Slovak Republic, Spain and the United States; 2006 for Denmark, France, Germany, Italy, Korea, Mexico, Norway, Poland, Sweden and Switzerland. HALE: 2007 for all countries. Amenable mortality: 2003 for Portugal; 2004 for Australia and Canada; 2005 for Hungary, Luxembourg, New Zealand, the Slovak Republic, Spain and the United States; 2006 for Denmark, France, Germany, Italy, Korea, Mexico, Norway, Poland and Sweden. In-hospital case-fatality rates: 2006 for Austria, Italy, Luxembourg and the United States; 2005 for the Netherlands.
2. Potential years of life lost (PYLL) are calculated excluding deaths from land transport accidents, accidental falls, suicides and assaults. PYLL data are missing for Belgium and Turkey.

Source: OECD Health Data 2009; WHO, *World Health Statistics 2010.*

Box 1.1. **Indicators of mortality, longevity, amenable mortality and the quality of care**

Raw mortality indicators

Raw longevity and mortality indicators are numerous and have the main advantage of being available over long time periods. For analytical and methodological reasons, nine of them have been selected for analysis here out of those available in OECD Health Data (Annex 1.A1 provides more information on the definition for these indicators):

- *Life expectancy (LE) at birth, for females, males and total population*. LE at birth is one of the most widely used summary measures of the population health status. The gender dimension for this indicator, as well as for others when feasible, has also been retained since several empirical studies have concluded that health care systems contribute more to improve the health status of females than males.*
- *Life expectancy at 65, for females and males*. LE at older ages provides useful information for at least two reasons. First, most of the other health status measures do not cover the older population groups (*e.g.* premature mortality, maternal and perinatal mortality), while recent progress in health status for these groups has been rapid. And dispersion across countries in LE for the elderly is much higher than at birth. Second, data suggest that health care expenditure is often concentrated on older age groups, at least for the public spending component.
- *Premature mortality, for females, males and total population*. Measured as the number of Potential Years of Life Lost (PYLL) before 70, premature mortality has been used in some studies as the main health outcome indicator (*e.g.* Or, 2000*a* and 2000*b*). One key advantage is that premature mortality data are available with a breakdown by main causes. Thus, deaths which can be specifically attributed to "external causes" (including land transport accidents, accidental falls, assaults and suicides) can be adjusted for – a relevant adjustment since premature mortality due to these causes varies significantly across countries, accounting for less than 12% of total premature mortality in the United Kingdom, compared to above 21% in Finland, Japan, Korea, Luxembourg, New Zealand and the United States. The empirical work carried out here does so with the so-called "adjusted PYLL". The premature mortality indicator has drawbacks for an analysis of the efficiency of health care systems, however. In particular, it does not account for survival after an arbitrary age limit currently set at 70 in OECD Health Data, while health care spending often largely concentrates on those above 70. The age ceiling used by Eurostat is 65. The one used by Australia, Canada and the United States is 75.
- *Infant mortality.* This indicator focuses on the capacity of the health care system to prevent deaths at the youngest ages, a period of life where health care spending is also relatively high. It has further been argued that infant mortality is more relevant for an efficiency analysis than LE itself, since it is less influenced by factors not related to the health care system such as education or tobacco consumption (Nixon and Ullman, 2006).

Amenable mortality

Amenable mortality is defined as those deaths that are potentially preventable by timely and effective medical care. It is measured by age-specific mortality rates for selected causes of death (e.g. asthma below age 45). There is no universal definition, however, as the selection of death causes and age-limits often vary from one study to another. According to the study by Nolte and McKee (2008), which covers 19 OECD countries, amenable mortality constitutes an important proportion of total mortality under age 75: it ranged from 15% for French males up to 36% for Greek and Portuguese females.

Longevity indicators adjusted for the prevalence of disease and/or disability

- *Health-adjusted Life Expectancy (HALE).* This indicator produced by the WHO for 2002 and 2007 aims to summarise the number of years expected to be lived in what might be termed the equivalent of "full health". Across countries, the correlation between HALE and raw LE indicators is very high and significant.
- *Disability Free Life Expectancy (DFLE).* This indicator, produced by Eurostat, summarises the number of years to be lived without any disability for most EU countries. Because it treats severe and other disabilities equally, this indicator appears less relevant than the HALE.

Health care quality indicators

Many OECD countries report quality indicators but the availability of internationally comparable data remains limited. To reduce this data gap, the OECD's Health Care Quality Indicators (HCQI) project, which started in 2001, is developing a set of indicators (Garcia Armesto *et al*., 2007; Kelley *et al*., 2007; Mattke *et al*., 2006). The 2009 edition of *Health at a Glance* presents a selection of 23 HCQIs, including screening, survival and mortality rates for selected cancers, vaccination rates, avoidable in-patient admission rates for several chronic conditions and in-hospital fatality rates following Acute Myocardial Infarction (AMI) and stroke. However, differences in definitions, sources and methods often blur international comparisons. In addition, data for many of these indicators are still lacking for a third or more OECD countries. As an illustration, data on survival rates for selected cancers are available for the same year for, at best, 11 countries. As cancer survival rates have increased rapidly over the last decade, drawing cross-country comparisons with such data may introduce significant biases.

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* See Or (2000*a* and 2000*b*) and Elola *et al.* (1995). Asiskovitch (2010) draws the opposite conclusion.

Most mortality and longevity indicators suffer from some drawbacks, however. Indicators of health status should ideally reflect the prevalence and severity of sickness and functional disability. Furthermore, while they are driven by medical care, lifestyle and socioeconomic environment also play an important role (see below).

Cross-country comparisons of health status are not overly dependent on the choice of indicator

Existing mortality and longevity indicators are highly correlated, supporting the view that cross-country comparisons are not overly dependent on the choice of indicator. Pearson coefficients for all these indicators are high and significant, indicating that the level of these indicators is highly correlated across countries. The ranking of countries varies somewhat across the indicators (Table 1.1, Panel B), in particular when the focus is put on infant mortality instead of life expectancy. Still, in most cases country ranks are broadly stable. For instance, Japan ranks consistently first to fourth while Hungary, the Slovak Republic and Turkey are always located at the other extreme of the spectrum. The very similar country rankings, irrespective to the health status measure, is confirmed by Spearman correlation coefficients (Table 1.2).

Table 1.2. **Correlation between different measures of health outcomes**

Common (Pearson) and rank (Spearman) coefficients for 2007[1]

	Life expectancy					Adjusted PYLL [2]			Infant mortality	Health-adjusted life expectancy at birth [3]			Amenable mortality [4]
	at birth			at 65									
	Total	Female	Male	Female	Male	Total	Female	Male		Total	Female	Male	
Raw mortality indicators													
Life expectancy at birth, total	1.00	0.97 **	0.98 **	0.94 **	0.92 **	-0.93 **	-0.83 **	-0.94 **	-0.67 **	0.98 **	0.96 **	0.96 **	-0.96 **
Life expectancy at birth, female	0.91 **	1.00	0.89 **	0.97 **	0.84 **	-0.88 **	-0.85 **	-0.86 **	-0.74 **	0.94 **	0.98 **	0.89 **	-0.89 **
Life expectancy at birth, male	0.97 **	0.81 **	1.00	0.86 **	0.94 **	-0.92 **	-0.77 **	-0.96 **	-0.58 **	0.96 **	0.90 **	0.97 **	-0.95 **
Life expectancy at 65, female	0.89 **	0.97 **	0.78 **	1.00	0.88 **	-0.77 **	-0.70 **	-0.77 **	-0.64 **	0.90 **	0.95 **	0.84 **	-0.86 **
Life expectancy at 65, male	0.92 **	0.80 **	0.91 **	0.82 **	1.00	-0.74 **	-0.55 **	-0.81 **	-0.44 *	0.88 **	0.83 **	0.89 **	-0.89 **
Adjusted PYLL, total [2]	-0.82 **	-0.71 **	-0.85 **	-0.64 **	-0.64 **	1.00	0.95 **	0.98 **	0.76 **	-0.94 **	-0.91 **	-0.93 **	0.91 **
Adjusted PYLL, female [2]	-0.74 **	-0.76 **	-0.68 **	-0.66 **	-0.55 **	0.86 **	1.00	0.87 **	0.89 **	-0.84 **	-0.87 **	-0.81 **	0.79 **
Adjusted PYLL, male [2]	-0.83 **	-0.66 **	-0.90 **	-0.61 **	-0.68 **	0.97 **	0.75 **	1.00	0.64 **	-0.94 **	-0.88 **	-0.95 **	0.94 **
Infant mortality	-0.47 **	-0.52 **	-0.45 *	-0.39 *	-0.31	0.65 **	0.72 **	0.55 **	1.00	-0.66 **	-0.74 **	-0.60 **	0.54 **
Health-adjusted indicators [3]													
Health-adjusted life expectancy at birth, total	0.95 **	0.87 **	0.94 **	0.81 **	0.85 **	-0.83 **	-0.76 **	-0.84 **	-0.47 **	1.00	0.91 **	0.95 **	-0.82 **
Health-adjusted life expectancy at birth, female	0.89 **	0.96 **	0.81 **	0.91 **	0.77 **	-0.73 **	-0.82 **	-0.68 **	-0.53 **	0.91 **	1.00	0.80 **	-0.83 **
Health-adjusted life expectancy at birth, male	0.92 **	0.76 **	0.95 **	0.71 **	0.84 **	-0.84 **	-0.72 **	-0.88 **	-0.44 *	0.95 **	0.80 **	1.00	-0.80 **
Other indicators													
Amenable mortality [4]	-0.92 **	-0.87 **	-0.87 **	-0.82 **	-0.77 **	0.85 **	0.79 **	0.82 **	0.57 **	-0.82 **	-0.83 **	-0.80 **	1.00

1. Pearson coefficients, which are shown above the diagonal, measure the linear correlation between the levels of different health status measures across countries in 2007 (or latest year for which data are available). Spearman coefficients, displayed in the shaded area, measure the correlation between the ranks of the countries ordered according to the relevant variables. Coefficients with ** are significant at less than 1%. Those with * are significant at between 1 and 10%. Those with no * are not significant below a 10% threshold. Data availability varies, affecting the degree of significance of coefficient estimates.
2. Potential years of life lost (PYLL) are calculated excluding deaths from land transport accidents, accidental falls, suicides and assaults. PYLL data are missing for Belgium and Turkey.
3. Health-adjusted life expectancy (HALE) data are for 2007.
4. Age-standardised deaths rates per 100 000 people. Data are missing for Belgium, Switzerland and Turkey.

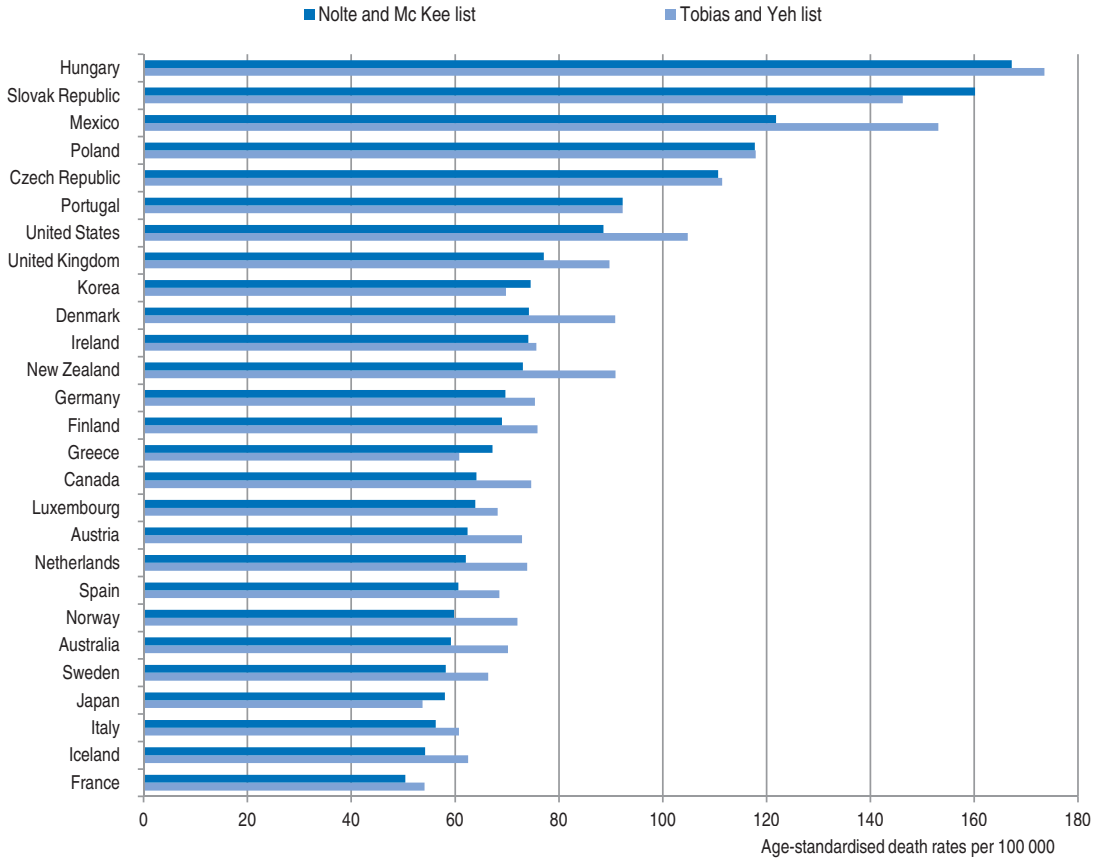
Source: OECD Health Data 2009; WHO, *World Health Statistics 2010*.

Amenable mortality is a promising concept but data are still in development

Amenable mortality – *i.e.* those deaths that could be avoided by timely and effective medical care – is another approach to better focus on the impact of health care for the population health status. Still, it is no panacea. *First*, data are not available for Switzerland and Turkey, as well as for Belgium after 1999. *Second*, there is no consensus across studies on the causes of death that can be considered amenable to health care and the associated age limits – so-called "lists". Figure 1.2 presents recent OECD estimates for amenable mortality using two different lists. The results are broadly similar for most countries, though significant differences appear for some (*e.g.* Mexico and the United States). In addition, the definition may vary over time in line with medical progress and the likely development of new diseases. *Third*, the measure is sensitive to differences in diagnostic patterns, death certification and coding of causes of death. This may weaken cross-country comparability. *Fourth*, amenable mortality, like longevity indicators, does not account for health care interventions aimed at improving the quality of life of the, sometimes sick, population.

Figure 1.2. **Amenable mortality: international comparisons using two different lists**

All causes, 2006 or latest year available



1. Amenable mortality lists specify both causes of death and age-specific limits for each cause. Various lists exist. Results shown here are based on those developed by Nolte and Mc Kee (2008) and by Tobias and Yeh (2009).

Source: OECD estimates.

Accounting for the prevalence of diseases or disability does not change the picture drastically

Efforts have been made by several organisations, notably the World Health Organisation (WHO) and Eurostat, to build health status variables reflecting both mortality and the prevalence of diseases and/or disability (*i.e.* morbidity). The most commonly used indicators are the Health-adjusted Life Expectancy (HALE) and the Disability Free Life Expectancy (DFLE). Cross-country correlations between the HALE and raw longevity/mortality indicators are both very high and significant (Table 1.2). They are lower for the DFLE but this indicator appears to be less relevant, at least in the context of this work. Still, the lack of time series data for the HALE and the limited country coverage for the DFLE are a serious impediment to their use in the empirical work.

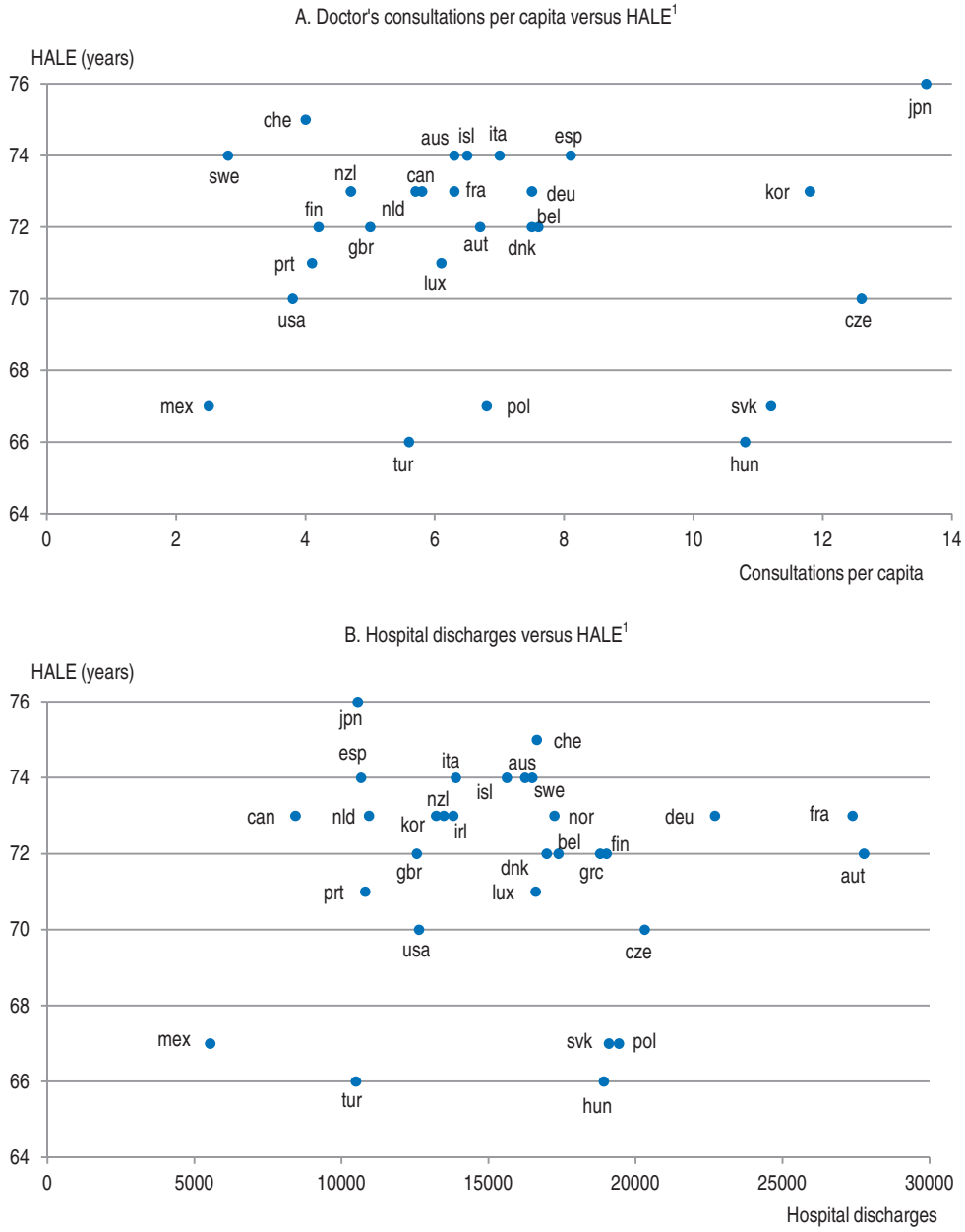
Health care outputs are poor proxies of outcomes

Because of the difficulty in measuring health care outcomes, outputs are sometimes used as proxies. And data on health care outputs are being developed and used increasingly in the national accounts to measure productivity gains (Box 1.2), mostly based on the number of consultations and hospital treatments. In practice, there are large cross-country variations in the number of doctor consultations *per capita*, from over ten in 2007 in the Czech Republic, Hungary, Japan, Korea and the Slovak Republic, to below four in Mexico, Sweden and the United States. An even higher dispersion exists for the number of hospital interventions *per capita*. Comparing health care outputs with health status indicators, however, strongly suggests that such output measures are not relevant proxies for health care outcomes (Figure 1.3).

There are various reasons why health care outputs may not say much about health outcomes. The services provided, and measured, may not be the most effective in improving life expectancy and quality of life. The mix of care matters – good preventive care should allow reducing health care outputs and simultaneously raising health outcomes. Likewise, having little hospital admissions for a number of chronic conditions (such as asthma and congestive heart failure) is largely reflecting effective out-patient care services (Mattke *et al*., 2006; Garcia Armesto, 2007). Quality of care also matters and similar volumes of outputs may not have the same impact on the population health status if they are not as high quality. Overall, a large volume of care could either signal an inefficient health care system with too few resources invested in preventive care or an efficient health care system responding to needs which could not be prevented.

Figure 1.3. **Health care outputs are hardly correlated with outcomes**

2007 or latest available year



1. Health-adjusted life expectancy (HALE) at birth (years).

Source: WHO, *World Health Statistics 2010*; OECD Health Data 2009.

Box 1.2. **Measuring health care outputs in the national accounts: recent developments**

Until recently, most OECD countries measured the volume of non-market services – health care and education are among the most important – through the so-called input method. Output volumes were estimated through associated input volumes. This input method was recognised to have serious drawbacks in particular when drawing intertemporal and cross-country comparisons. Most notably, it assumes that productivity is constant over time and across countries.*

To overcome shortcomings of the input method, work has been carried out in several OECD countries and by both Eurostat and the OECD to secure a more consistent measure of outputs in the health and education sector in the National Accounts. The System of National Accounts (SNA93) and Eurostat recommended that volume measures should be based on an observable flow of service provision. For health services, Eurostat (2001) considered that the most appropriate methods are those where: "Health output is the quantity of care received by patients, adjusted to allow for the qualities of service provided, for each type of health care. The quantities should be weighted together using data on the costs or prices of the health care provided. The quantity of health care received by patients should be measured in terms of complete treatments". In practice, most countries have adopted methods in which output is measured by the number of various services (activities) that are weighted by their average unit cost. For example, hospital care output can be measured through DRGs. The OECD Handbook (Schreyer et al., 2010) identifies as the basic unit of service the quality-adjusted numbers of treatment of particular diseases. It recognises, however, that this approach is much more difficult to pursue for out-patient services and for elderly and long-term care where it is difficult to identify diseases and where treatments are often open-ended. In practice, it proposes to retain hospital output aggregated by DRGs with quality adjustment and for out-patient care rudimentary measures such as the number of doctor visits, pathology tests by broad category and prescriptions filled by type.

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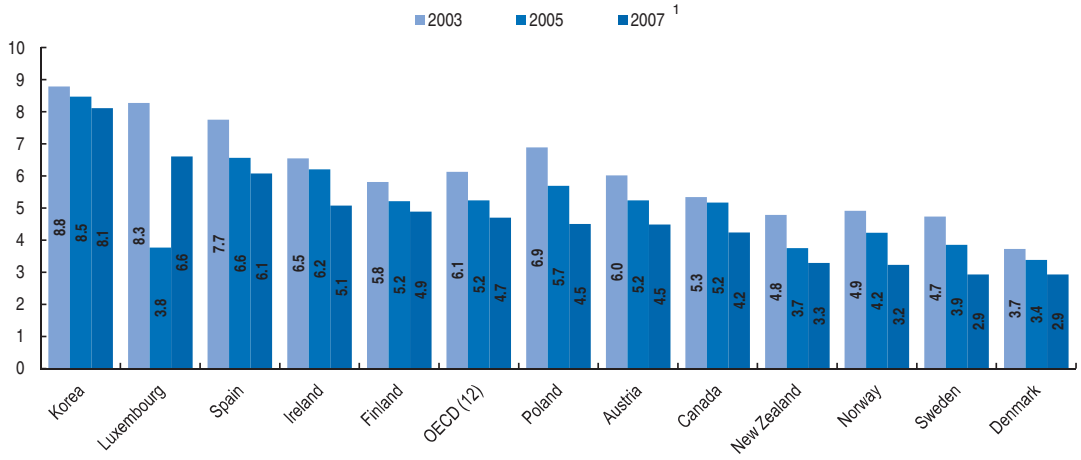
* As an illustration, the United Kingdom has moved since 1998 to a direct (output-based) measure of changes in government production for around two-thirds of government final consumption. As a result of this change, between 1995 and 2003, GDP in constant prices grew by 2¾ per cent per year, as compared to 3 per cent if output in the general government had continued to be measured by inputs (Atkinson, 2005).

Survival rates after specific diseases provide useful information but data need to be developed further

Existing information on the quality of care confirms that better medical treatments have contributed to improve the population health status. Coronary artery disease remains the leading cause of death in most OECD countries but much of the reduction in mortality rates since the 1970s can be attributed to lower mortality from acute myocardial infarction (AMI) (OECD, 2009*a*). In fact, the number of people dying within 30 days after an AMI has been reduced by a fourth between 2003 and 2007 on average for the 12 OECD countries for which data are available (Figure 1.4). Similarly, survival rates after ischemic and hemorrhagic stroke have increased significantly, largely reflecting the impact of dedicated stroke units in hospitals over the past decade. Also revealing are the survival rates after cancer.

Figure 1.4. **Reduction in in-hospital case-fatality rates for acute myocardial infarction**

Within 30 days after admission



1. Or nearest year.

Source: OECD Health Care Quality Indicators Data 2009. Rates are age-sex standardised to 2005 OECD population (45+).

Using data on disease specific survival rates to draw cross-country comparisons is, however, difficult for at least two reasons. *First*, data availability remains limited and variations in methodology may blur cross-country comparisons. As an illustration, data on survival rates for selected cancers are available for the same period for, at best, 11 OECD countries. As cancer survival rates have increased rapidly over the last decade, drawing cross-country comparisons with data for different years may introduce significant biases. *Second*, each of these indicators is partial, and as a result potentially misleading if considered in isolation. In particular, relative country positions vary considerably from one indicator to another. As an example, among OECD countries for which internationally-comparable data are available (*i.e.* nineteen), Korea had the highest in-hospital case-fatality rate within 30 days after admission for AMI in 2007. For the same year, Korea scored as one of the best performing country for both ischemic and hemorrhagic strokes.

Public satisfaction and sick leave can hardly be used to compare health outcomes across countries

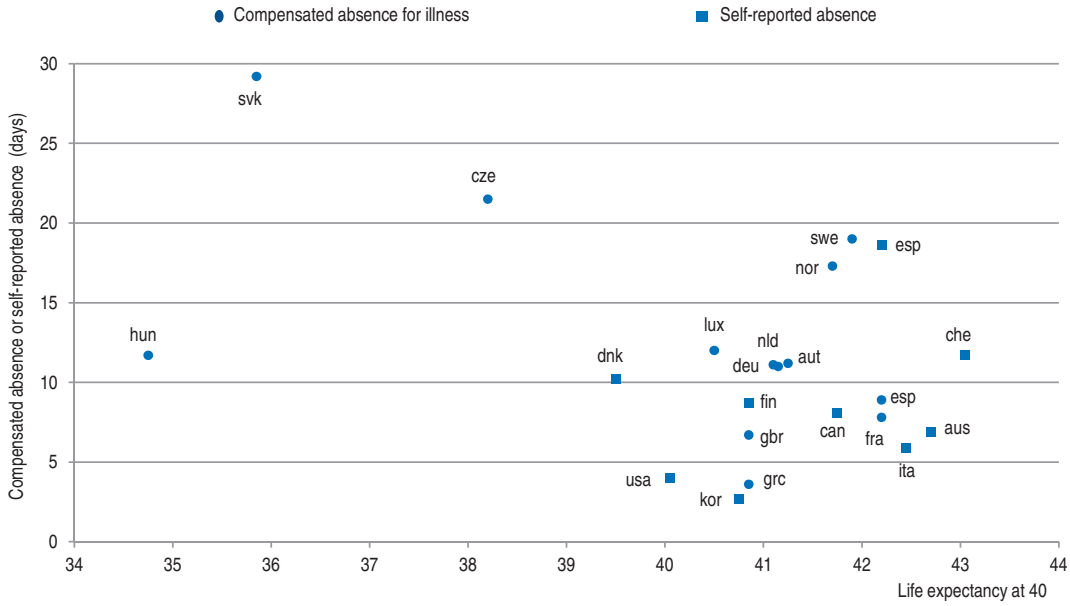
The amount of sick leave taken could in principle be considered as an outcome of the health care system. By preventing people from becoming sick or by curing them rapidly, health care can be expected to reduce the amount and length of sick leave, boosting the labour supply and thus the economy's potential output. By helping to keep sick people alive for longer, health care may, however, also increase sick leave. Previous studies have further suggested that sick leave largely reflects macroeconomic developments and various aspects of the institutional framework (including generosity of sickness benefits, type of job contract and strictness of employment protection legislation).[1] The overall

1. See Osterkamp and Röhn (2007) for international comparisons, Grignon and Renaud (2007) for France and Askildsen *et al.* (2000, 2002) for Norway.

impact of health care on sick leave may thus be both ambiguous and marginal. The sparse data available reveal that, across countries, compensated sick leave is poorly correlated with "conventional" health status measures (Figure 1.5). Hence, sick leave cannot be used as a reasonable proxy for cross-country comparisons of health care outcomes.

Figure 1.5. **Sick leave is poorly correlated with conventional health status measures**

2007 or latest available year[1]

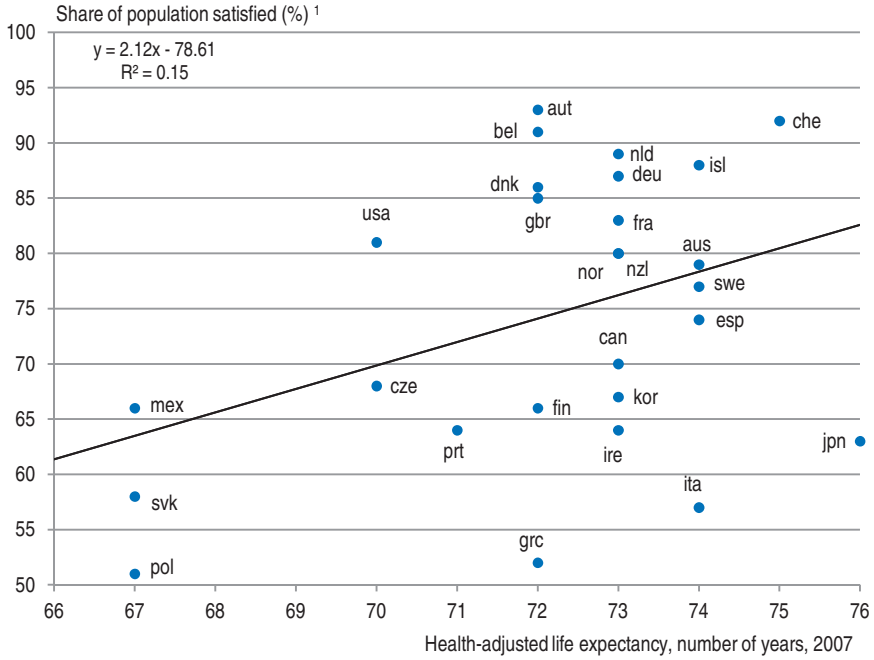


1. Compensated absence for illness: 2006 for Germany and Sweden; 2005 for Greece and 2003 for the Slovak Republic. Self-reported absence for illness: 2005 for Denmark, Italy and Korea; 2004 for Australia and 2003 for Spain.

Source: OECD Health Data 2009.

Public satisfaction with the health care system could also be a criterion for assessing its performance. Satisfaction is, however, affected not only by people's experiences with the health care system but also by their expectations, which are likely to vary significantly both across countries and over time. As a matter of fact, public satisfaction appears to be only very weakly correlated with HALE across OECD countries (Figure 1.6). Even within countries, Adang and Born (2007) show that changes in health care system performance are not associated with changes in public satisfaction – at a certain point in time people might well be dissatisfied, but if the level of aspiration adjusts downward, satisfaction may well increase while health care performance remains constant or even declines.

Figure 1.6. **Public satisfaction and health-adjusted life expectancy**



1. Share of population satisfied with availability of quality health care, 2008.

Source: WHO, *World Health Statistics 2010*; OECD Health Data 2009.

Equity goes hand in hand with a better average health status

Equity is often a key policy objective and this is also the case in health policy. Still, internationally comparable data on health inequalities – *i.e.* apparent differences in mortality/longevity and the prevalence of morbidity – are scarce.[2] Health inequalities can be proxied by the dispersion in the age of death among individuals (Edwards and Tuljapurkar, 2005; OECD, 2006*a*), which display significant cross-country variation.[3] In 2006, the dispersion in the age of death was highest in the United States, followed by Hungary and Poland, and lowest in the Netherlands and Sweden. Simplicity and the availability of data for most (26) OECD countries are the main advantages of this indicator. One key drawback is that this indicator fails to reflect inequalities in morbidity. Data on the dispersion in longevity indicators adjusted for morbidity or disability (DALE, DFLE and HALE) are, however, not available on a consistent basis for many OECD countries.

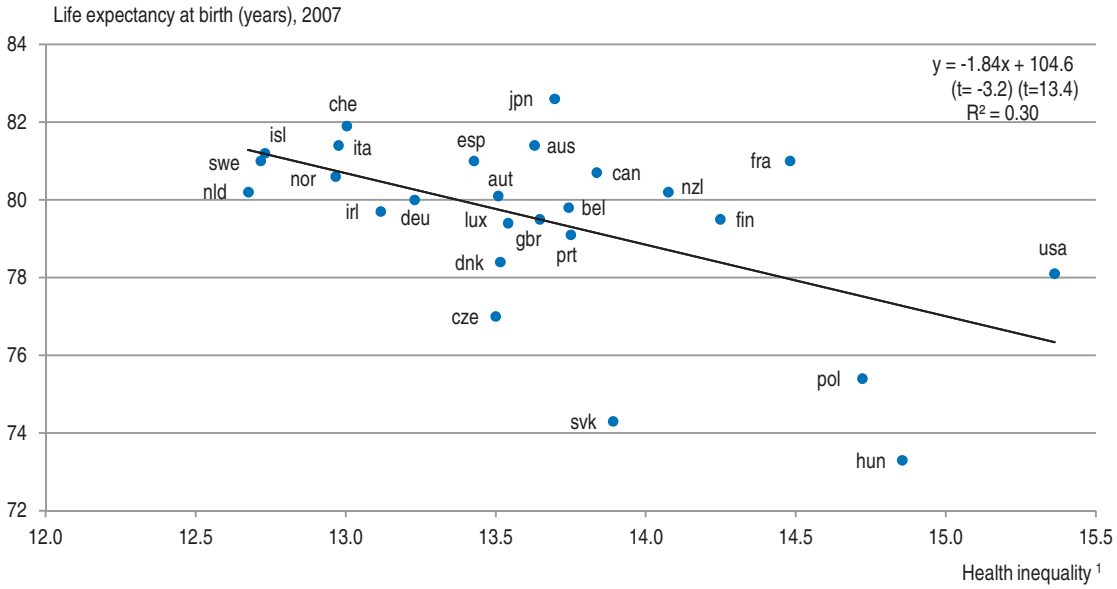
Existing data suggest that there is no trade-off between increasing the average health status of the population and reducing the dispersion in health status (Figure 1.7, Panel A). There may even be complementarity, though the scarcity of available indicators makes it difficult to draw a definitive conclusion.[3] Declining returns to scale of health care

2. De Looper and Lafortune (2009) provide a useful review of existing data on health inequalities and their limitations.

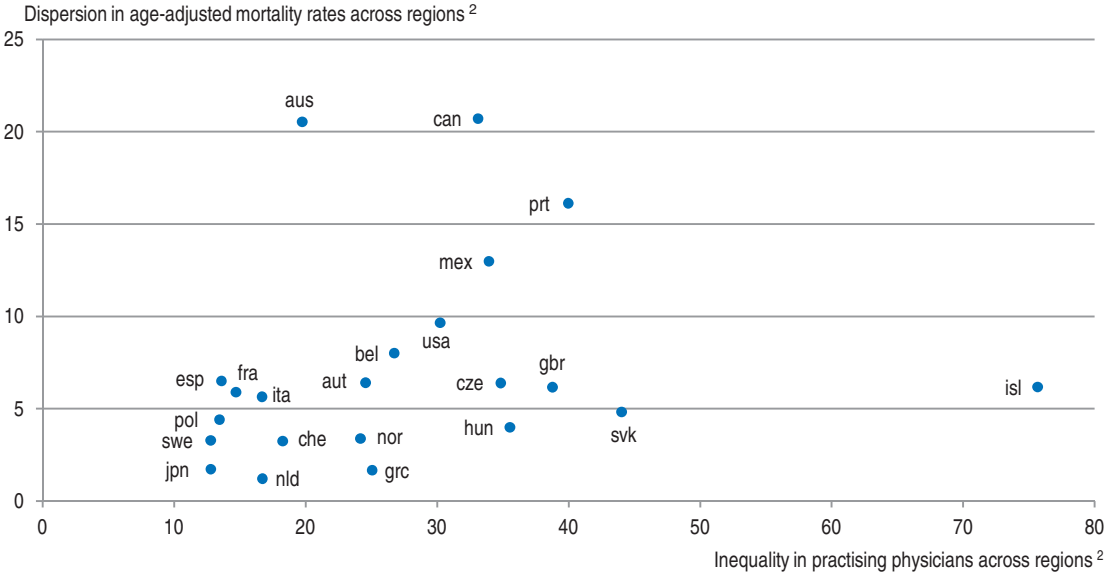
3. The dispersion in the age at death is measured as the standard deviation of all deaths above the age of ten for each age bracket, weighted by the number of observed deaths in each age bracket.

Figure 1.7. **Inequalities in health status**

Panel A. No trade-off between the average health status and its dispersion among individuals



Panel B. Weak correlation with the regional dispersion of physicians



1. Measured by the standard deviation in mortality ages for population older than ten. Calculations are based on 2007 data or latest available year.
2. Inequality across regions is proxied by the dispersion of regional mortality rates expressed as a percentage of national mortality rates. In the same way inequality in practising physicians across regions is derived from the dispersion in the number of physicians *per capita* in each region expressed as a percentage of the number of physicians *per capita* at the national level. Data concern the year 2004.

Source: Human Mortality Database (HMD); OECD Health Data 2009; *OECD Regions at a Glance* (2007).

spending could partly explain why low inequalities go hand in hand with higher average health status: concentrating spending on a small population group yields lower additional years of life for society than having a more equitable distribution of spending.[4] Not covering part of the population with health insurance could lead to that group suffering from severe health problems which may eventually be treated but at a high cost.

Partial evidence also suggests that the health system does not play the key role in shaping health inequalities. Most OECD countries have achieved nearly universal coverage of the population for a core basket of health goods and services, thus mitigating inequality in access. Inequality in access may still originate from differences in availability of medical resources across regions. The very weak correlation, if any, between the dispersion in age-adjusted mortality rates and in the number of practising physicians *per capita* across regions (Figure 1.7, Panel B) suggests that inequality in access plays a minor role in explaining inequalities in health status.

The literature often concludes that health inequalities are largely driven by socio-economic factors and thus determined outside the health care sector. Many studies reveal that those with a lower income, less education or employment in a less prestigious occupation tend to have a higher prevalence of illness and die at a younger age.[5] Health inequality measures focusing on socio-economic disadvantages have been developed in some countries. Still, gathering comparable data is difficult since, in many countries, mortality registries collect little or no information that can be used to determine the socio-economic background (De Looper and Lafortune, 2009). Indicators of socio-economic inequalities in health status and health care access that could easily be gathered regularly by the OECD are those for self-rated health status, self-rated disability and measures of unmet care needs. There are serious limitations, however, in using self-reported health status measures in cross-country comparisons.

Spending on health care: pressures have been strong and are projected to intensify

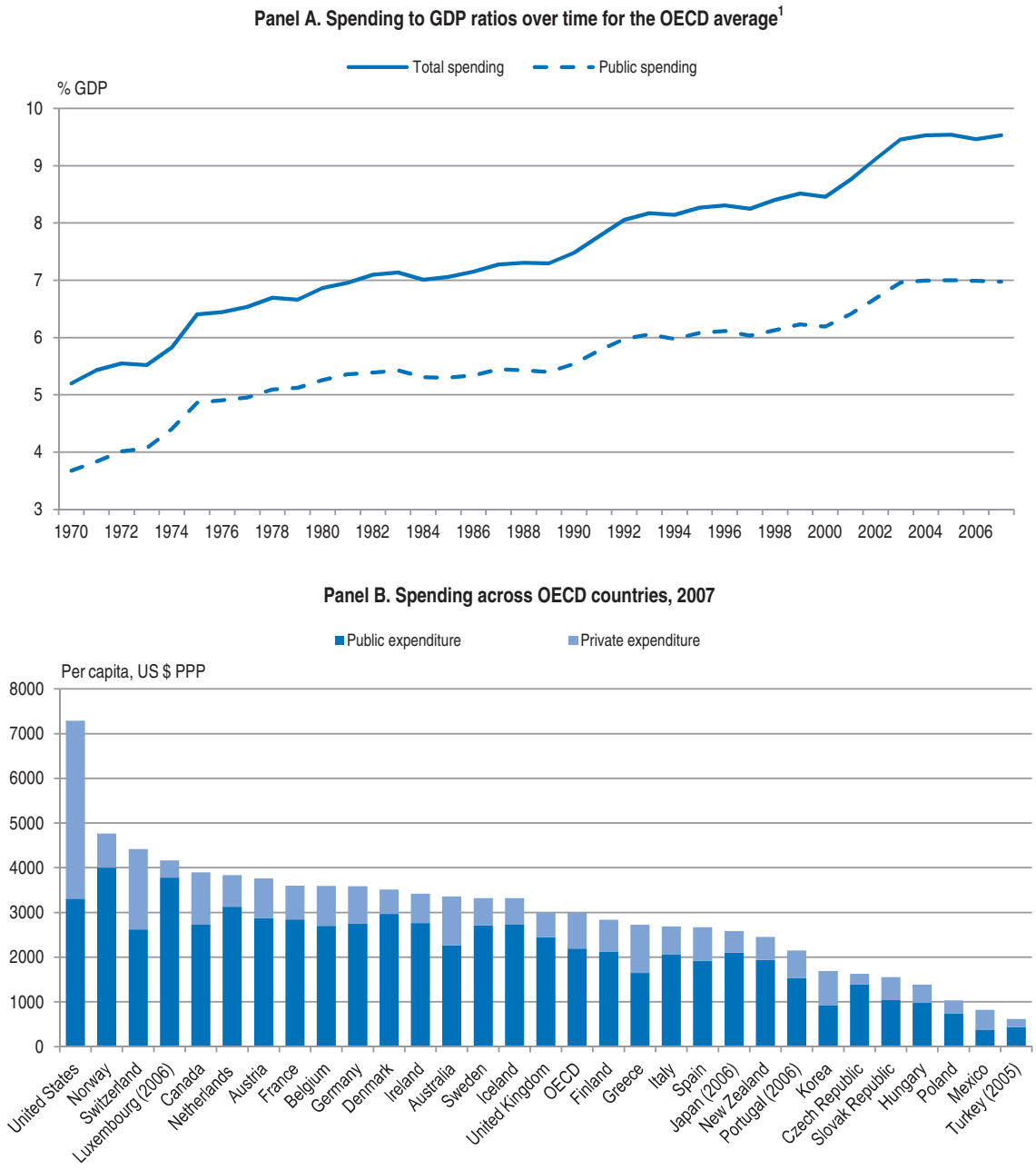
A hefty rise in health care spending over the last decades

Health care spending has increased more rapidly than total income in virtually all OECD countries since the early 1970s. Total health care spending amounted to 9½% of GDP in 2007, up from just over 5% in 1970 for the group of 21 OECD countries for which comparable historical series are available (Figure 1.8, Panel A). Total health care spending *per capita* rose by over 70% in real terms between 1990 and 2007. And three quarters of the increase in the spending to GDP ratio has been financed by the public sector. The countries that have experienced the highest growth in health expenditure *per capita* are those that had relatively low levels at the beginning of the period, such as Korea, Ireland, Turkey and the United Kingdom. The hospital sector has been the main driver of spending growth in many OECD countries, despite a continuing shift from in-patient to ambulatory care.

4. In the education sector also, those countries with the highest average PISA scores – measuring the aptitude of 15-year old pupils – tend to be characterised by low disparities in PISA scores across pupils (Sutherland *et al.*, 2007).

5. See for instance Conti, Heckman and Urzua (2010).

Figure 1.8. **Spending on health care: trends and levels**



1. For a group of 21 OECD countries for which comparable historical series are available.

Source: OECD Health Data 2009.

A very wide cross-country dispersion in spending levels persists

While all countries have experienced a steady growth in health care spending, cross-country variations in spending levels per head remain extremely large. In 2007, health care spending per head in the United States stood at $7 290, almost 2½ times the OECD average and over 7 times more than in Poland, Mexico and Turkey (Figure 1.8, Panel B). Various factors contribute to explain the wide dispersion, including the age structure of

the population, patterns of disease, the number of health professionals, the use of technology and the efficiency of resource utilisation and administrative costs.[6]

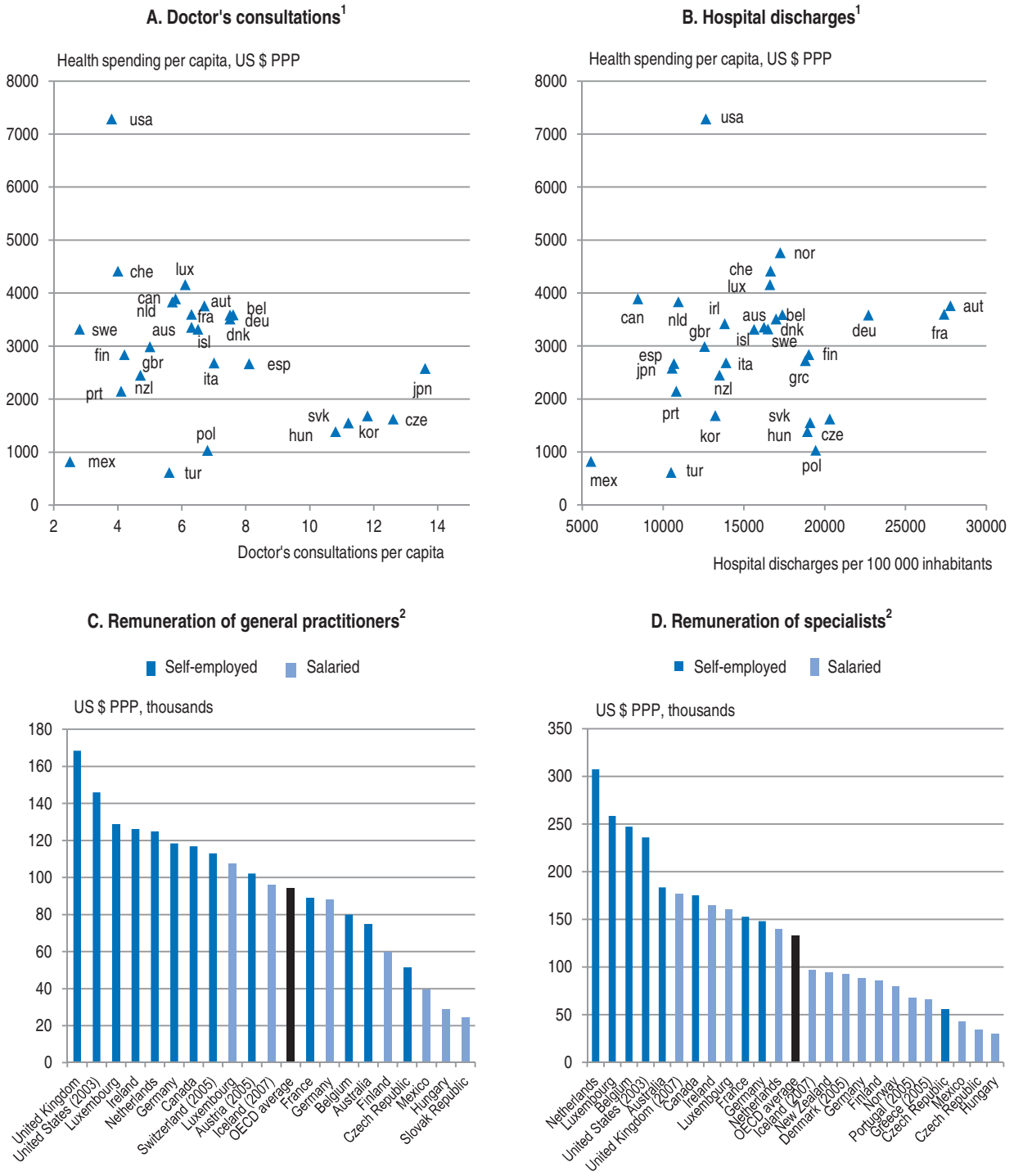
The cross-country variation in the degree of utilisation of health care services and the remuneration level of health professionals is very wide. Indeed, the number of doctor consultations *per capita* was, for example, three-fold or more in Korea, Japan and the Czech Republic than in Mexico, Sweden and the United States in 2007 (Figure 1.9, Panel A). And the number of hospital discharges was more than three times higher in Austria and France than in Canada (Figure 1.9, Panel B). Some high spending countries – including the United States and the Netherlands – are characterised by rather low utilisation rates but high health care prices. As an illustration, self-employed specialists earn 7.6 and 5.6 times the average wage in the Netherlands and the United States, respectively, *i.e.* much more than in most other OECD countries.

Demands on public health care spending are projected to intensify

Public spending on health care is one of the largest government spending items – it absorbed 15% of general government spending on average in the OECD in 2007 (more than 6% of GDP), up from 12% in 1995. Population ageing, rapidly rising health care prices and costly developments in medical technology are putting upward pressure on health care budgets. The OECD projects that public health care spending could increase by 3.5 to 6 percentage points of GDP between 2005 and 2050 across OECD countries (Figure 1.10).

6. Oxley and Morgan (2009) provide a detailed assessment of the factors contributing to variations in the level of health care spending *per capita* across OECD countries.

Figure 1.9. **Cross-country variations in health care activity and compensation levels**

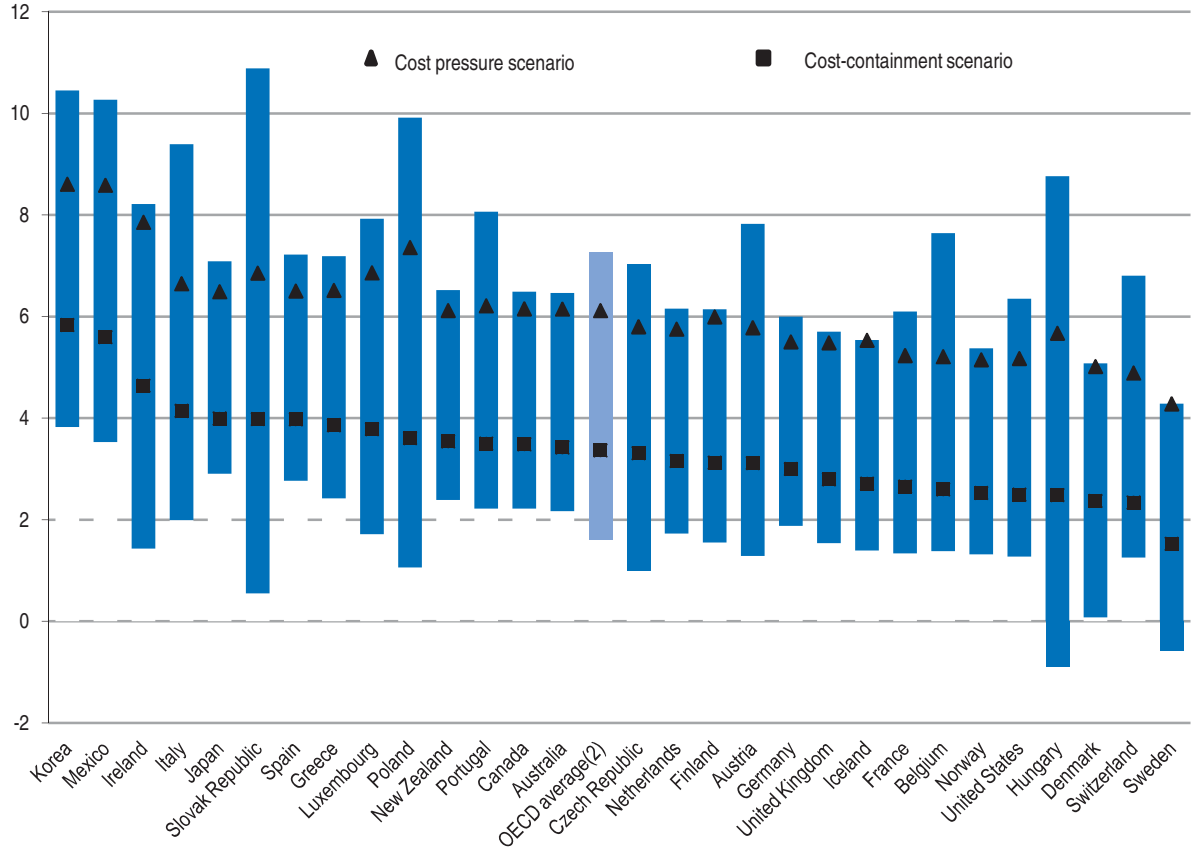


1. 2007 or latest available year.
2. 2006 or latest available year.

Source: OECD Health Data 2009 and, for the United States, Community Tracking Study Physician Survey, 2004-05.

Figure 1.10. **Increase in public health and long-term care spending by country**

2005-50[1], in percentage points of GDP



1. The vertical bars correspond to the range of the alternative scenarios, including sensitivity analysis. Countries are ranked by the increase of expenditure between 2005 and 2050 in the cost-containment scenario. Turkey was not included because data limitations made it impossible to calculate one of the scenarios.
2. OECD average excluding Turkey.

Source: Oliveira Martins and de la Maisonneuve (2006).

Annex 1.A1

Definitions and sources

Health status indicators[1]

Premature mortality, potential years of life lost (PYLL) and adjusted PYLL

Premature mortality focuses on the life years lost before 70, with deaths weighted according to their prematurity preceding 70. With this age limit, the death of an infant (70 life-years lost) will be given 14 times the weight given to the death of a 65-year old (5 years lost). This contrasts with conventional mortality rates which implicitly attribute the same weight to all the deaths irrespective of age.

In order to assure cross-country and trend comparison, the Potential Years of Life Lost (PYLL) are standardised, for each country i and each year t as follows:

$$PYLL_{it} = \sum_{a=0}^{l-1} (l-a)(d_{at} / p_{at})(P_a / P_n) * 100000$$

where a represents age, l is the upper age limit chosen for the measure (70 years in OECD Health Data), d_{at} is the number of deaths at age a, p_{at} refers to the number of persons aged a in country i at time t, P_a refers to the number of persons aged a in the reference population, and P_n refers to the total number of persons in the reference population. The total OECD population in 1980 is taken as the reference population for age standardisation.

Data on premature mortality are available for most OECD countries, with the main exception of Turkey, over the period 1960-2007. However, data are missing for part of this period for many countries, in particular Belgium, the Czech Republic, Korea, Mexico and the Slovak Republic.

Premature mortality data include deaths which are caused by such external factors as land transport accidents, accidental falls, suicides and assaults. In the empirical work, these causes of death have been excluded to derive the "adjusted PYLL" indicator.

Infant mortality

Infant mortality focuses on the health system capacity to prevent deaths at the youngest ages. Infant mortality refers to the number of deaths of children under one year, expressed per 1 000 live births. Definitional issues may complicate international

1. Most of the information presented in this Annex comes from OECD Health Data.

comparisons. Some of the international variations in infant mortality rate may be due to differences in the definition of a live birth (whether they are reported as live births or foetal deaths) – a problem which would be more acute with neonatal mortality. In several countries, such as in the United States, Canada and the Nordic countries, very premature babies with relatively low odds of survival are registered as live births – this increases mortality rates compared with other countries that do not register them as live births.

Life expectancy

Several indicators of life expectancy are available for all OECD countries over the period 1960-2007 by gender and at different ages (the period covered differs according to countries and age retained). The paper mainly focuses on life expectancy at birth and at 65 (given the concentration of health expenditure on people aged 65 and above) for the total population and broken down by gender.

Health-Adjusted Life Expectancy

To calculate the Health-adjusted Life Expectancy (HALE), the World Health Organisation (WHO) weights the years of ill-health according to severity and subtracts them from overall life expectancy to give the equivalent years of healthy life. Data were published first in 2001, then in 2002 and 2007. Due to improvements in survey methodology and the use of epidemiological data, comparisons over time should be drawn with caution, however.

Disability Adjusted and Disability Free Life Expectancy (DALE and DFLE)

DALE is defined as life expectancy adjusted for the average time a person has lived with some disability (weighted for severity) while DFLE is defined as the absence of limitations in functioning/disability. Because severe and other disabilities are treated equally, DFLE is a less relevant measure than DALE.

Other health outcome indicators

Sick leave

Data availability on sick leave is rather limited: 13 countries provide data on the number of sick days lost and compensated for over the period 2000-07, and information on self-reported absences from work owing to illness is even less complete.

Amenable mortality

The concept of amenable deaths – *i.e.* deaths that should not occur in the presence of effective and timely medical care – is another promising approach to addressing the question of the degree to which health care contributes to population health. Measuring "avoidable deaths" requires establishing a list of conditions considered amenable to health services and setting age limits for each condition (*e.g.* asthma below age 45, diabetes mellitus under age 50 and tuberculosis under age 75). Many lists have been proposed since the Working Group on Preventable and Manageable Diseases in the United States introduced the notion of "unnecessary untimely deaths" in the 1970s. Some have evolved through time, partly reflecting medical progress in knowledge and

technology. The OECD has compiled preliminary data using two different lists for 27 countries (see Figure 1.2), with the results being broadly similar (Nolte and McKee, 2008 and Tobias and Yeh, 2009).

Measures of health inputs

Lifestyle factors

Tobacco consumption

OECD Health Data contains three variables which could be used as proxies for harmful tobacco consumption:

- annual consumption of tobacco items in grams per person aged 15 years or over;
- average number of cigarettes per smoker per day;
- share of daily smokers in the population aged 15 years or more.

The last variable is the only one available by gender but it also seems less relevant since it does not account for the consumption per smoker. It is actually poorly correlated with the overall consumption of tobacco. As an example, the Czech Republic is the OECD country with the second highest tobacco consumption (measured in grams *per capita*) but ranks only fourteenth for the percentage of adult population smoking daily.

In most of the panel regressions, tobacco consumption is measured by the annual consumption of tobacco in grams per person aged 15 years or over. Replacing the annual consumption of tobacco by the share of daily smokers, by gender, does not change our results, however. The DEA relies on the share of non-daily smokers since data are available for all OECD countries – data on annual tobacco consumption in grams are available only for 23 countries.

Alcohol consumption

OECD Health Data contains data on the annual consumption of pure alcohol in litres per person aged 15 years and above. Data are available for all OECD countries but cover different time periods. Average *per capita* consumption may, however, fail to account for a particularly dangerous pattern of consumption – consumption of large quantities of alcohol at a single session ("binge drinking") – which is on the rise in some countries and social groups.

Diet

Only a minority of empirical studies has included diet in the health production function and there is no consensus in these studies on what would be the best proxy for diet. OECD Health Data contains five proxies for diet: intake of calories, proteins, sugar, fat, and fresh fruits and vegetables. Introducing the first four proxies raises at least two problems: *i)* the consumption of calories, sugar, protein and fat is likely to have a non-linear effect on health – it contributes positively up to a certain level but beyond becomes detrimental; *ii)* these three variables are highly correlated with GDP *per capita*, thus potentially biasing estimated coefficients. The consumption of fresh fruits and vegetables appears to be largely immune from these problems and has been the proxy chosen for the

empirical work. Alternative specifications have been tested, replacing the consumption of fruits and vegetables by calorie or fat intakes but they led to unstable or inconsistent coefficients.

Obesity

Obesity is sometimes considered as a determinant of the population health status because it can be considered as a proxy for a broad range of nutritional and physical activity patterns. In practice, obese people tend to die at a younger age. Data on obesity are, however, not easily comparable: 28 countries collect data for obesity but on a very irregular basis. Furthermore, in some countries data refer to self-reported status, while in others they are derived from actual heights and weights. More fundamentally, one could question whether obesity should be considered as a determinant of the population health status (*i.e*. a right-hand side term of the health status production equation) or instead as a measure of the health status itself (left-hand side term). It is clear, in practice, that obesity is influenced by education, income, lifestyle factors and, though probably less, by health-care resources.

Socio-economic factors

Pollution

OECD Health Data contains three proxies for air pollution: sulphur oxide emissions, nitrogen oxide emissions (NOx) and carbon monoxide emissions. The choice of NOx as the proxy for pollution in our empirical work has been mainly dictated by the difficulty to derive long-enough time series for the other two measures. To build time series for the NOx, information contained in OECD Health Data (available for most OECD countries over the period 1990-2005) has been combined with data published by the EMEP (Co-operative programme for monitoring and evaluation of the long range transmission of air pollutants in Europe). On the basis of NOx *per capita*, air quality is the lowest in Australia, Canada, Iceland and the United States. Had sulphur oxide emissions been chosen as a proxy for pollution, country relative ranking would have been somewhat different. It should be noted however that Australia, Canada and the United States are also the countries with the highest sulphur oxide emissions *per capita*.

Education

OECD Health Data contains two main proxies for education: educational attainment (percentage of the adult population, 25 to 64 years old, that has completed a certain level of education defined according to the ISCED system) and school expectancy (defined as the expected years of schooling under current conditions calculated through enrolment rates). Data on the average effective number of school years are also available from Bassanini and Scarpetta (2001) and *OECD Education at a Glance*. Previous empirical studies have selected different options. Educational attainment was used by Thornton (2002) and Self and Grabowski (2003). The average number of schooling was used by Or *et al.* (2005) as well as by Puig-Junoy (1998).

The choice of a particular measure may affect country rankings significantly. As an illustration, in Australia less than 63% of the population aged 25-64 has at least attained upper secondary education, but on average each student remains over 12 years in the educational system which, compared to other countries, is rather high. Both for educational attainment and school years, there are significant data gaps. For the empirical

work, the educational attainment level (share of the population that has attained at least upper secondary education) was considered as the best proxy for the contribution of human capital to health. Data in OECD Health Data are available for all countries but start rather late in the 1990s. To obtain longer time series, an earlier OECD historical database was used.

Economic, Social and Cultural Status (ESCS)

To minimise the number of inputs, preference has been given for DEA to the PISA index of the economic, social and cultural status (ESCS), instead of education and income levels. This index is designed to capture broad aspects of a student's family and home background. It is derived from sub-indices based on: *i)* the highest occupational status of the students' parent; *ii)* the highest level of education of the parents; and *iii)* an index based on educational resources in the home and the number of books at home.

Health care resources

Spending on health care

OECD Health Data series for total expenditure on health *per capita* were used. For several countries (in particular Austria, Belgium, Finland, France and Turkey), these data include series breaks. To cope with this issue, the growth rate in the break year was replaced by the average growth rate in the preceding five years (a proxy for trend growth). The levels before the break year were revised by retropolation using actual growth rates (those of the unadjusted series).

Data on health care spending include long-term care. While it may have been desirable to exclude this component when estimating the impact of health care on the health status, it is in practice quite difficult. Total expenditure on long-term care is available for ten countries from 2003 on.

To convert health care spending into volume measures which are comparable across countries, previous studies have relied on different approaches. Most studies have relied on GDP PPPs but some have used existing health care PPPs (*e.g.* Or, 2000*a*; Miller and Frech, 2002). Existing health-specific PPPs are, however, flawed with several drawbacks. For health services, only "market" outpatient services are covered by price surveys but international comparability of these data is less than perfect, in particular for countries where the share of the private sector is low. Recognising the drawbacks of existing data, the OECD has launched a work programme to develop health-specific PPPs. In the meantime, GDP price deflators and PPP exchange rates for the base year (2000) have been used to convert health spending in this empirical work.

Health care spending has been broken down by category: pharmaceuticals, out-patient care, in-patient care and other, using the data available in OECD Health Data. Differences in institutional arrangements and categorisation of spending may, however, blur the picture. Peterson and Burton (2007) noted that in the United States it is common for physicians to provide in-patient care while not being employees of the hospital. For categorising US spending, these physician services are considered out-patient services, even though they are provided in an in-patient setting. The result is that the United States appears to have a higher proportion of out-patient spending that it otherwise would. In other OECD countries (including Australia, Japan, Mexico and the Netherlands), some spending items have been re-classified over time between out-patient and in-patient care, creating series breaks.

Health care spending could be broken down into public and private components. However, the different treatment of tax expenditures across countries, a rather large item in some, may introduce serious bias. In principle, tax expenditures are included in the data for total health care spending. However, countries interpret differently the OECD manual on the System of Health accounts on how to deal with tax expenditures. Australia and Germany, for instance, deduct tax expenditures from the private insurance expenditures and report it as public expenditure. But in the United States, tax expenditures are not considered as public expenditure. According to Peterson and Burton (2007), they amounted to $141.5 billion in 2006 (*i.e.* over 1% of GDP), and include tax exemption of employers' contributions for employee health insurance ($90.6 billion) and deductions for out-of-pocket medical expenses ($7.3 billion).

Human resources

OECD Health Data contains data on health employment while underlining the fact that cross-country comparisons should be carried out with care. Data can be on a head count basis in some countries and on a full-time equivalent basis in others; they may include or not professionals who are foreigners, non-practising or retired professionals. In the same way, data on practising nurses may or may not include non-practising nurses, midwives or self-employed nurses.

Physicians and nurses account for the largest share of health practitioners in many countries. Still, their number *per capita* varies a lot *across countries*, as does the ratio of nurses to doctors. In contrast, the ratio of nurses to doctors is rather stable *across time* within countries. Hence, in order to use a less restrictive measure of health employment resources than practising physicians, a human resource indicator was constructed and used for both the panel regressions and the DEA. It has been built by summing up the number of physicians and half the number of nurses (reflecting the fact that many nurses work part-time and that their productivity may be lower than the productivity of practising physicians, as partial evidence on wage levels would suggest).

Chapter 2

Efficiency measures

This chapter examines how to measure the efficiency of health care systems. It reviews the various definitions of efficiency and assesses the pros and cons of the different approaches to measure it. It then derives efficiency estimates, taking due account of the impact of lifestyle and socio-economic factors on health status. The results for OECD countries are presented and compared with other performance indicators.

Introduction

Health care spending needs to become more effective to mitigate pressures on the public finances stemming from health care demand and the ageing of the population.[1] The recent crisis and its impact on public budgets have heightened pressures for reform. In practice, many OECD countries have launched reforms to contain public spending on health care and some intend to cut it.[2]

Defining efficiency: the concept and three approaches

Measuring efficiency in health care spending is concerned with a comparison of inputs with outputs or outcomes of the health care system to assess the degree to which goals are achieved while minimising resource usage (Figure 2.1). As discussed above, preference is given in this book to outcomes in measuring efficiency since outputs are often poor proxies for the impact of medical treatments on health.

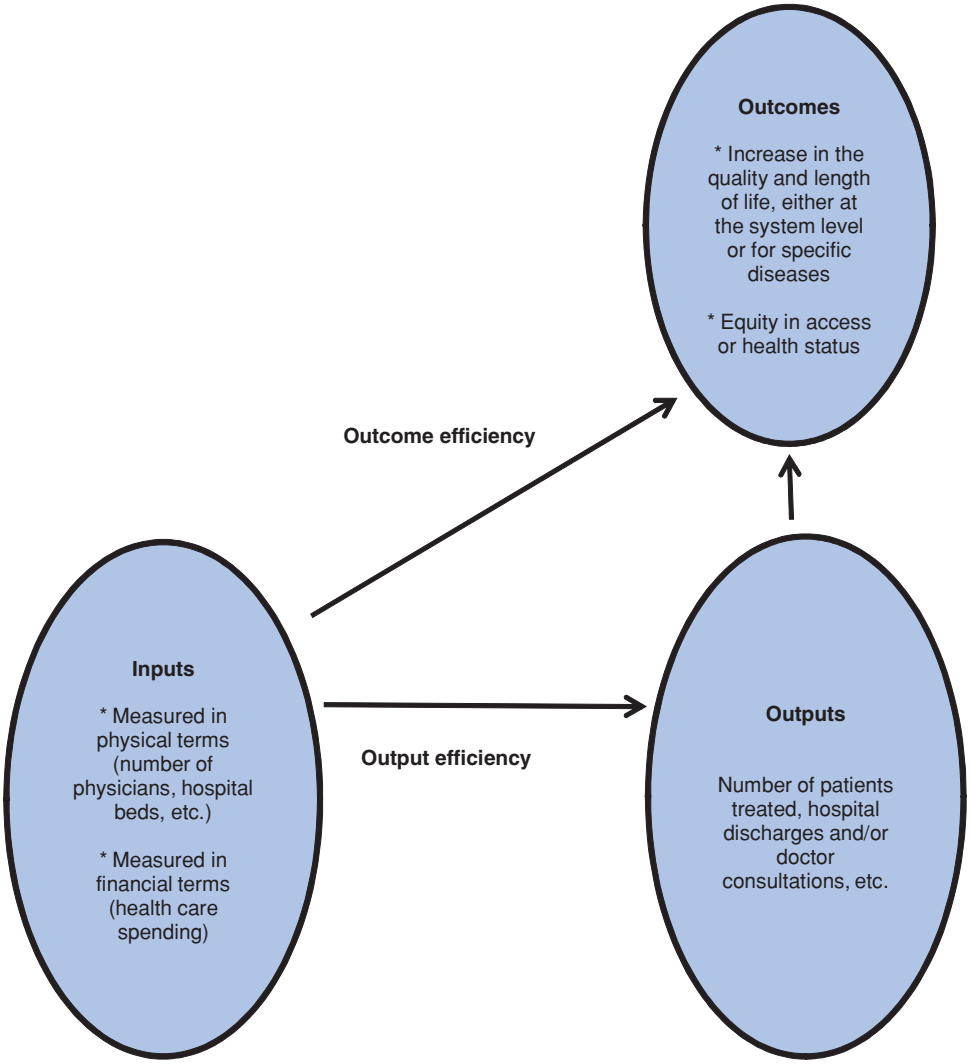
Efficiency measures could, in principle, be assessed at three levels: the disease, sub-sector and system level. The disease level approach focuses for each disease on the gains in health status brought by the health care system. The sub-sector approach focuses on the gains brought specifically by hospitals, out-patient care and pharmaceuticals while the system level approach relies on a holistic view. The pros and cons of each approach will be briefly reviewed below, with a particular focus on data availability and quality to draw international comparisons.[3]

1. Spending on health care partly reflects the demographic structure of the population (see Annex 2.A1, Figure 2.A1.1).

2. In Greece, for instance, prices of pharmaceuticals were reduced in March 2010 by 3 to 27%, depending on their initial price, while in Ireland the government negotiated a cut of 40% in the price of nearly 300 widely prescribed medicines. The Netherlands envisages raising the maximum amount of out-of-pocket payments while in Spain, wages of health practitioners in the public sector have been cut by 5% in 2010 and will be frozen in 2011.

3. Häkkinen and Joumard (2007) provide a detailed discussion of the pros and cons of carrying out cross-country analysis in health care efficiency at a system, sub-sector and disease levels.

Figure 2.1. **From health care inputs to outputs and outcomes**



Source: OECD.

The disease-level approach is conceptually attractive but data limitations are severe

The disease-level approach focuses on the cost-effectiveness of medical treatment for specific diseases. It is attractive because it focuses on health gains due to specific treatments (*i.e.* outcomes, measured most frequently in terms of survival rates or additional quality-adjusted life years, QALYs, see Box 2.1). Work has been carried out to estimate how many QALYs health care interventions produce when treating, for example, strokes or acute myocardial infarctions (AMI). The disease-level approach may also serve to allocate money across health care programmes, based on their impact on the health status measured with a common metric. The cost per QALY is, for instance, used as a cost-effectiveness indicator by the British National Institute for Health and Clinical Excellence (NICE) to assess new technologies. International comparisons may help

identifying country-specific weaknesses and thus areas where policy reforms may be most rewarding. As an example, breaking down data on amenable mortality by disease group shows that Japan performs very well in international comparison in most domains with the main exception of respiratory diseases. Similarly, Korea, Mexico, Portugal and the United States underperform in the treatment of infectious diseases.

Box 2.1. **Measuring health-related quality of life (QALYs and DALYs)**

QALYs (Quality-Adjusted Life Years) and the related DALYs (Disability-Adjusted Life Years) are often used to assess the benefit of a medical intervention, and thus its cost-effectiveness (Sassi, 2006; Robberstad, 2005). Typically, the benefit is measured by the number of years of life that would be added by the intervention. It combines length of life with health-related quality of life (HRQoL) into a single index – the QALYs, or DALYs. Each year of perfect health is assigned the value of 1, down to a value of 0 for death. If the extra years would not be lived in full health, for example if the patient would be blind, then the extra life-years are given a value between 0 and 1. The "weight" values between 0 and 1 are usually determined through population surveys by methods such as:

- The time trade-off. Respondents are asked to choose between remaining in a state of ill health for a period of time, or being restored to perfect health, but having a shorter life expectancy.
- The standard gamble. Respondents are asked to choose between remaining in a state of ill health for a period of time, or choosing a medical intervention which has a chance of either restoring them to perfect health or killing them.

The weight assigned to a particular condition can thus vary greatly, depending on the method and population surveyed. Those who do not suffer from the affliction in question will tend, on average, to overestimate the detrimental effect on the quality of life, while those who are afflicted have come to live with their condition. Furthermore, there are many instruments available for measuring HRQoL (EuroQuol, 15d, Health Utility Index, SF-6d) and their use varies across countries.

The cost-effectiveness of a treatment can be assessed by the cost per QALY or DALY. For example, a cancer treatment which costs $10 000 and on average gives the patient two extra years of full health costs $5 000 per QALY. Assessing treatments in this way avoids the difficulties associated with putting a monetary value on life. The approach has, however, been criticised (Prieto and Sacristán, 2003). For example, it has frequently been suggested that the social value of health status may not just be the simple sum or unweighted average of individual preferences obtained using techniques such as the standard gamble or time trade-off. In addition, QALYs and DALYs rely on the assumption that the younger the age at which a life is prolonged, the greater the value of the treatment. This may be a reasonable ethical rule and the return on the investment which the treatment represents will likely be higher for someone with greater life expectancy. This, however, may not be a reason for attributing a higher value of the treatment as such, particularly when drawing cross-country comparisons of effectiveness.

Implementing a disease-level approach for measuring efficiency across countries is, however, plagued by severe data constraints. On the *input* side, internationally comparable data are currently not available at the disease level. Even when register-based data are available for in-patient care, the lack of information on ambulatory care practices and pharmaceutical consumption makes it difficult to fully document a care episode (Heijink and Renaud, 2009). On the *outcome* side, except for the preliminary data on amenable mortality recently developed at the OECD, comparable cross-country data by disease are seldom available. Data for QALYs exist for only a few countries and a few

diseases. Furthermore, cross-country comparisons are made difficult by the absence of a common framework applied consistently across countries to measure QALYs. In addition, QALYs may fail to account properly for the impact of preventive care, not least because it takes time to deliver their full benefits. Thus QALYs could be used to inform on the health gains stemming from health care interventions once patient are sick, but less on those gains resulting from avoiding that people become sick in the first place. Overall, deriving cross-country efficiency estimates at the disease level, except for a few specific illnesses and a very limited number of countries, is currently impossible.

The sub-sector level approach mostly focuses on hospitals and output measures

Several empirical studies on efficiency have been carried-out at the sub-sector level, and for the hospital sector in particular.[4] The sub-sector approach has the advantage of focusing on more homogenous activities and lends itself to drawing sector-specific policy recommendations. Patient mobility and the increasing use of activity-based payment systems for hospitals have created new impetus for comparison both at the domestic level (see for instance Berta *et al.*, 2010; Or *et al.*, 2009) and international level (*e.g.* Busse *et al.*, 2008, Erlandsen, 2007). In most cases however, these studies rely on output-related efficiency measures, such as the number of hospital treatments in relation to their costs and/or the number of consultations per physician. This largely reflects the difficulties in defining and measuring outcomes at the sub-sector level, not least because disentangling the impact of drugs, in-patient and out-patient care on health is extremely challenging. Co-ordination across sub-sectors is often key to the success and effectiveness of medical treatment.

For those studies relying on output-related efficiency at the sub-sector level to draw cross-country comparisons, a key challenge is to account for the patient case-mix. Progress in this area has been more rapid in the hospital than in other sub-sectors of the health care system (ambulatory care and pharmaceuticals). For example, hospital output in early studies was typically measured by the number of bed days, admissions or discharges, while the patient case-mix was captured only in a crude way (*e.g.* by adjusting for the number of surgical *versus* non-surgical patients). The development of patient classification systems has significantly improved the scope for adjusting aggregate output measures for case severity. Indeed, an increasing number of countries use Diagnostic-Related Groups (DRGs) which assign patients into clinically and economically homogeneous groups according to patients' diseases, clinical procedures and patient-demographic factors.

Existing studies on costs for standard hospital treatments show that cross-country variations are large.[5] As an illustration, the study by Erlandsen (2007) on 10 OECD countries suggests that the potential savings in the case of laparoscopic cholecystectomy (a non-invasive method for removal of the gall bladder) would stand between about two-thirds for the country having the highest unit costs in relation to the benchmark country to less than 5% for the second most efficient. Based on a survey in nine EU

4. See Hollingsworth (2007) and Hussey *et al.* (2009) for a review.

5. Erlandsen (2007) derives unit costs for seven standard hospital treatments, including coronary bypass and vaginal delivery. Bellanger and Or (2008) draw cross-country comparisons for child delivery, while noting that hospital costs are not independent of supplementary home care provided outside hospitals. Busse *et al.* (2008) summarise results for ten in-patient and out-patient cases (so-called "vignettes").

countries, Stargardt (2008) finds that the cost of primary hip replacement was more than six times higher in the Netherlands than in Hungary. And for the same countries, Bellanger and Or (2008) present similar cost differences for child delivery between Germany and Hungary.

Cross-country comparisons based on output-efficiency studies are plagued by important limitations. In particular, on the input side, countries may not use comparable methods to allocate overheads and the cost of capital. In addition, selected care episodes often capture only part of the care pathway. On the output side, cross-country comparability of the measures based on DRGs is far from perfect, potentially creating an important bias. Furthermore, the lack of information on the quality of care and, more generally, on the impact of medical treatment on the population health status significantly reduces cross-country comparability. Also, individual medical outputs may be produced efficiently but still have only a very limited impact on the health status of the population if they are not allocated adequately. In addition, these approaches focus mostly on treatment costs, while neglecting prevention policies which could be more effective in improving the population health status.

The system-level approach is a second best

Data limitations at the disease and sub-sector levels as well as conceptual issues clearly push in favour of a system level approach, with a focus on the population health status as the outcome and total spending as a key input. Data on inputs for the system level approach are widely available in OECD Health Data. Mortality and longevity data are imperfect proxies of the population health status but appear to be reasonably well correlated with those adjusted for the prevalence of disease and quality of life. In addition, the system level approach is the only one which naturally accounts for the interactions and co-ordination between sub-sectors and resource allocation across them. This will thus be the main approach followed in this book, as in the 2000 *World Health Report* (Box 2.2). Performance information based on a sub-sector and disease level approach will, however, be used to complement the system-level approach when possible.

Health status determinants: accounting for lifestyle and socio-economic factors

Accounting for the impact of lifestyle and socio-economic factors which affect the population health status is required when implementing the system-level approach based on mortality and longevity indicators. As noted above, these indicators are numerous and deliver a broadly consistent picture, and accounting for the prevalence and severity of diseases does not change dramatically the relative position of countries. The main drawback of mortality and longevity indicators, however, is that they do not reflect only medical care; lifestyle and socio-economic factors likely play a key role. The following section proposes an approach to take due account of these factors.

Most previous analyses have adopted a production-function approach

The health status of a population can be seen as determined by a combination of health care resources, lifestyle and socio-economic factors. This "production-function approach" has been adopted frequently in the literature to assess the role of several factors on life expectancy or other health status variables, both over time for specific countries and/or across countries or sub-national governments – *e.g.* states in the

United States, Canadian provinces and Brazilian municipalities (Annex 2.A2 provides a snapshot of existing empirical work).

A rather wide consensus on the main factors (inputs) shaping the population health status emerges from previous analyses. These include:

- *Health care resources per capita*. Most empirical work has included some health care resource variable, though specifications differ greatly. Health care resources can be measured in monetary terms (health care spending) or in physical terms (number of doctors in most cases, with capital goods such as the number of hospital beds and scanners accounted for in a few studies). Some studies restrict the analysis to the share of health care spending financed by the public sector (as opposed to total spending). A few others focus on specific health spending components, in particular pharmaceuticals (*e.g.* Miller and Frech, 2002; Shaw *et al.,* 2002).
- *A vector of lifestyle factors*. Empirical analyses have usually included the consumption of tobacco and alcohol, as well as some proxy for diet (consumption of fat, sugar, calories, or fruits and vegetables, or several of these).
- *A vector of socio-economic factors*. Income *per capita*, education and pollution are the socio-economic factors most frequently included in empirical work. Other factors such as poverty, urbanisation, income distribution, unemployment, ethnic origin and/or religion, and occupational status, are also included in a few studies.

Institutional features have been considered as inputs to health status in very few empirical studies. Some researchers have introduced time-invariant dummies; others have selected specific aspects with time series data often derived from OECD Health at a Glance.[6] Including health care institutions into the health production function, however, raises methodological and conceptual issues. *First*, cross-country comparable data on institutions are seldom available, in particular over time, though the OECD has recently produced health policy indicators for 2008 for 29 OECD countries (Chapter 3 of this book). In this context, the empirical analysis has to be carried out on a cross-country or cross sub-national government basis and often on a very small number of observations. Empirical results may thus lack robustness. *Second*, the dummy approach may not be satisfactory. For instance, there are no pure integrated health care systems, nor pure social security systems. *Third*, choosing one individual institutional feature may be questionable since there is no firm consensus on the features that matter most for health spending effectiveness. Interaction effects across institutions may also play an important role. For all these reasons, institutional features have not been included in the estimated production function.

6. Examples include: insurance *versus* integrated national systems (Elola *et al*., 1995), insurance coverage of the population (Nixon and Ullman, 2006), share of public spending (Berger and Messer, 2002).

Box 2.2. **The 2000 WHO study on the effectiveness of health care systems**

In 2000, the World Health Organisation (WHO) undertook a major effort to measure whether health systems in WHO member states achieve various goals and how efficiently they are using their resources (Murray and Evans, 2003; WHO, 2000). The main features of this work are as follows:

Two outcome measures for the health care system were built for 191 countries:

- The average health status of the population was measured by a simple indicator, the Disability-Adjusted Life Expectancy (DALE). DALE aims at measuring the life expectancy of the population taking into account a "qualitative" deterioration in life caused by disabilities due to illness, injuries and/or accidents.
- A composite index made up of five components: the average level of health status (measured by the country's DALE overall); inequalities in health status (measured by the dispersion in child survival rates); average degree of responsiveness of the health care system (measured by a composite index made up of various sub-indicators for the respect of dignity, confidentiality, choice of provider, etc.); inequalities in responsiveness; and fairness of financial contribution. The five goals were aggregated on the basis of weights derived from a survey of 1 006 persons. Approximately half of the respondents were WHO's own staff while the other half consisted of people who had visited the WHO web site.

The "efficient frontier approach" was used for measuring country effectiveness

Individual countries' effectiveness scores were derived with inputs measured in financial terms (health care spending *per capita* converted with economy-wide PPP exchange rates). The average years of schooling for the population aged over 25 was considered as another important input to be accounted for in estimating the production function. Stochastic frontier methods (as opposed to deterministic frontier approaches such as with data envelopment analysis) were used since random unobserved factors and measurement problems were perceived to be important. Countries were then ranked according to their effectiveness.

The philosophy and methodology of the WHO's work have led to considerable discussion

The WHO methodology has raised various concerns. The *use of composite indicators* for assessing health care system performance has been criticised on several grounds. First, by aggregating measures of various aspects of performance, a composite indicator may disguise serious failings in certain parts of the health care system. Second, it may make it difficult to identify factors responsible for poor performance and therefore what remedial action to take. Third, the methodology used to derive the weighting system for the sub-indicators is questionable. Fourth, the weights used in composite indicators reflect a single set of preferences. Differences in countries' policy priorities may be important.

In addition, it was felt that the determinants of health-system performance were too complex to be captured within a traceable statistical model, particularly in view of the poor quality of the data. The production function used was also criticised for not recognising the important time lags that exist in producing health outcomes (See Anand *et al.*, 2003 for more detail).

WHO researchers responded to many of these criticisms (Murray and Evans, 2003). The Scientific Peer Review Group (Anand *et al.*, 2003) suggested that there was a case for continuing the WHO work in the efficiency area, but as an ongoing research programme rather than providing a definitive judgment on health systems and country rankings. They also proposed some new analysis including a second-stage analysis (Evans *et al.*, 2003),

which explores whether exogenous factors, such as institutional quality, income distribution, population density, etc., have an impact on effectiveness. The WHO activity on benchmarking health system effectiveness had, however, come to a standstill for several years. In 2008, the WHO European Ministerial Conference on Health Systems decided to develop tools to improve performance assessment of health care systems – the Tallin Charter (WHO, 2009).

Health care spending largely drives changes, and cross-country differences, in health status

Panel regression results provide estimates of the impact of the factors identified above on health status proxies, both over time and across countries (see more details in Annex 2.A3). Life expectancy at birth has increased by 2½ and 3½ years for females and males, respectively, on average in the OECD since the early 1990s. Over the same period, all of the health determinants have moved favourably. The consumption of tobacco and alcohol has declined; air pollution has been curtailed; educational achievement and income *per capita* have increased steadily and health care resources *per capita* have been raised dramatically.[7] Econometric results suggest that a gain in life expectancy at birth of slightly more than one year for both females and males could be attributed to the increase in health care spending *per capita* (Table 2.1). Differences in spending would also seem to be the single most important factor explaining differences in health status across countries, though other factors also play important roles (Table 2.2).

The remainder of this section briefly justifies the selection of inputs as well as their measurement, and provides a more detailed discussion of the empirical results.

Lifestyle factors: tobacco, alcohol and diet

Tobacco is the second major cause of death in the world and is directly responsible for about one in ten adult deaths worldwide according to the 2002 *World Health Report*. Influenced by public awareness campaigns, smoking prohibition in public areas and in the workplace, advertising bans and increased taxation, tobacco consumption has declined steadily in most OECD countries since the early 1980s (Figure 2.2), in particular in Australia, Canada, France, New Zealand, the United Kingdom and the United States, where consumption has more than halved. However, disparities in tobacco consumption across countries remain large, with heavy smoking in the Czech Republic, Greece and Japan. The empirical results are consistent with tobacco being a major determinant of the

7. The increase in health care spending partly reflects the ageing of the population (see Oliveira Martins and de la Maisonneuve, 2006 and Figure 2.A1.1).

population health status, in spite of measurement problems for tobacco consumption and the difficulty to account for time lags through which tobacco consumption affects health. A gender dimension further emerges: both the coefficient and significance of tobacco consumption are higher for males than females for the period under consideration.[8]

Table 2.1. **Contributions of main explanatory variables to changes in health status**

1991-2003

	Gains in life expectancy				Decline in infant mortality rate	*Memorandum item:* 1991-2003 changes
	At birth		At 65			
	Female	Male	Female	Male		
Explained by[1]:	*Years*				*Deaths/1 000 live births*	*Per cent*
Health care spending	1.14	1.34	0.38	0.37	- 2.53	51.7
Smoking	0.00	0.12	0.09	0.21	- 0.21	- 22.6
Alcohol	0.06	0.07	0.02	0.00	- 0.24	- 6.7
Diet	0.02	0.02	0.02	0.03	0.03	7.4
Pollution	0.15	0.29	0.15	0.22	- 0.75	- 19.7
Education	0.50	0.49	0.26	0.14	- 0.89	24.8
GDP	0.11	0.63	0.20	0.39	- 1.01	28.5
Memorandum item:						
Observed changes	2.49	3.45	1.40	1.63	- 4.67	

1. Contributions of health status determinants are calculated using coefficients estimated by the model (panel data regressions on a sample of countries for which data were available). Observed changes in health status are calculated for the OECD area. The sum of identified contributions may thus differ from the actual change in health status measures.

Source: OECD calculations.

Excessive alcohol consumption has numerous harmful health effects.[9] In particular, it increases the risk for heart stroke and vascular diseases, as well as liver cirrhosis and certain cancers. Alcohol consumption has fallen in many OECD countries since the early 1980s but some countries are standing out – consumption has increased sharply in Ireland up to the early 2000s and more mildly in most of the Nordic countries. The empirical results suggest that differences in alcohol consumption can help to explain a gap in life expectancy at birth of up to 1.8 years between low-consumption countries (such as Turkey) and high-consumption ones (including France, Hungary and Ireland).

8. Estimates are quite stable when changing the measure of health care resources (*e.g.* total spending *versus* number of physicians and nurses). Changing the measure of tobacco consumption to the share of daily smokers also produces similar results: a 10% cut in the share of adult population smoking daily would result in a 1½ to 2½ per cent decline in premature mortality. These estimates are broadly in line with previous studies (see for instance Berger and Messer, 2002; Crémieux *et al.*, 1999 and Or, 2000*a*). When a gender-specific tobacco variable is introduced (share of smoking persons), the coefficient for females becomes highly significant but remains lower than for males, probably reflecting that females tend to smoke less heavily than males.

9. Although a moderate consumption of alcohol may, according to some studies, have beneficial impacts on health, high consumption is detrimental.

Table 2.2. **Contributions of main explanatory variables to cross-country differences**

Differences in life expectancy at birth between countries and the OECD average for each variable, expressed in years, 2003

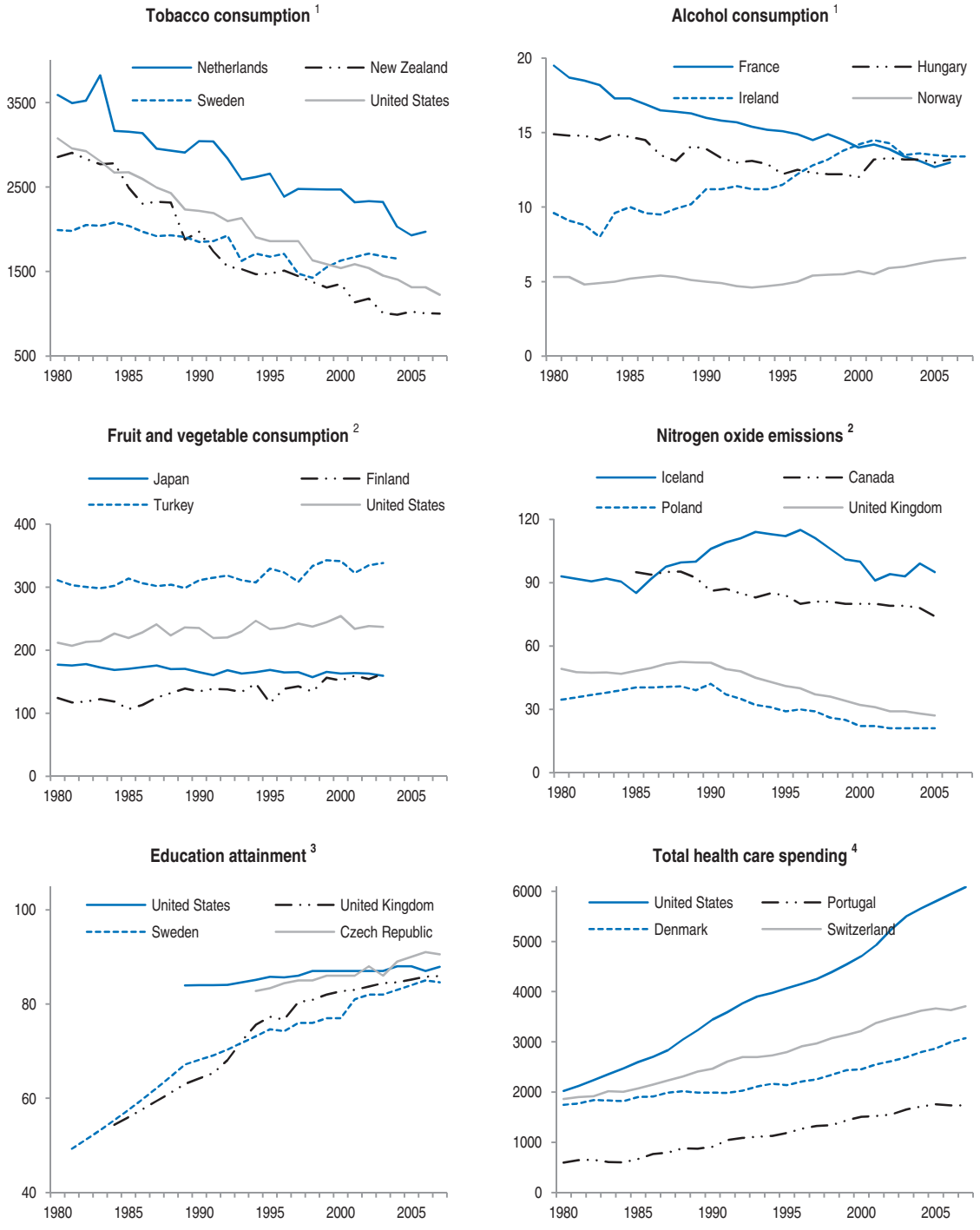
	Life expectancy at birth	Determinants							
		Spending	Education	Tobacco	Alcohol	Diet	Pollution	GDP	Country-specific effect[1]
Australia	2.2	0.7	-0.3	0.1	-0.1	0.0	-0.9	0.2	2.5
Austria	0.8	1.0	0.2	0.0	-0.2	0.0	0.1	0.3	-0.7
Belgium	0.8	0.8	-0.3	0.0	-0.2	0.0	0.1	0.2	0.2
Canada	1.8	0.9	0.4	0.1	0.1	0.0	-0.8	0.3	0.9
Czech Republic	-2.7	-1.8	0.5	-0.1	-0.3	-0.1	0.0	-0.6	-0.3
Denmark	-0.5	0.7	0.3	0.0	-0.2	0.0	-0.2	0.3	-1.5
Finland	0.5	-0.2	0.1	0.2	0.0	-0.1	-0.3	0.2	0.5
France	1.3	0.9	-0.2	0.0	-0.3	0.0	0.4	0.2	0.4
Germany	0.6	0.8	0.4	-0.1	-0.1	0.0	0.5	0.1	-1.0
Greece	0.9	0.3	-0.7	-0.2	0.0	0.2	0.0	0.0	1.3
Hungary	-5.6	-2.0	0.1	0.0	-0.3	0.0	0.5	-0.8	-3.1
Iceland	3.1	1.1	-0.2	0.0	0.3	-0.1	-1.0	0.3	2.6
Ireland	0.3	0.3	-0.3	0.0	-0.4	0.0	0.1	0.4	0.2
Korea	-0.6	-2.4	0.1	0.0	0.0	0.1	0.3	-0.4	1.7
Netherlands	0.6	0.6	-0.2	-0.1	-0.1	0.0	0.3	0.3	-0.3
New Zealand	1.5	-0.6	0.2	0.1	0.0	0.0	-0.5	-0.1	2.3
Norway	1.5	1.8	0.5	0.1	0.3	0.0	-0.3	0.7	-1.5
Poland	-3.4	-3.5	0.3	0.0	0.1	-0.1	0.4	-1.1	0.5
Sweden	2.1	0.6	0.3	0.0	0.2	0.0	0.3	0.2	0.5
Switzerland	2.5	1.5	0.4	-0.1	-0.2	0.0	0.9	0.3	-0.4
Turkey	-7.4	-4.5	-2.3	-0.1	1.5	0.1	0.7	-1.9	-1.0
United Kingdom	0.5	-0.1	0.4	0.1	-0.2	0.0	0.1	0.2	0.0
United States	-0.5	2.9	0.5	0.0	0.0	0.0	-0.6	0.6	-4.0
Memorandum items:									
Maximum range	10.5	7.4	2.8	0.4	1.8	0.3	1.8	2.5	6.6
Estimated coefficients		0.041	0.030	-0.004	-0.011	0.004	-0.012	0.019	

1. The country-specific effect is calculated as the sum of the country fixed-effect plus the residual of the equation.

Source: OECD calculations.

A healthy diet is widely recognised as a major factor in the promotion and maintenance of good health. Diets can be proxied by several variables and, in this empirical work, the consumption of fruits and vegetables has been given preference. Low intake of fruits and vegetables is estimated by the WHO to be one of the main risk behaviours in developed countries and, in particular, to cause about 31% of the occurrence of ischemic heart disease, 11% of strokes and 19% of gastrointestinal cancers (*World Health Report*, 2002). The consumption of fruits and vegetables has tended to increase over the past two decades in most OECD countries (Japan and Switzerland being the main exceptions). However, cross-country differences remain very wide – most Mediterranean countries and Korea being best placed while Eastern European countries, Japan and most Nordic countries are located at the other extreme. The empirical work undertaken here finds a limited impact of the consumption of fruits and vegetables on life expectancy in some specifications. But its impact on premature and infant mortality is often insignificant or even goes in the wrong direction. The difficulty of accounting for time lags could partly explain the rather weak link between diet and health status.

Figure 2.2. **Trends in health status determinants – selected OECD countries**



1. Grams or litres *per capita* for people aged 15 and over.
2. Kilos *per capita*.
3. Per cent of population aged 25-64 years with at least upper secondary educational level (*i.e.* up to ISCED categories 3-4).
4. Total expenditure on health care *per capita* in real terms, US dollars 2000 PPP.

Source: OECD Health Data 2009.

Socio-economic factors: pollution, education and income

The impact of water, soil, noise and air pollution on health is increasingly recognised (OECD, 2008*b*). Partly reflecting limited data availability, *per capita* emissions of nitrogen oxide (NOx) have been used as a proxy for pollution. By contributing to the formation of fine particulate matter, NOx emissions aggravate respiratory illness and cause premature death in the elderly and infants. They also play a major role in the formation of ground-level ozone (smog).[10] On high ozone days, there is a marked increase in hospital admissions and visits for asthma and other respiratory illnesses. Since the early 1990s, however, NOx emissions *per capita* have declined in many OECD countries, partly reflecting technological improvements of combustion processes, in particular in power production and vehicle engines, and policies aimed at reducing NOx emissions (*e.g.* Canada, European Union). The empirical work suggests that this has contributed to improve the population health status – the relation between air pollution, as defined by NOx emissions, and health status is consistently negative and rather robust to changes in model specifications.[11]

Although the strong relation between health and education is well established, the direction of causality is still debated and may well be both ways. Better health is associated with higher educational investment, since healthier individuals are able to devote more time and energy to learning. Because they live longer, they also have a greater incentive to learn since they have a higher return on human capital. On the other hand, education causes health if better-educated people use health care services more effectively – they tend to comply better with medical treatments, use more recent drugs and better understand discharge instructions.[12] Education, as measured by the share of population aged 25 to 64 with an upper-secondary degree or higher, has been increasing steadily in particular in most of the countries with the lowest levels in the early 1980s (*e.g.* Belgium, Greece and Spain; Mexico, Portugal and Turkey being notable exceptions to this catch-up process). The current empirical work suggests that education contributes significantly to health, over and above its impact on lifestyle factors, and explains a large part of cross-country differences in health status.

The level of income is even more correlated with the population health status across OECD countries than education. Higher GDP *per capita* affects health by facilitating access to many of the goods and services which contribute to improving health and longevity (*e.g.* food, housing, transportation), over and above those specifically accounted for by the model (in particular education and health care resources). The relation between GDP *per capita* and health may also reflect working conditions – richer countries tend to

10. Smog is formed when NOx and volatile organic compounds combine in the presence of heat and sunlight.

11. Country-specific effects of NOx emissions should be interpreted with caution due to their transborder impact, *e.g.* smog being transported by the wind from one country to another. Iceland is a particular case in point, as the rather substantial NOx emissions from its fishing fleet do not directly affect Icelanders themselves.

12. Education may also affect health through lifestyle factors, as better educated people tend to adopt healthier lifestyles (*e.g.* smoke less, exercise more, etc.). Since lifestyle factors are controlled for separately in the equation, they should not be the explanation for the impact of education on health in the model. Useful references on the relationship between health and education include: Becker (2007), Cutler *et al.* (2005), Cutler and Lleras-Muney (2006), Feinstein *et al.* (2006) and Grossman (2004).

have a higher share of service activities, which are considered to be less health-damaging than others such as construction or industrial activities. As with education, the direction of causality has been debated, some arguing that the relationship mainly runs from health to income. This may be particularly true at the micro level (Cutler *et al.*, 2005; Kiuila and Mieszkowski, 2007): healthy people have more time and resources to study and work and they tend to be more productive and earn more. At the macro level, however, the causality likely runs predominantly from income to health, at least in developed countries. The regression results are consistent with *per capita* income being a major determinant of the population health status. These results are not altered when replacing *per capita* income by the share of service employment to address causality issues (between *per capita* income and health spending) and to account for the fact that higher GDP acts on health mainly *via* better working conditions in the larger service sector.

Many other factors are widely believed to have an impact on health status but data paucity has made it impossible to include them. Income dispersion could be considered as a determinant of the health status of a country's population as suggested by several studies.[13] This view, however, has been challenged by other research.[14] While time series are not available, Gini coefficients are available for a few points in time and cross-country correlations between various health status measures and these Gini coefficients are weak. Working conditions and safety standards are also likely to affect health but the lack of internationally comparable data and the complexity of the links between working conditions and health status make it impossible to assess the impact.[15] Broadly similar considerations apply to physical activity and obesity which likely have a significant impact on health status.

Health care resources

While recent empirical studies invariably conclude that socio-economic and lifestyle factors are important determinants of the population health status, the contribution of health care resources has been much debated. Berger and Messer (2002) as well as Or (2000*a* and 2000*b*) conclude that health care resources have played a positive and

13. See for instance Wilkinson (1992), McIsaac and Wilkinson (1997), De Vogli *et al.* (2005). Income inequality could impact health through three main channels: *i)* socio-economic factors: housing and working conditions, education, nutrition, pollution, insecurity; *ii)* psychosocial factors: direct impact of psychological stress on health and risky behaviours, in particular excessive consumption of alcohol, tobacco and bad eating habits; *iii)* inequalities in access to health care. There is some evidence that even health systems that provide universal coverage have not fully succeeded in eliminating social differences in access to health care (see Chapter 4 and Cambois and Jusot, 2007).

14. See for instance Gravelle (1998), Judge (1995), Lorgelly and Lindley (2007) and Mackenbach (2002).

15. Dorman (2000) estimated that the costs of occupational illnesses and injuries (including curative treatment but also lost production and insurance coverage) amounted to approximately 3% of GDP in the United States in 1992 and to several points of GDP in a number of European countries in the 1990s. Incidence rates of occupational illnesses and injuries have been reduced significantly since then but costs are likely to have remained quite large. According to the US Bureau of Labor Statistics, fatal occupational injuries declined from 5.3 to 4.0 per 100 000 between 1992 and 2006, while nonfatal injuries and illnesses dropped from 8.9% to 4.4% over the same period. The role of new work patterns in the evolution of work-related mental illnesses is assessed in OECD (2008*a*). Tengs *et al.* (1995) assess the cost-effectiveness of various life-saving interventions, from safety regulations to various health care activities.

large role up to the early 1990s for a panel of OECD countries. And Crémieux *et al*. (1999) and Soares (2007) reach similar conclusions for Canadian provinces and Brazilian municipalities, respectively. Hitiris and Posnet (1992) and Nixon and Ulmann (2006) both find that an increase in health expenditure *per capita* has an impact on health status, which is statistically significant but quite small. Likewise, Thornton (2002) concludes for the United States that additional medical care utilisation is relatively ineffective in lowering mortality and increasing life expectancy, and thus that health care policy which focuses primarily on the provision of medical services and ignores larger economic and social considerations may do little to benefit the nation's health. Finally, Filmer and Pritchett (1997) as well as Self and Grabowski (2003) find that health care resources have no significant impact on the population health status.[16]

Controversy about the link between health care resources and health status could reflect measurement problems and/or the fact that health-care resources represent too broad a concept, with some components having a more marked impact on health status than others. Special attention has been given to these issues in this study, which tests alternative specifications with different measures of health care resources.

Measuring health care resources in physical terms

Health care resources have first been measured in physical terms, paying special attention to the availability of physicians, nurses, hospital beds and technical equipment. Many previous empirical studies have focused on the number of physicians as a proxy for health care resources.[17] However, this rather restrictive approach is potentially misleading. In particular, nurses also play an important role in providing health care. Furthermore, the ratio of the number of nurses to that of physicians varies widely across OECD countries, partly reflecting differences in the demarcation of roles between the two categories. As an illustration, Australia, Denmark, Hungary, Ireland and Luxembourg all had about three practising physicians per 1 000 inhabitants in 2007. The number of nurses ranged from 6 in Hungary to 15.5 in Ireland (Figure 2.3, Panel A). This argues for including both the number of nurses and the number of physicians into the regressions.

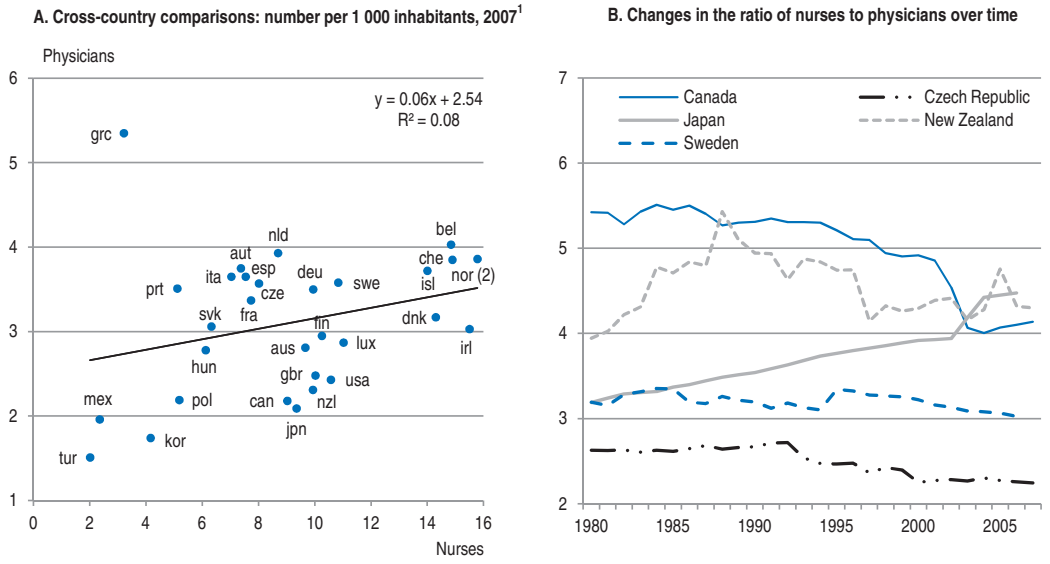
The numbers of nurses and physicians are highly correlated over time – for many countries, the ratio of nurses to doctors hardly changes (Figure 2.3, Panel B). Thus, introducing them separately would lead to unreliable results. Therefore, a human resource indicator has been constructed which accounts for the number of both nurses and physicians: half the number of nurses is added to the number of physicians. The lower weight for nurses is applied in an *ad hoc* way but also reflects the fact that nurses often work on a part-time basis and are assumed to have a lower productivity (as suggested by relative salaries). Regression results for this specification suggest that the number of health practitioners plays a role in health system performance: estimated elasticities of most health status measures with respect to the human resource indicator are highly significant. They indicate that a 10% increase in the number of health practitioners would increase life expectancy at birth by around two months on average in OECD countries.[18]

16. It should be noted that Filmer and Pritchett (1997) and Self and Grabowski (2003) use public health spending instead of total spending and rely on a cross-section analysis.

17. See for instance Crémieux *et al.* (1999), Or (2000*b*) and Retzlaff-Roberts *et al.* (2004).

18. The health status of men tends to be slightly more responsive to health care resources than that of women. This result is at odds with some previous studies suggesting that male health status is much less sensitive to health care resources. This difference could reflect the fact that the

Figure 2.3. **Number of physicians and nurses across countries and over time**



1. 2006 for Australia, Denmark, Finland, Greece, Japan, Luxembourg and Sweden. 2004 for the Slovak Republic.
2. Professional nurses only. In 2007 the number of practising nurses per 1 000 inhabitants in Norway reached 31.9 but half of them were associate nurses.

Source: OECD Health Data 2009.

The role of health capital equipment in shaping health status has also been given special consideration. Cross-country variations in the number of hospital beds and scanners are even higher than in the number of doctors and nurses. When included in the regressions, the number of hospital beds was in most cases not significant or had the wrong sign (implying that a decline in the number of hospital beds improves health status). The ambiguous impact of hospital beds could be related to the development of high-tech health procedures, contributing to shorten the average length of stays. Over the estimation period, the number of hospital beds has declined in many OECD countries, while life expectancy and the overall efficiency of health care resources have been increasing. It may also corroborate some findings that show that hospitalisation for conditions that do not require surgery increases with the supply of hospital beds.[19] The number of scanners is never significant and proxies for health care capital equipment have not been included in the regressions.

Measuring health care resources in monetary terms

Health care resources can also be measured in monetary terms, so as to capture aspects not covered by physical inputs. In particular, health practitioners' remuneration is likely to affect productivity. In practice, the level of physicians' compensation varies greatly across countries and partial evidence suggests that the greater the number of

analysis adjusts premature mortality data to exclude non-health related mortality causes which are more frequent causes of mortality for males than females (see above). In Or (2000*a*), the elasticity of (non-adjusted) premature mortality to the number of physicians was more than four times smaller for men than women.

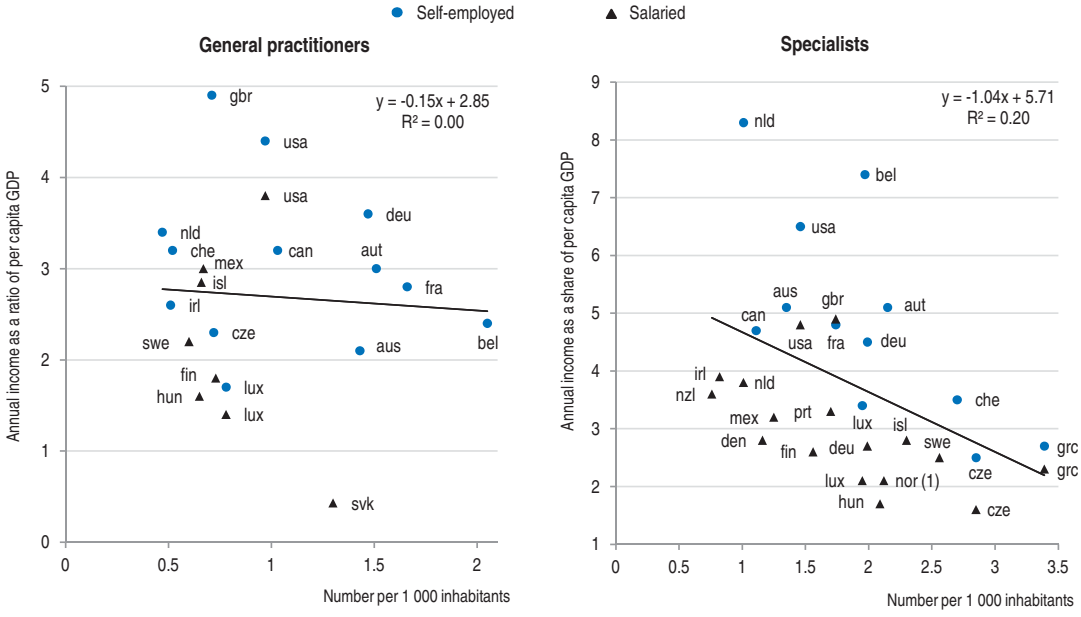
19. Peterson and Burton (2007) provide some references.

specialists the less they are paid (Figure 2.4). The preferred specification thus includes total health care spending, at constant prices and PPP exchange rates instead of health care resources measured in physical terms. The regression results, which are rather robust across model specifications, suggest that a 10% increase in total health spending would increase life expectancy at birth by between 0.3 and 0.5%, *i.e.* by three to four months, on average in the OECD.[20]

Some categories of spending may contribute more to improve the population health status than others. In one of the specifications tested, spending on health care has been broken down into three components: pharmaceuticals, in-patient and out-patient care. It is, however, difficult to isolate their respective impacts since they are highly correlated both across countries and over time.[21]

Figure 2.4. **Density and compensation levels of physicians**

2006 or latest year available



1. Annual income as a ratio of *per capita* mainland GDP.

Source: OECD Health Data 2009.

20. Life expectancy at birth in the OECD area stood at 78.6 years in 2005. The results are broadly in line with those presented by Or (2000*a*) – a spending elasticity of 0.18 for female premature mortality (compared with 0.27 in the current baseline regression) – and Crémieux *et al.* (1999).

21. Countries with high levels of spending on out-patient care also tend to spend more than average on pharmaceuticals. And over time, the ratio between out-patient care and pharmaceutical spending is rather stable for individual countries. Including the three spending components simultaneously into the regression model yields very unstable results, while focusing instead on a specific component is likely to create an upward bias – the selected component may capture the effect of omitted components. Miller and Frech (2002) and Shaw *et al.* (2002) have carried out panel data regressions to study the impact of pharmaceutical spending on the population health status.

In contrast with some previous studies, spending has not been broken down by paying agents (public and private) for two reasons.[22] First, in many countries, a single health care intervention may be paid simultaneously by public subsidies, private insurance and out-of-pocket payments. In these circumstances, it would be extremely difficult to disentangle how public *versus* private spending influences the health status. Second, comparisons across countries and over time could be blurred by tax expenditures, which are not consistently reported but which can be large when identified. In some countries, including the United States, they amount to more than 1% of GDP (Annex 1.A1).

Several reasons call for caution in interpreting the effect of health care spending on the population health status presented so far. These include:

- Elasticity estimates are averages for the population. The increase in spending may not raise life expectancy for the great majority but could raise life expectancy of a few by several years.
- As for most economic activities, health care could be subject to declining returns. Hence, it might prove costly for countries with high health status to improve it further.
- Health care spending over the past decade has partly focused on improving the quality of life, *e.g.* to mitigate pain for sick people, for example with the development of palliative care units.[23] Using mortality data to measuring the impact of health care spending may underestimate the benefits (*e.g.* those related to lower morbidity and/or disability, and better quality of life).
- "How money is spent" is probably as important as "how much is spent" and countries may be quite different in this respect, reflecting a great variety in institutional arrangements.

The rest of this section focuses on the last aspect, proposing an approach to assessing whether health care resources produce the same value for money across countries when due account is taken of differences in lifestyles, income and other health status determinants.

Deriving efficiency estimates from panel data regressions

Performance in transforming health care resources into health status may vary across countries. Panel data regressions can shed light on this relative performance if it is assumed that unexplained differences in health status indicators across countries reflect efficiency differences in the use of inputs. This approach is similar to the one frequently used in growth accounting, where total factor productivity is derived as the residual of an aggregate production function. The implicit assumption is that all the unexplained country-specific effects and residuals reflect inefficiency, and not measurement errors, omitted variables and other factors.[24] Supporting this assumption are the very low

22. Several studies incorporate the share of public versus private funding in total health care financing, including Filmer and Pritchett (1997), Or (2000*a*) and Self and Grabowski (2003).

23. Fogel (2004) argues that the health care system contributes to reduce morbidity (hip replacement, cataract surgery and so on) but not much to reduce mortality.

24. Some authors have used Stochastic Frontier Analysis which aims at disentangling statistical noise from the inefficiency component (Jacobs *et al.*, 2006). Such an approach has not been pursued because the sample was too small to obtain meaningful results.

correlations, if any, between the unexplained differences in health status indicators and recent values of key variables which could not be included in the panel regressions – in particular, income dispersion (as measured by Gini coefficients), obesity and population density.[25] In that context, the relative performance of individual countries has been proxied by focusing on the country-specific effects and residuals, controlling for environmental factors and the amount of inputs. As previously, health care resources have been measured, alternatively, by total spending or by the indicator for the number of health practitioners.

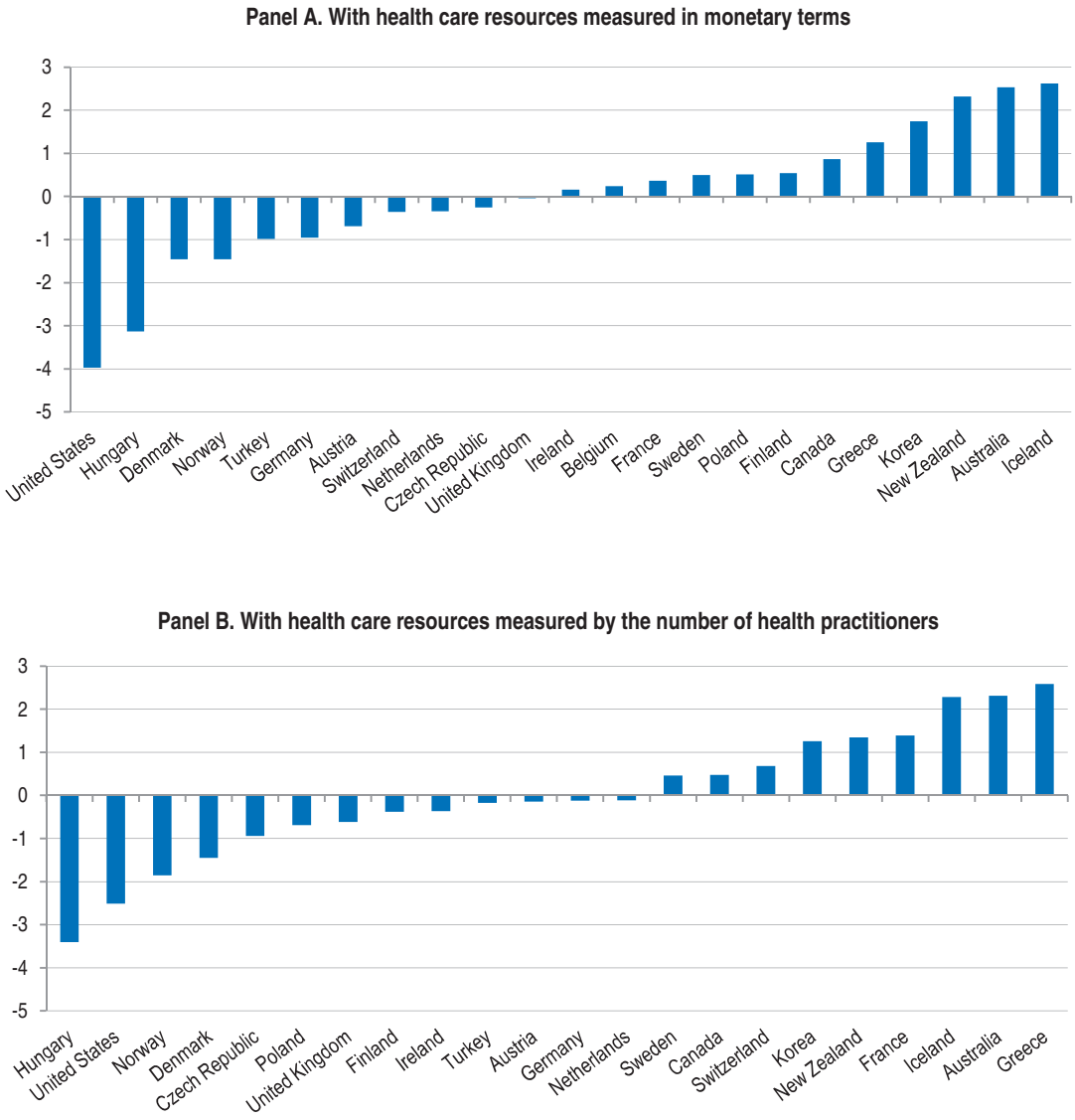
Efficiency estimates are derived from panel regressions. Figure 2.5 displays for each country the residual difference between the actual level of life expectancy at birth and the level accounted for by the model. When measuring health care resources by spending, life expectancy at birth is more than two years above the level predicted by the model for Iceland, Australia and New Zealand (Figure 2.5, Panel A). A broadly similar pattern emerges when measuring health care resources by the number of health care practitioners (Figure 2.5, Panel B). Some countries, however, seem to perform slightly worse when health care resources are measured in monetary terms, including Austria, Germany, Switzerland and Turkey. Apart from spurious influences, differences in results between the two measures could be related to differences in the arrangements and levels of health practitioner compensation and/or to the impact of other health spending components, such as medical equipment or drugs (both through volume and price effects).[26]

25. Health and safety regulations, working and housing conditions and poverty could also play a role but the lack of data constrains the inclusion of these variables in the analysis.

26. Roughly similar country rankings are obtained for life expectancy at age 65, with Spearman rank correlation coefficients exceeding 0.8. Country rankings differ more when focusing on infant mortality, with correlation coefficients ranging between 0.3 and 0.7 (For detailed results, see Joumard *et al.*, 2008).

Figure 2.5. **Panel regressions: years of life which are not explained by the general model**[1]

2003



1. Model residuals and country fixed-effects deviations from averages are added and considered as a proxy for relative efficiency (*i.e.* the years shown in the figure can be viewed as years of life that would be saved (or lost) if country i was as efficient as the OECD average). A Spearman rank correlation of .76 indicates a strong correlation in the ranking obtained by the two panel regressions.

Source: OECD calculations.

Defining an efficiency frontier and measuring the distance to this frontier

Deriving efficiency scores from the DEA: the method

Efficiency estimates can be obtained by defining an efficiency frontier and measuring the distance to this frontier, using Data Envelopment Analysis – a statistical method based on linear programming models (Box 2.3).[27] The shape and location of this efficiency frontier is determined by input and outcome data (Figure 2.6). In a nutshell: a country which spends less on health care to produce the same outcome level can be considered more efficient, for a given set of socio-economic and lifestyle factors.

Three main types of health status determinants have been introduced in the DEA, in line with panel regressions described above:

- Health care spending *per capita* (converted with a GDP PPP exchange rate);
- The socio-economic environment: GDP *per capita* and educational attainment;
- Lifestyle factors: air pollution, consumption of fruits and vegetables, lagged consumption of alcohol and tobacco.

Robustness checks have been carried out by changing the specification, both on the outcome side (replacing life expectancy at birth by life expectancy at 65 or amenable mortality) and on the input side (by replacing health care spending by the number of health practitioners or by alternative input combinations). Bootstrapping has also been implemented to help address sensitivity to measurement errors and statistical noise and to correct the bias resulting from the small sample size. [28]

DEA scores suggest large potential efficiency gains and are fairly robust

Potential efficiency gains, as derived from a DEA, are substantial (Figure 2.7). Life expectancy at birth could be raised by more than two years on average in OECD countries while holding health care spending constant, if all countries were to become as efficient as the best performers. By way of comparison, the panel regression results suggest that a 10% increase in *per capita* health care spending, assuming no reform, would increase life expectancy by only three to four months. The potential for efficiency gains varies widely across countries, from less than one extra year in Australia, Korea and Switzerland to over four years in Denmark, the Slovak Republic, Hungary and the United States. Using life expectancy at 65 as outcome indicators leads to a similar conclusion on margins to improve efficiency. Using amenable mortality would improve the relative position of some countries, most notably France, Greece, Italy and Japan (Figure 2.7, Panel A). It also suggests a less favourable position for some others.

27. Stochastic Frontier Analysis (SFA) is also widely used, in particular to measure hospital efficiency. Its main advantage compared with the DEA is that it allows distinguishing between inefficiency and random disturbances. Implementing this technique, however, requires a larger sample size than the DEA and a prior specification of functional form, including the distribution of errors. Jacobs, Smith and Street (2006) provide a very good summary of the pros and cons of each technique.

28. DEA results are sensitive to measurement errors and statistical noise. Confidence intervals, generated by a bootstrapping method, are shown in Annex 2.A1, Figure 2.A1.2.

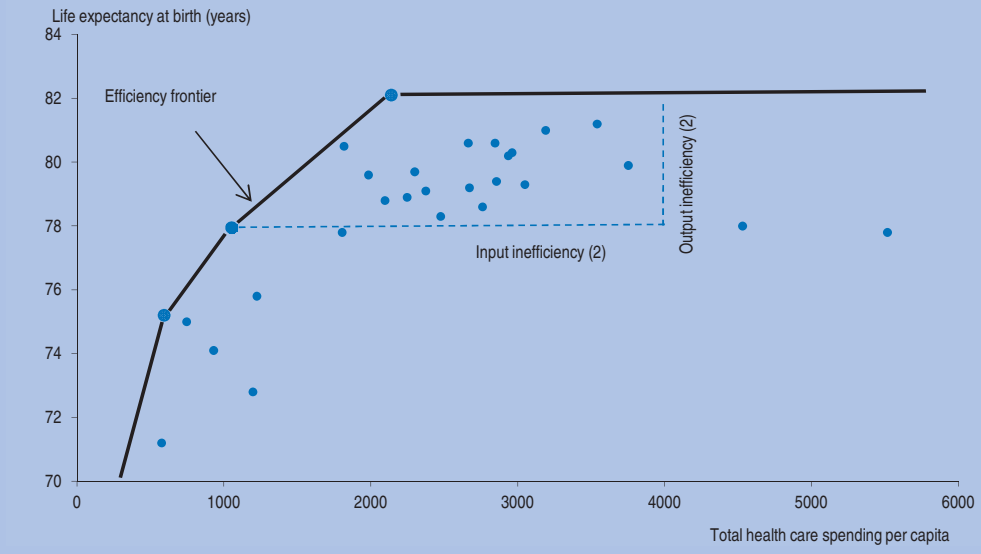
Box 2.3. **Data envelopment analysis: Methodological aspects**

Data envelopment analysis constructs an efficiency frontier and derives efficiency scores for entities/countries involved in a similar production process. An efficient entity is defined as one that cannot improve output without increasing inputs (output-oriented DEA) or cannot reduce inputs without compromising output (input-oriented DEA). By assumption, the frontier linking efficient entities defines best practice and potential efficiency gains for less efficient units are measured by their position relative to the frontier (or envelope).

Potential efficiency gains can be defined in two ways. A graphic illustration with one output (life expectancy at birth) and one input (health care spending *per capita*) is given in Figure 2.6 *i*) the increase in the population health status which could be achieved while holding spending constant (outcome-oriented gains); *ii*) the degree to which spending could be scaled back while holding constant the actual level of health status (input-oriented gains). This book focuses mostly on the first approach.

Figure 2.6. **The efficiency frontier and the measurement of potential efficiency gains**[1]

An illustration based on a scenario with one output and one input



1. The "efficiency frontier" has been designed under the assumption of non-increasing returns to scale.
2. Potential efficiency gains are derived by measuring the distance from the efficiency frontier. They can be defined as the amount by which input could be reduced while holding constant the level of output (input inefficiency) or as the amount by which output could be increased while holding constant the level of input (output inefficiency).

Source: OECD.

Selection of inputs

The health status of the population has many determinants but, given the size of the sample, the number of inputs and outputs needs to be limited in order to obtain reliable DEA estimates. In this study, one output – life expectancy at birth of the total population – and two inputs are included for the main scenario – health care spending *per capita* and a composite indicator reflecting both the socio-economic environment (GDP *per capita*, educational attainment) and lifestyle factors (pollution, diet and lagged consumption of alcohol and tobacco). Since DEA results can be rather sensitive to the set of inputs and outcomes selected, results of alternative inputs are also provided.

Returns to scale

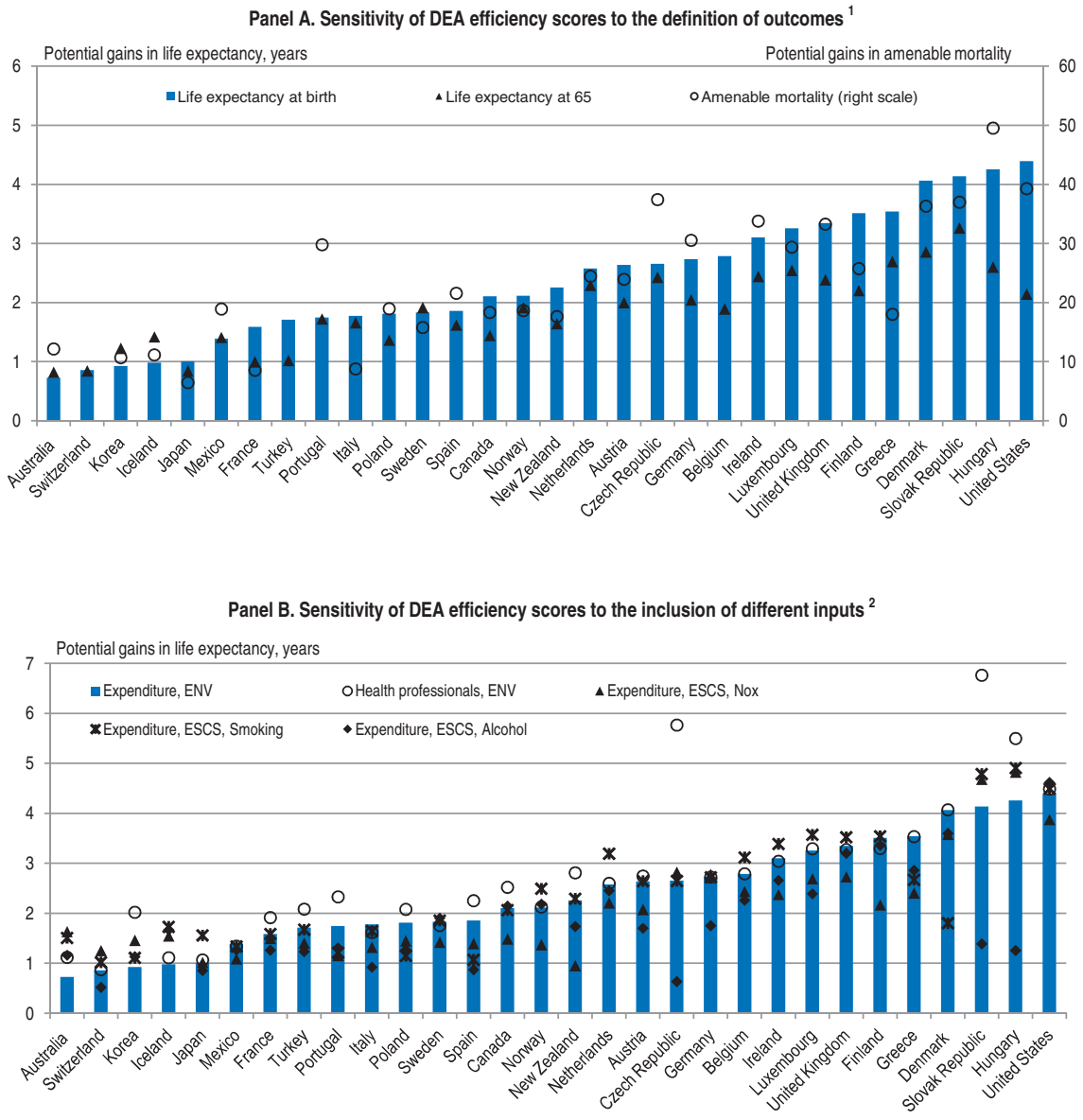
The shape of the DEA efficiency frontier depends on the assumptions about returns to scale. In the production of health, returns to scale are taken as decreasing beyond a certain level.

Correcting for bias and creating confidence intervals

Since the frontier is defined by efficient countries, efficiency scores tend to be biased upwards by possible omissions. The bias has been corrected through "bootstrapping", which is a statistical method for estimating the sampling distribution of an estimator. In addition, the bootstrap provides confidence intervals for the efficiency scores. Computing confidence intervals around DEA scores is important since estimates are sensitive to measurement errors, statistical noise and outliers. However, it should be kept in mind that the reliability of an efficiency score depends on the density of observations in the region of the frontier where a country is located. Countries with atypical levels of inputs and outputs tend to be considered as efficient but this result is merely a consequence of the lack of comparable observations (Simar and Wilson, 2005).

Efficiency estimates are rather robust to changes in both specification and estimation method. Measuring health care resources in volume terms (number of health professionals) also makes some difference for the efficiency estimates (Figure 2.7, Panel B), in particular for those countries where compensation is rather low by OECD standards – in particular the Czech Republic, Hungary and the Slovak Republic. Overall, the picture does not change much when alternative specifications are used. In addition, the DEA and panel regression estimates are rather consistent. Figure 2.8 shows that the two techniques give a broadly consistent picture of the gains, as measured by the number of years of life that could be saved if efficiency were to be raised to the level implied by the estimated efficiency frontier. Australia, Iceland, Korea and New Zealand are consistently among the best performers. At the other end of the spectrum, Denmark, Hungary and the United States consistently score poorly. Using the DEA scores, Finland, the United Kingdom and to a lesser extent Greece appear relatively inefficient, while panel regressions suggest more sanguine conclusions. It should be acknowledged, however, that these two approaches are not fully comparable. In particular, they have not been applied on the same time horizons: the DEA is implemented on a cross-section and thus shows the picture for one year whereas the panel regressions combine cross-section and time series and display averages over the estimation period. And in some countries, for instance the United Kingdom, health care spending *per capita* has risen steeply over the sample period.

Figure 2.7. **DEA efficiency scores are fairly robust to changes in specification**



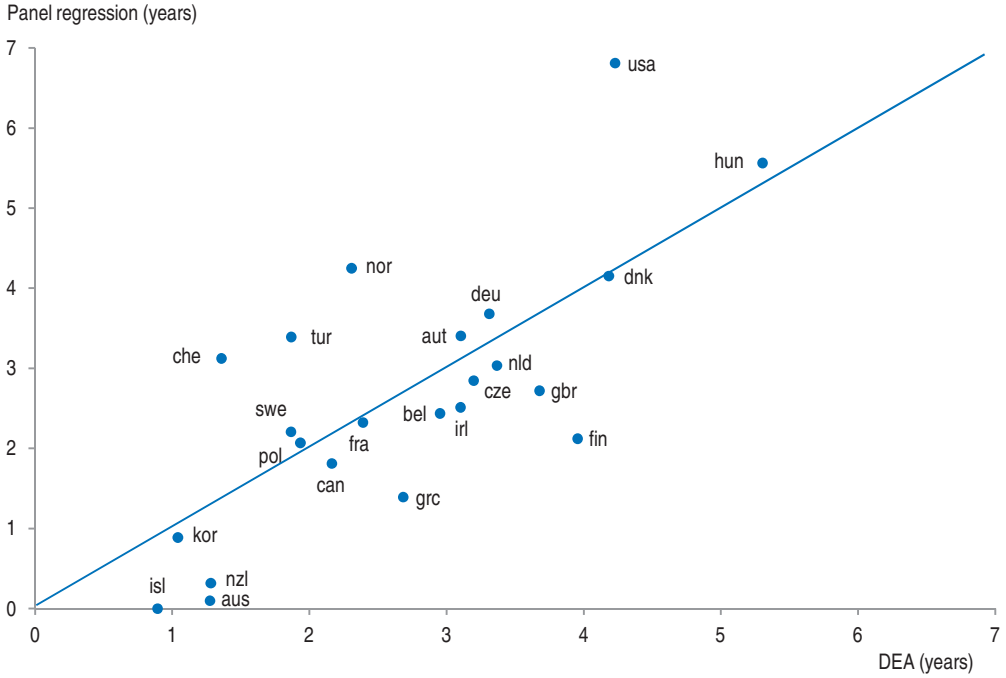
Note: Potential gains are measured either by the number of years of life that could be saved or by the decrease in amenable mortality rates which could be achieved if efficiency in country i were to be raised to the level implied by the estimated efficiency frontier.

1. In this panel, all DEAs were performed with two inputs: health care spending *per capita* and a variable referred to in Panel B as ENV. ENV is a composite indicator of the socio-economic environment (GDP *per capita*, educational attainment) and lifestyle factors (nitrogen oxide emissions, consumption of fruit and vegetables, lagged consumption of alcohol and tobacco – 1990 data). All DEAs refer to 2007 except in the case where amenable mortality rates were taken as the outcome since these are only available until 2003 and for 27 countries.
2. In this panel, all DEAs were performed with life expectancy at birth as outcome. ESCS is an index of economic, social and cultural status derived from PISA 2006. Nox represents nitrogen oxide emissions *per capita*. All data refer to 2007 except in the case of alcohol and smoking, for which 1990 data were used, and for Nox, which is only available until 2005.

Source: OECD calculations; OECD Health Data 2009.

Figure 2.8. **Comparing DEA and panel data regression re3sults**

Potential gains in life expectancy at birth[1]



1. Potential gains are measured as the number of years of life that could be saved if efficiency in country i were to be raised to the level implied by the estimated efficiency frontier (DEA) or were equal to the level calculated for the best performing country (panel regression). To improve comparability, results for both DEA and panel data regression are shown for 2003.

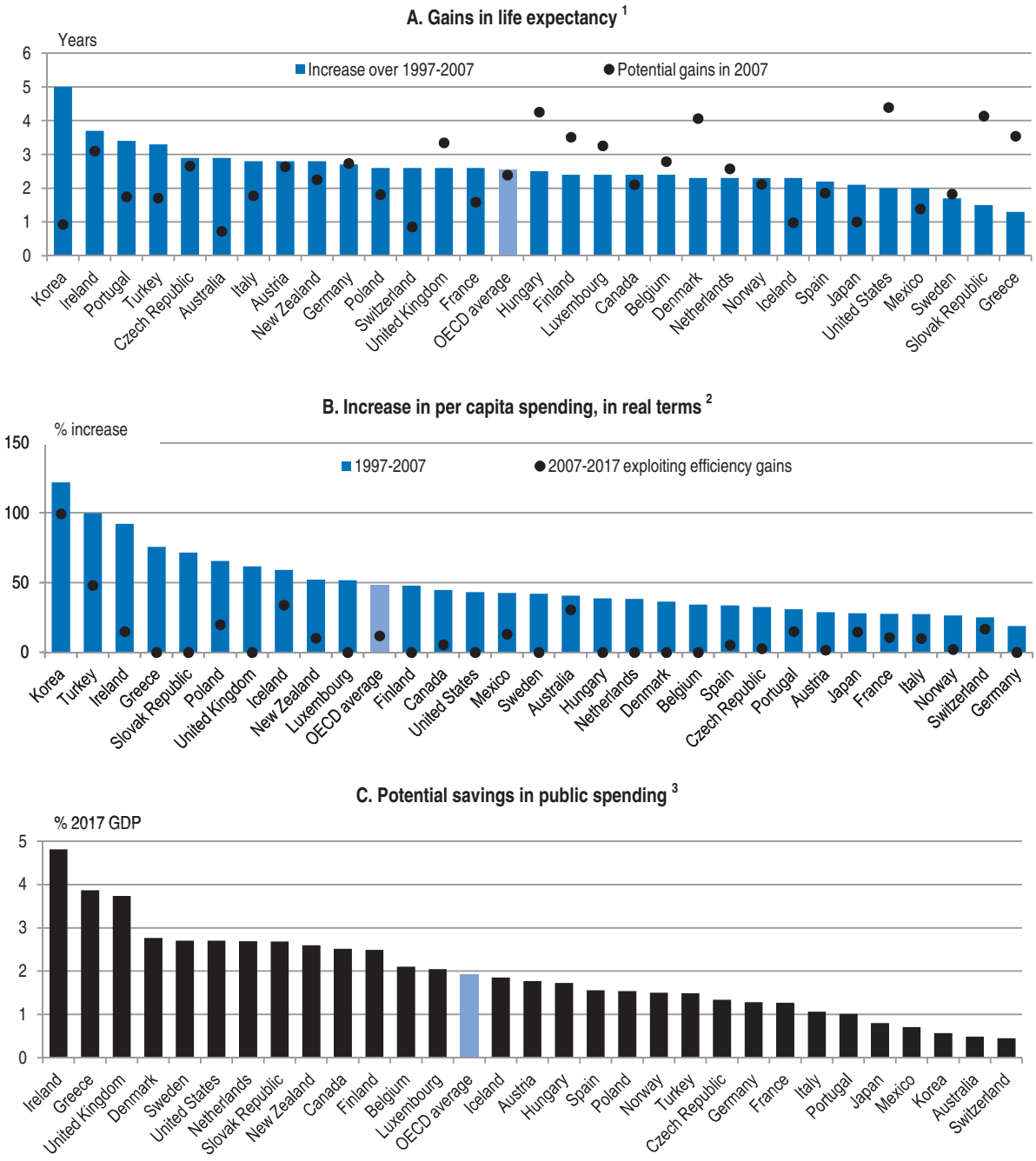
Source: OECD calculations.

Spending could be contained while still allowing for an improvement in health status

Future improvement in health status could partly be financed through efficiency gains and, when needed, by additional spending. In about one third of OECD countries, the increase in life expectancy achieved over the period 1997-2007 is lower than the increase which could be achieved while holding spending constant as estimated *via* the DEA (Figure 2.9, Panel A). For most others, potential efficiency gains are large and reforms could contain spending increases by a considerable margin compared to the no-reform scenario.

The increase in health care spending over the period 1997-2007 was strong and could be contained in the future in most countries. *Per capita* health care spending increased in real terms by over 50% in ten countries, and most notably in Greece, Ireland, Korea and Turkey. Based on a set of simplifying assumptions (Box 2.4), Figure 2.9, Panel B compares the increase in spending *per capita* in real terms over the period 1997-2007 and the increase which would be needed for the period 2007-17 if countries wanted to improve the health status of the population by the same amount they did over the period 1997-2007 (as measured by the increase in life expectancy in years). This calculation suggests that some countries could finance all the increase in health status through efficiency gains (*e.g.* Germany, the United Kingdom and the United States) because the

Figure 2.9. **Achieving efficiency gains would help contain spending over time**



1. Potential gains are derived from an output-oriented DEA analysis performed with one output (life expectancy at birth) and two inputs (health care spending and a composite indicator of the socio-economic environment and lifestyle factors). They are measured by the number of years of life that could be saved if efficiency in country i were to be raised to the level implied by the estimated efficiency frontier while holding inputs constant and under the assumption of non-increasing returns to scale.
2. 2007-17: assuming that countries exploit estimated potential efficiency gains, life expectancy over the period 2007-17 could increase at the same pace as over the previous ten year period but at a much lower cost in many countries.
3. Potential savings represent the difference between a no-reform scenario and a scenario where countries would become as efficient as the best performing countries.

Source: OECD Health Data 2009; OECD calculations.

increase in life expectancy over the period 1997-2007 is smaller than the one which could be achieved while holding spending constant. In about two-thirds of OECD countries, the simulation suggests that efficiency gains would account for only a fraction, though often significant, of the increase in health status (*e.g.* Australia, France and Japan).

Box 2.4. **Main assumptions behind the estimates on potential public spending savings**

To draw some estimates on the public spending savings which could be obtained while exploiting potential efficiency gains in the health care sector, a number of key assumptions have been made. They are as follows:

- The health status of the population over the period 2007-2017 increases as it did over the period 1997-2007 (as measured by changes in life expectancy);
- The contribution of other health status determinants (GDP growth, education, pollution, alcohol and tobacco consumption, diet, etc.) to the increase in life expectancy remains the same as over the period 1997-2007;
- There was no significant change in spending efficiency over the period 1997-2007;
- The mix between public and private spending remains constant over time (this was broadly the case over the past decades).

Exploiting efficiency gains would result in significant public spending savings in all countries. Figure 2.9, Panel C, compares a baseline where countries increase the health status of the population and spending in line with developments over the period 1997-2007 and a "reform scenario" where countries exploit potential efficiency gains. Potential public spending savings would amount to 1.9% of 2017 GDP on average for the OECD area, and over 3% for Greece, Ireland and the United Kingdom.

Complementing aggregate efficiency indicators

Outcome-based efficiency measures at the system level can be complemented by performance measures based on outputs, by indicators on the quality of care and by information on the share of resources devoted to administration as opposed to actual care. Each of these "intermediate" performance indicators is partial, and as a result potentially misleading if considered in isolation. Still, they can provide indications of country specificities and point to areas in need of reform.

Output-based measures are poor proxies but help identifying reform priorities

The OECD Health Data contain information which can be used to derive proxies for efficiency in resource utilisation in the in-patient care sector. The average length of stay (ALOS) in hospitals is one of them. All other things equal, a shorter stay will reduce the cost per discharge and shift care from in-patient to less expensive post-acute settings. Important limitations of this indicator are that it does not reflect the intensity of the service provided (*e.g.* the use of high-tech imaging) and the risks of poorer health outcomes or readmission in the case of premature discharge from the hospital. The ALOS for total in-patient care displays significant cross-country variation (Figure 2.10), partly reflecting differences in the degree of reliance on in-patient care for the elderly. As an

illustration, in Japan, where hospitals play an important role in providing long-term care, the ALOS in in-patient care is about four times the OECD average.[29]

Focusing on disease-specific ALOSs can remove some of the heterogeneity arising from in-patient conditions across countries.[30] Disease-specific ALOSs thus likely reflect the impact of financial incentives embodied in hospital payment methods as well as other institutional factors better (such as the availability of beds for convalescent patients in rehabilitation centres). In Ireland for instance, where hospitals are partly paid on a *per diem* basis, disease-specific ALOSs tend to be above the OECD average. Two other indicators are often considered to be relevant for assessing efficiency in the use of existing medical facilities and are thus included in the set: the turnover rate – the number of cases per available acute care bed – and the occupancy rate for acute care beds.[31]

Although very close in essence, efficiency indicators for in-patient care are not always highly correlated (Table 2.A1.1). There are some correlations across disease-specific ALOS, but they are far from being systematic – for instance, the ALOS for patients with tuberculosis seems to be largely unrelated to the ALOS for other diseases. This suggests that countries can be efficient in treating some diseases but not others. Furthermore, efficiency indicators for in-patient care should be interpreted with caution. A high occupancy rate (usually considered as an efficient use of resources) can either reflect long ALOS (usually considered as an inefficient use of resources) or a high turnover rate.[32]

Cross-country correlations between in-patient care efficiency measures and outcome efficiency scores derived from the DEA are either not significant or even wrongly signed. The significant and positive correlations between the DEA efficiency scores and both the aggregate ALOS and the ALOS for two types of cancers are particularly puzzling. This could be explained if too short in-patient stays create a serious risk of medically-induced patient re-admissions or cost-shifting from acute care to other care settings (Kondo *et al.*, 2009). No internationally comparable data on re-admission rates are available to adjust ALOS data. However, various empirical studies on US and German hospitals conclude that the implementation of case management systems and/or payment per case systems for hospitals led to a reduction in the length of stay without affecting treatment quality (*e.g.* Kainzinger *et al.*, 2009). Shorter ALOSs also reduce the risk of hospital-acquired infection.

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29. In Japan, moving away from a *per diem* payment scheme for hospitals toward a DRG scheme has been considered as a priority to reduce the ALOS for acute care (OECD, 2009*d*). Data on disease-specific ALOS for Japan are, however, not available in OECD Health Data.

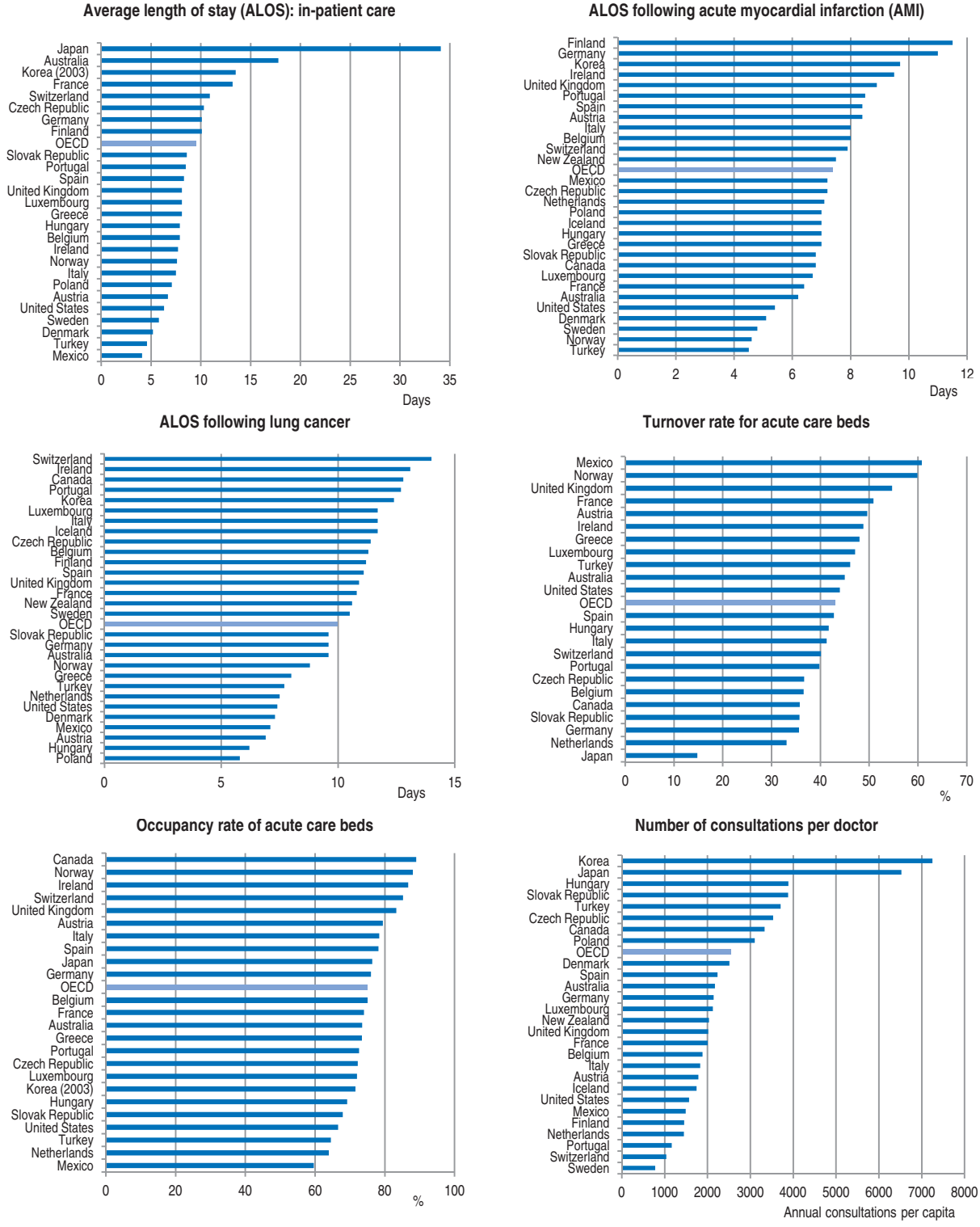
30. Data on ALOS are available in OECD Health Data for about 130 diagnostic categories. To select a reasonable number of categories for in-depth analysis, the following criteria have been used: the diseases are frequent, well-recognised and/or rarely associated with other diagnostic categories (so as to limit the risk of differences in categorisation across countries). The following disease-specific ALOSs have been selected: three categories of cancers (trachea, bronchus and lung; breast; colon, rectum and anus); acute myocardial infarction (AMI); tuberculosis; and femur fractures.

31. The number of exams per high-tech equipment (*e.g.* MRIs and scanners) could also provide useful information but data are lacking for many countries in OECD Health Data.

32. The formula linking the occupancy rate (OR), turnover rate (TR) and ALOS is as follows: OR=ALOS*TR/365. Definitions and methods for collecting data may not be fully consistent and this relationship does not always hold exactly.

Figure 2.10. **A selection of efficiency measures based on outputs – international comparisons**

2007 or latest available year



Source: OECD Health Data 2009.

The number of consultations per doctor is sometimes used as an indicator of efficiency for the out-patient care sector. There is huge cross-country variation in the number of consultations per doctor, ranging from above 6 500 in Korea and Japan per year to less than 1 500 in Finland, Mexico, the Netherlands, Portugal and Sweden. However, the number of consultations per doctor may not be a good indicator of efficiency for at least two reasons. First, the nature and content of consultations likely vary significantly across countries. In particular, aggregating consultations by general practitioners and specialists may not be warranted and the split in the total number of consultations is not available. Second, consultations that are too short may be of poor quality and/or cost inefficient.[33] Moreover, there is no significant correlation between this indicator and the DEA (outcome) efficiency scores.

The level of administrative costs is sometimes seen as a relevant element in assessing health care system efficiency – high administrative costs would represent a diversion of resources away from productive use. In 2007, these costs amounted to less than 2% of total current expenditure in Denmark, Hungary, Italy, Norway and Portugal but to 7% or more in Belgium, France, Luxembourg, Mexico, New Zealand and the United States. High administrative costs may, however, not be inefficient if they allow a better use of existing medical resources. Woolhandler *et al.* (2003) suggest that a system with multiple insurers and market-based competition at the provider level may be intrinsically costlier. In practice, cross-country correlations between administrative costs and output-based efficiency indicators are either not significant or do not go in the expected direction. There is, in addition, no significant correlation between high administrative costs and outcome-based (DEA) efficiency scores.

Overall, output-focused efficiency indicators raise a number of problems if they are used as proxies for overall system efficiency. *First*, they do not deliver a consistent message. Using them to assess efficiency in the health care sector would require choosing among them or designing a method to aggregate them, both of which suffer from severe drawbacks. *Second*, indicators based on currently available data focus almost exclusively on the in-patient care sector while some medical interventions and surgical procedures are increasingly performed on a day care basis at a reduced cost. Cataract surgery is an example. Available data reveal that the share of cataract surgeries carried out on a day care basis varies significantly across countries, from above 97% in Canada, Finland, the Netherlands and Sweden to below 65% in the Czech Republic, Hungary, Luxembourg and Poland. *Third*, measuring efficiency in the out-patient care sector is far from obvious as the heterogeneity of cases is large and largely undocumented. Designing a relevant efficiency indicator for the pharmaceutical sector would be even more difficult. *Fourth*, differences in the quality of medical output should be accounted for.

Efficiency measures focusing on health care outputs cannot replace efficiency measures focused on outcomes; however, they can complement outcome-based measures and help to identify country specificities and reform priorities. Among the countries with below-average outcome efficiency scores (DEA), many tend to have above-average disease-specific ALOSs, including Belgium, the Czech Republic, Finland, Ireland, Luxembourg and the United Kingdom. Most other countries with below-average outcome efficiency scores are characterised by a low occupancy rate of acute care beds, including

33. In Japan, one common complaint is that patients spend three hours waiting for a consultation with the doctor that lasts for only three minutes. To mitigate this problem, the government reduced reimbursement of medical consultations of less than five minutes (OECD, 2009*b*).

Greece, Hungary, the Netherlands, the Slovak Republic and the United States. Scope for improvement can also be identified for countries with relatively high DEA scores. As an illustration, Australia, France, Japan, Korea and Switzerland are all characterised by longer lengths of stay for in-patient care, partly reflecting a heavy reliance on hospitals for long-term care. The share of resources devoted to administration is also high in France, and to a lesser extent in Switzerland.

Quality indicators are useful but need to be developed further

In assessing health care system performance, the quality of health care outputs needs to be taken into account. Constrained by data availability, the analysis in this book was restricted to a small number of Health Care Quality Indicators (HCQIs):

- Three outcome measures on care for chronic conditions – avoidable hospital admission rates for asthma, for chronic obstructive pulmonary diseases (COPD) and for congestive heart failures (CHF) – with the assumption that high admission rates may indicate poor quality of care because in most cases these conditions could be prevented and/or handled without hospitalisation;
- Two outcome measures on care for acute exacerbations of chronic conditions – in-hospital case fatality rates within 30 days after admission for acute myocardial infarction (AMI) and for ischemic stroke. Coronary artery disease remains the leading cause of death in most OECD countries but much of the reduction in mortality rates since the 1970s can be attributed to lower mortality from AMI (OECD, 2009*a*). Given the variety of services and system devices that need to be mobilised to provide care for this illness, the AMI case-fatality rate is regarded as a good outcome measure of acute care quality. Likewise, ischemic stroke is an important cause of death and stroke case-fatality rates have been used for hospital benchmarking within and between countries.
- Three process measures on prevention – rates of (childhood) vaccination for measles and for diphtheria, tetanus and pertussis (DTP) and the rate of influenza vaccination for elderly people. While these are more process or output than outcome indicators, they have some advantages. In particular, they are readily available and can be used to derive policy recommendations.[34]

These indicators provide very useful information on some of the weaknesses and strengths of each country's health care system. There are wide cross-country variations for each of these indicators but no unique "ranking" – most countries are good in some areas but less so in others (Figure 2.11). As an example, Italy scores very well on avoidable admissions for both asthma and COPD, but compares less favourably on avoidable admissions for CHF. Likewise, Korea performed best on in-hospital case-fatality rates for AMI, but also the worse for ischemic stroke in 2007. In addition, these indicators are not all significantly correlated with life expectancy at birth and amenable

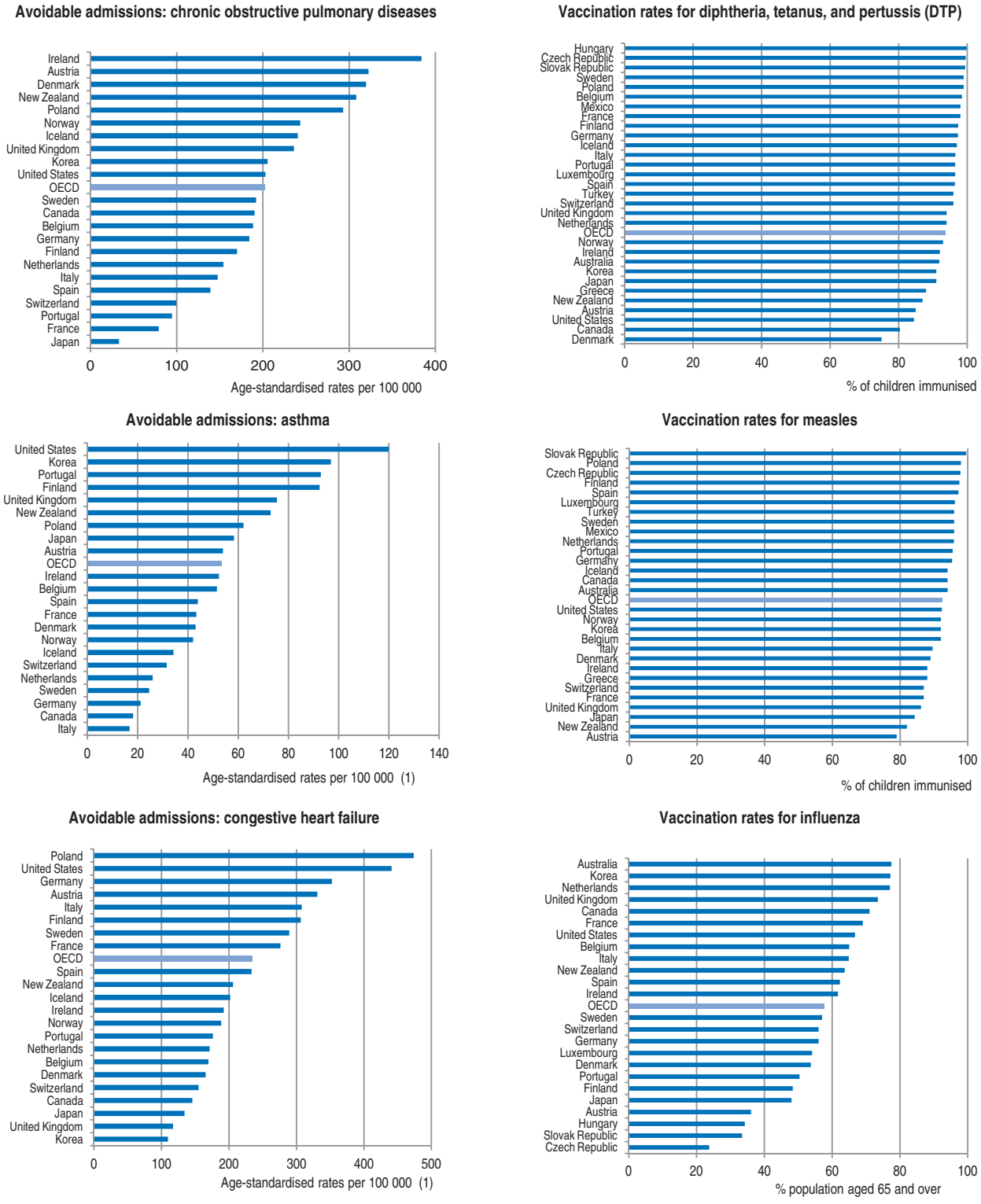
34. Process measures do not measure outcomes but have some advantages when there is good evidence that links the care process to desirable outcomes. They are often more reliable and can be obtained on a regular basis. They also directly indicate the actions needed to improve care (Crombie and Davies, 1998). Smith (2002) further considers that process measures are often more likely to offer a more satisfactory measure of contemporary system performance than contemporary health status measures which reflect years of population exposure to the health care system and external influences (pollution, socio-economic factors, etc.).

mortality. Indicators on the quality of care for chronic diseases (*i.e.* avoidable admission rates) are reasonably well associated with life expectancy, amenable mortality and efficiency scores derived from the DEA (Table 2.A1.1). The relationship between vaccination rates and other HCQIs, as well as health outcome measures, are far less clear cut.

Overall, a close look at HCQIs helps to identify country specificities and reform priorities, while keeping in mind that these indicators should be treated with care for at least two reasons: data comparability problems are in some cases important and these indicators remain partial. As an example, while Austria scores relatively well on most output-efficiency measures focused on the in-patient care sector, indicators of the quality of care are less favourable. In particular, avoidable in-patient admissions for COPD and CHF seem high and vaccination rates low, possibly signalling weaknesses in preventive care and/or in the out-patient care sector.

Figure 2.11. **A selection of health care quality indicators – international comparisons**

2007 or latest available year



1. Population aged 15 and over.

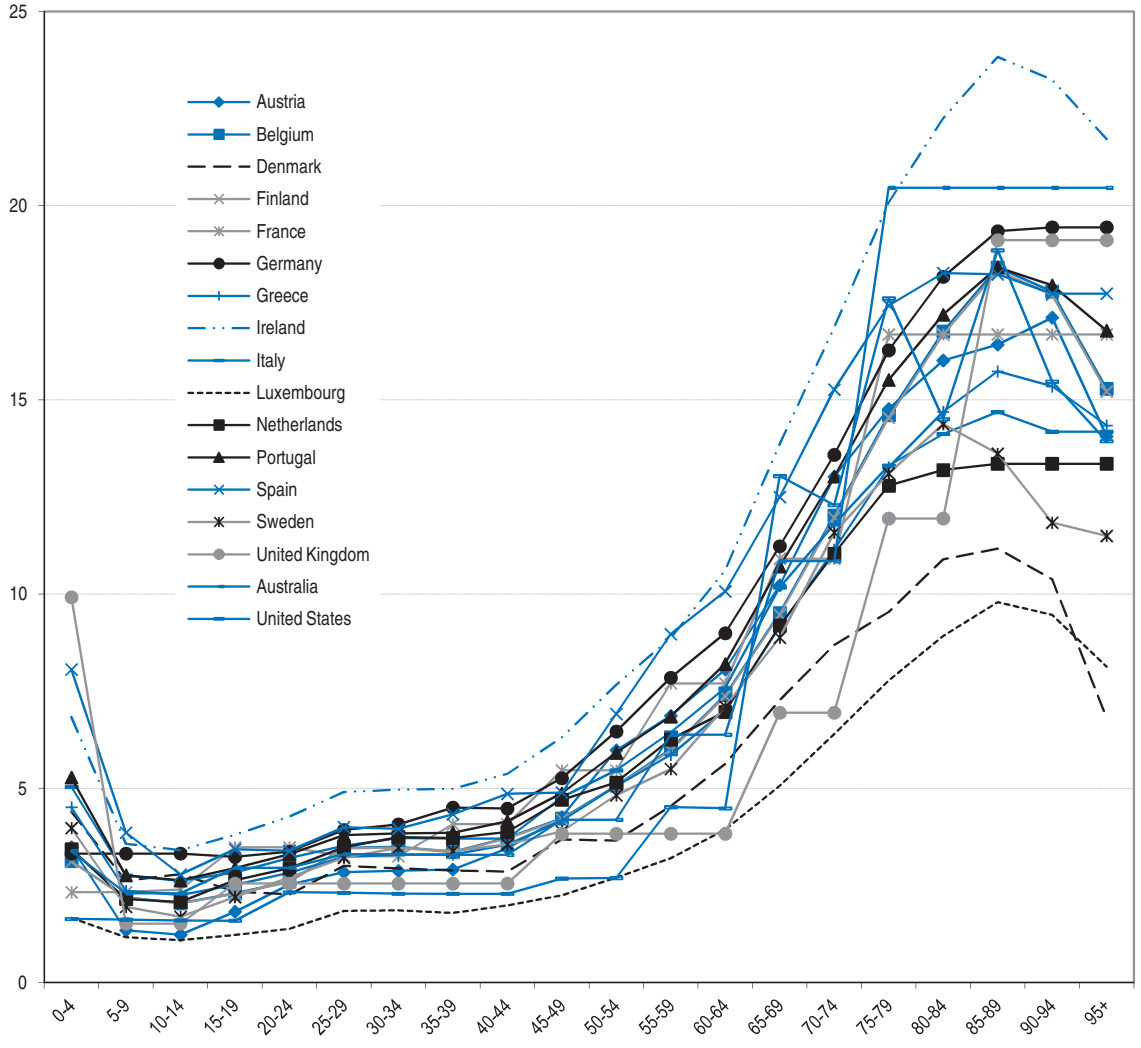
Source: OECD Health Data 2009.

Annex 2.A1

Additional information on health care outcomes, spending and efficiency

Figure 2.A1.1. **Public health care expenditure by age groups**[1]

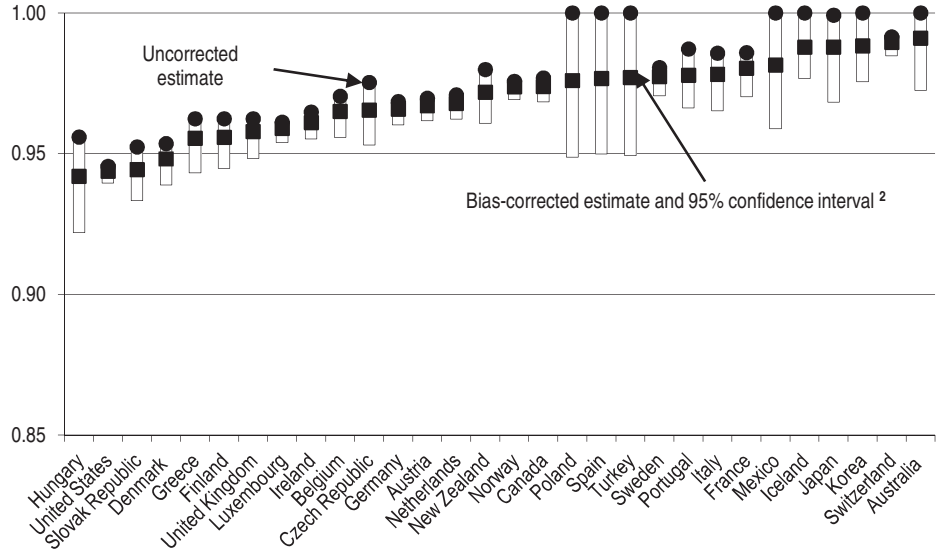
Per cent of GDP *per capita*



1. Expenditure *per capita* in each age group divided by GDP *per capita*, 1999.

Source: Oliveira Martins and de la Maisonneuve (2006).

Figure 2.A1.2. **DEA: 2007 output-oriented efficiency scores and their confidence intervals**[1]



1. DEA performed with two inputs (health care spending, a composite indicator made of socio-economic conditions, consumption of fruits and vegetables, lagged consumption of alcohol and tobacco) and one outcome (life expectancy at birth).
2. DEA results are sensitive to measurement errors and statistical noise. They are also plagued by a bias towards smaller inefficiency estimates. Bootstrapping (*i.e.* taking repeated samples that are the same size as observed data) can help address these problems by making a correction for the bias resulting from the small sample size and producing confidence intervals.

Source: OECD estimates.

Table 2.A1.1. **Bilateral correlations across output- and quality-based performance indicators**

	Efficiency measures based on outputs											Quality indicators								Administrative costs	Measures of outcomes		Efficiency measure based on outcomes: DEA scores
	In-patient care									Out-patient care		Care for communicable diseases			Care for chronic conditions: avoidable admissions			Fatality rates					
	Average length of stay (ALOS)																						
	Total in-patient	AMI	Breast cancer	Trachea, bronchus and lung cancer	Colon, rectum and anus cancer	Fracture of femur	Tuberculosis	Turnover rate	Occupancy rate	Cataract surgery	Number of consultations per doctor	Vaccination rates: Measles	DTP	Influenza	Asthma	Chronic obstructive pulmonary disease	Congestive heart failure	AMI	Ischemic stroke		Life expectancy	Amenable mortality	
Efficiency measures based on outputs																							
ALOS, Total in-patient	1.00	0.27	0.24	0.35 *	0.33 *	0.38 *	0.17	-0.67 **	0.10	0.16	0.53 **	-0.15	-0.03	0.08	0.04	-0.57 **	-0.34	0.63 **	0.04	-0.11	0.46 *	-0.26	0.41 *
ALOS, AMI		1.00	0.56 **	0.39 *	0.40 *	0.66 **	0.28	-0.37 *	0.24	0.02	0.06	-0.08	0.20	-0.01	0.18	-0.07	-0.05	0.42 *	0.03	0.09	0.21	-0.04	0.00
ALOS, Breast cancer			1.00	0.43 *	0.28	0.54 **	0.28	-0.42 *	0.07	-0.12	0.33 *	0.04	0.27	-0.35	0.00	0.01	-0.19	0.49 *	0.05	0.10	0.01	0.09	-0.10
ALOS, Trachea, bronchus and lung cancer				1.00	0.82 **	0.46 *	-0.01	-0.33	0.57 **	0.35	-0.03	-0.13	0.14	0.22	-0.17	-0.37 *	-0.58 **	0.13	0.24	0.02	0.57 **	-0.40 *	0.37 *
ALOS, Colon, rectum and anus cancer					1.00	0.36 *	-0.06	-0.28	0.52 *	0.52 *	-0.26	-0.22	0.10	0.44 *	-0.36	-0.46 *	-0.55 **	0.16	0.36	0.13	0.67 **	-0.53 **	0.33 *
ALOS, Fracture of femur						1.00	0.27	-0.50 *	0.18	0.01	0.49 *	-0.05	0.17	0.08	0.31	-0.04	-0.37	0.58 **	0.03	0.06	0.16	-0.08	0.11
ALOS, Tuberculosis							1.00	-0.63 **	0.12	-0.44 *	0.30	0.28	0.33 *	-0.30	-0.15	-0.01	0.31	0.24	0.28	-0.31	-0.26	0.32	0.11
Turnover rate, acute care beds								1.00	0.08	-0.07	-0.68 **	-0.15	0.06	0.07	-0.03	0.49 *	0.28	-0.58 *	0.14	0.26	-0.20	0.01	-0.18
Occupancy rate, acute care beds									1.00	0.37	-0.05	-0.52 **	-0.35 *	0.15	-0.36	0.35	-0.31	-0.63 *	0.16	-0.39 *	0.62 **	-0.48 *	0.17
Cataract surgery - % performed as day cases										1.00	-0.51 *	-0.39 *	-0.43 *	0.59 **	-0.13	-0.14	-0.67 **	-0.28	-0.14	-0.08	0.72 **	-0.72 **	0.25
Number of consultations per doctor											1.00	0.07	-0.10	-0.11	0.28	-0.12	-0.32	0.55 *	-0.01	-0.22	-0.20	0.21	0.10
Quality indicators																							
Vaccination rates, measles												1.00	0.55 **	-0.22	-0.09	-0.27	0.23	0.28	0.01	-0.13	-0.51 **	0.50 **	-0.14
Vaccination rates, diphtheria, tetanus, and pertussis (DTP)													1.00	-0.25	-0.17	-0.40 *	0.18	0.25	0.06	0.05	-0.24	0.33 *	0.18
Vaccination rates, influenza														1.00	0.05	-0.05	-0.30	0.08	0.05	0.28	0.56 **	-0.61 **	0.40 *
Avoidable hospital admissions: asthma															1.00	0.17	0.17	0.42	-0.06	0.28	-0.46 *	0.49 *	-0.39 *
Avoidable hospital admissions: Chronic obstructive pulmonary diseases																1.00	0.16	-0.29	0.05	-0.05	-0.50 *	0.31	-0.46 *
Avoidable hospital admissions: Congestive heart failures																	1.00	-0.19	-0.35	0.04	-0.49 *	0.39 *	-0.29
In-hospital case fatality rates for acute myocardial infarction																		1.00	0.40 *	0.41 *	-0.39 *	0.41 *	-0.23
In-hospital case fatality rates for ischemic stroke																			1.00	0.39	-0.29	0.40 *	-0.31
Administrative costs																				1.00	-0.05	0.04	-0.06
Measures of outcomes																							
Life expectancy at birth																					1.00	-0.96 **	0.47 **
Amenable mortality rates																						1.00	-0.49 **
Efficiency measure based on outcomes: DEA scores																							1.00

Notes: Pearson coefficients measure the linear correlation between the levels of different health efficiency measures across countries in 2007 (or latest year available). Coefficients with ** are significant at less than 1%. Those with * are significant at between 1 and 10%. Those with no * are not significant below a 10% threshold.

Source: OECD Health Data 2009; OECD calculations.

Annex 2.A2

Selected empirical work linking health outcomes and inputs

Table 2.A2.1. **Selected empirical works: Approaches and main results**

Authors	Sample, coverage, methods	Dependent variables	Main explanatory variables	Main results
Afonso and St Aubyn (2006)	• 30 OECD countries • Period: early 2000s • Two-step procedure on cross-section data: DEA and Tobit regressions	A principal component consisting of life expectancy at birth, infant mortality and premature mortality	• A principal component consisting of doctors, hospital beds, MRI in the DEA. Tobit regressions include: GDP *per capita*; education; tobacco, alcohol and sugar consumption and obesity	GDP *per capita*, education level and tobacco and obesity help to explain why some countries achieve better health status than others while using comparable levels of health care resources.
Berger and Messer (2002)	• 20 OECD countries • Period: 1960-92 • Panel data regressions	Mortality rates	• Income; income distribution; age structure; tobacco, fat and alcohol consumption, education; income inequalities. • Health care spending; share of public spending; public insurance coverage for inpatient and ambulatory care	Increases in health care expenditure are associated with lower mortality, as are healthier lifestyles, higher education. Income inequality does not play a role. Increases in the publicly financed share of health care expenditure are associated with higher mortality rates. Increased insurance coverage for ambulatory care reduces mortality rates; the impact of insurance coverage for inpatient care is less clear.
Crémieux *et al.* (1999)	• 10 Canadian provinces • Period: 1978-1992 • Panel data regressions	Infant mortality; male and female life expectancy	• GDP *per capita*; education; tobacco; meat and fat consumption; poverty • Number of physicians *per capita*; health care spending *per capita*	Lifestyle factors are significant determinants of health outcomes. Education has little impact on health status. Income is a determinant of life expectancy. A lower number of physicians or/and cuts in spending is associated with increased infant mortality and reduced life expectancy. A 10% spending cut would be associated with a six month reduction in life expectancy for men and three months for women.

Table 2.A2.1. **Selected empirical works: Approaches and main results** (continued)

Authors	Sample, coverage, methods	Dependent variables	Main explanatory variables	Main results
Elola *et al.* (1995)	• 17 European countries • Cross-section regressions	Life expectancy and premature mortality (PYLL) by sex; infant mortality	• GDP *per capita* • Health care spending; type of health system (social security versus integrated national health service)	*Per capita* health care spending may explain more variance in infant mortality than would *per capita* GDP. Health care spending are inversely correlated to female premature mortality and positively correlated to female life expectancy. Income distribution is not an explanatory variable for variations in health status among European countries. Countries with national health services are more efficient at producing lower infant mortality rates than those with social security systems. But there is no statistical relation between health system organisation and other health status variables.
Filmer and Pritchett (1997)	• 109 developing countries • Cross-section regressions	Child (<5) and infant mortality	• GDP *per capita*, female education, income inequality, degree of urbanisation, religious affiliation, ethno-linguistic fractionalisation, access to safe water • Public spending share in total health care spending	95% of cross-national variation in mortality can be explained by a country's income *per capita*, the distribution of income, female education, ethnic fragmentation and predominant religion. The impact of public spending on health is small and insignificant.
Hitiris and Posnett (1992)	• 28 OECD countries • Period: 1960-87 • Panel data regressions	Mortality rates	• GDP *per capita, per capita* health spending, share of population over 65	Mortality is negatively related to *per capita* health spending but the elasticity is very low (0.08 to 0.06, depending on the PPP exchange rate).
Nixon and Ullman (2006)	• 15 EU countries • Period: 1980-95 • Panel data regressions	Life expectancy at birth and infant mortality	• Unemployment rate, alcohol, tobacco, diet and pollution • Health spending *per capita* and as a share of GDP, number of physicians, hospital beds, in-patient admission rate and average length of stay, insurance coverage of the population	Results show a marginal but positive effect for health expenditure on health outcomes for EU countries. Change in health care expenditure and number of physicians have added 2.6 and 1.6 years respectively to male life expectancy in EU countries. And to a 0.63 and 0.22 percentage point decline in the infant mortality rate.

Table 2.A2.1. **Selected empirical works: Approaches and main results** (continued)

Authors	Sample, coverage, methods	Dependent variables	Main explanatory variables	Main results
Or (2000*a*)	• 21 OECD countries • Period: 1970-1992 • Panel data regressions	Premature mortality (potential years of life lost – all causes except suicides)	• GDP *per capita*; occupational status; alcohol, tobacco, fat and sugar consumption • Total health spending *per capita*; share of public spending	The rise in the employment share of white collar workers and the rise in *per capita* income play the greatest role in the reduction of premature mortality between 1970 and 1992. There is a significant and positive relation between health expenditure and health status, particularly for women. Since the public share of expenditure has remained fairly constant, its contribution to the decline in premature mortality has been negligible.
Or (2000*b*)	• 21 OECD countries • Period: 1970-95 • Panel data regressions	Various mortality variables (infant mortality, perinatal mortality, PYLL and specific PYLL by sex, life expectancy at age 65)	• Alcohol and tobacco consumption, GDP *per capita*, occupational status (share of white collars) and air pollution • Number of doctors, public *vs* private financing, provider payment systems at the hospital and individual level, access arrangements (gate-keeper role)	A high number of doctors *per capita* is associated with lower rates of premature mortality, lower perinatal and infant mortality, and in particular longer life expectancy at 65 and lower heart diseases. A high share of public financing is associated with lower premature mortality and infant and perinatal mortality but does not affect LE at 65 or heart diseases. Institutional variables for funding arrangements are often not significant, with some exceptions: countries with fee-for-service at the hospital level tend to have lower premature mortality (but not longer LE at 65).
Or *et al.* (2005)	• 21 OECD countries • Period: 1970-98 • Panel data regressions	Life expectancy at birth and at 65, premature mortality from heart diseases	• Alcohol and tobacco consumption, GDP *per capita* and education • Number of doctors and medical equipment, public spending share, provider payment systems in the hospital and ambulatory sectors, gate-keeping role of physicians	The impact of health care (measured by the number of doctors) varies significantly across countries. There is some tendency for countries which pay their primary doctors by fee-for-service to be more efficient than those which pay doctors by salary or capitation. The public/private mix and gate-keeping do not play a significant role.

Table 2.A2.1. **Selected empirical works: Approaches and main results** (continued)

Authors	Sample, coverage, methods	Dependent variables	Main explanatory variables	Main results
Puig-Junoy (1998)	• OECD countries • Period: 1960-1990 • Two-steps procedure on panel data: DEA and Tobit regressions	Life expectancy at birth	• Tobacco and alcohol consumption • Number of physicians and non-physician health care employees, number of hospital beds health care	Non-efficient countries use, on average, about 40% more inputs than efficient countries (for similar outputs). Inefficiency can be divided up into pure inefficiency and scale inefficiency (*i.e.* associated with non-increasing returns to scale). Tobit regression results for DEA efficiency scores are significantly and positively correlated with the share of health care expenditure that is privately financed and average years of schooling but not correlated with a dummy representing the gate-keeping role of GPs.
Retzlaff-Roberts *et al.* (2004)	• 27 OECD countries • Period: 1998 • DEA, with constraints on non-discretionary inputs	Infant mortality and life expectancy at birth (analysed separately)	• School expectancy, Gini coefficient and tobacco use • Number of practicing physicians, inpatient beds, MRI units, health spending to GDP	Inputs could be reduced by between 14 to 21% on average in the OECD area without raising the level of infant mortality or reducing life expectancy, respectively.
Self and Grabowski (2003)	• A set of 191 developed countries, middle income countries and less developed countries • Cross-country regressions	DALE as calculated by the WHO in 2000	• Socio-economic conditions (number of years of education, income, dependency ratio); lifestyle factors (calorie intake and the share of urban population), pre-existing health conditions • *Per capita* health expenditure segregated into its public and private components	The impact of public health spending on the DALE is insignificant for the world overall as well as for the developed countries. In these countries, private spending does not either contribute to improve the DALE. The socio-economic status and pre-existing health conditions play a major role. High calorie diets, a high degree of urbanisation and the dependency ratio have a negative impact.
Soares (2007)	• A set of Brazilian municipalities • Period: 1970-2000 • Panel data regressions	Life expectancy at birth, child mortality	• Income *per capita*, urbanisation, nutrition • Access to public medical care and immunization coverage	Availability of health care infrastructure has a significant impact on life expectancy.

Table 2.A2.1. **Selected empirical works: Approaches and main results** (continued)

Authors	Sample, coverage, methods	Dependent variables	Main explanatory variables	Main results
Spinks and Hollingsworth (2007)	• 28 OECD countries • Period: 1995-2000 • DEA on panel data	Life expectancy at birth	• Education, unemployment, income • Health care spending	Though country rankings are rather robust to changes in dataset, policy makers should be aware of the limitations and uncertainty of using DEA techniques.
Thornton (2002)	• US states • Period: 1990 • Cross-state regressions	Age-adjusted death rate	• Income, education, smoking, alcohol, urbanisation, manufacturing, marriage and crime • Health care spending	The contribution of medical care in lowering mortality is quite small. Greater consideration should be given to the role of socio-economic and lifestyle factors in preventing disease and improving life expectancy.
Verhoeven *et al.* (2007)	• 28 OECD countries • Period: 1998-2003 (averages) • Two-steps procedure on cross-section data: DEA and bootstrapped truncated regressions	Healthy life expectancy, standardised death rate, infant, child and maternal mortality rates	• Index of the countries' average ranks for number of hospital beds, physicians and health workers *per capita*, immunizations and doctors' consultations • Expenditures on inpatient care, private expenditure on health, density of general practitioners, GDP, caloric intake per day and share of urban population	Inefficiencies in G7 countries mostly reflect the lack of cost effectiveness in acquiring real resources, such as pharmaceuticals. High wage spending is also associated with lower efficiency, while more frequent immunisations and doctors' consultations coincide with higher efficiency.
Studies focusing on pharmaceuticals				
Miller and Frech (2002)	• 18 OECD countries • Cross-country regressions	DALE and LE at birth and at age 60; premature mortality by sex	• GDP *per capita*, share of smokers by gender, alcohol consumption, obesity • Spending on pharmaceutical, spending on other care items	Pharmaceutical consumption is more powerful in extending DALE than life expectancy. Productivity of pharmaceutical consumption varies greatly by both cause of death and by age.
Shaw *et al.* (2002)	• 19 OECD countries • Period: 1999 • Cross-country regressions	Life expectancies for males and females at ages 40, 60 and 65	• GDP *per capita*; alcohol, tobacco, butter and fruits and vegetables consumption • *Per capita* drug expenditure • (all explanatory variables are lagged by 15 years)	Pharmaceutical consumption has a positive effect on life expectancy.

Annex 2.A3

Specification and empirical results of panel regressions

The econometric work presented in this book extends earlier studies by using the latest data from OECD Health Data, by introducing new variables to control for lifestyle and socio-economic factors, and by testing various specifications. The health production function has been specified as follows:

$$Y_{it} = \alpha_i + \beta \cdot HCR_{it} + \gamma \cdot SMOK_{it} + \phi \cdot DRINK_{it} + \theta \cdot DIET_{it} + \delta \cdot AIRPOL_{it} + \sigma \cdot EDU_{it} + \lambda \cdot GDP_{it} + \varepsilon_{it}$$

with all variables in log form and Y_{it} being a measure of the population health status as discussed earlier (in country *i*, at period *t*), *i.e.* alternatively:

- Life expectancy (LE) at birth, for males and females,
- LE at 65, for males and females,
- Premature mortality (adjusted for "external causes"), for males and females,
- Infant mortality.

and inputs consisting of:

HCR	=	health care resources *per capita*, either measured in monetary terms (total spending including long-term care at GDP PPP exchange rates and constant prices) or in physical terms (*e.g.* health practitioners).
SMOK	=	tobacco consumption in gram *per capita*.
DRINK	=	alcohol consumption in litre *per capita*.
DIET	=	consumption of fruits and vegetables *per capita* in kgs.
AIRPOL	=	emissions of nitrogen oxide (NOx) *per capita* in kgs.
EDU	=	share of the population (aged 25 to 64) with at least upper secondary education.
GDP	=	GDP *per capita*.

Panel data regression results suggest that health care resources, lifestyle and socio-economic factors are all important determinants of the population health status (Box 2.A3.1 presents the main features of panel data regressions). Virtually all regression coefficients for these inputs are highly significant, statistically, and carry the expected sign, with health care resources measured either in physical or monetary terms (Tables 2.A3.1 and 2.A3.2). The choice of health status indicator (LE at birth, at older age, premature mortality, etc.) is not crucial to the analysis, as foreshadowed above.

Box 2.A3.1. **Panel data regressions: key features, drawbacks and consistency checks**

Regressions on a panel of 23 OECD countries over the period 1981-2003 have been used to assess the impact of health care resources on the health status of the population.* This approach allows both changes over time in each country and differences across countries to be taken into account. Socio-economic and lifestyle factors affecting the population's health status, such as income and education, diet, pollution and consumption of alcohol and tobacco are controlled for.

Panel data regression results should be interpreted with care since they may be affected by specification and data problems. This box reviews the specification choices and the consistency checks, which have been performed.

Endogeneity and collinearity across exogenous variables

An important difficulty in estimating the health production function is that two of its major determinants, GDP per capita and health care spending per capita are highly correlated. Furthermore, health spending could also be affected by the health status of the population. Both collinear and endogenous variables may lead to biased coefficient estimates. In theory, the endogeneity problem could be addressed using instrumental variables. However, in practice, results prove too sensitive to the choice of instruments to provide reliable estimates. A way to assess the sensitivity of coefficient estimates to the inclusion of correlated regressors is to estimate alternative specifications excluding alternatively some regressors. Specifications excluding GDP per capita imply a larger impact of health spending, suggesting that when GDP is omitted, the spending variable also captures income effects that are unrelated to health expenditure. The same phenomenon occurs when the education variable is omitted. Still, health spending is statistically significant in all specifications. Controlling for income per capita and the level of education reduces the risk of an upward bias on the health spending coefficient. Replacing GDP per capita by the share of service employment taken as a proxy for working conditions also yields results close to those of the equation with GDP per capita. Coefficients for pollution and lifestyle variables are fairly stable across specification, indicating no collinearity problem associated with these variables.

Shape of the production function

Both dependent and explanatory variables are in logarithms and regression coefficients can thus be interpreted as elasticities. Alternative specifications have been tested: first, with all the variables in level terms, and second with only the dependent variable in levels and the explanatory variables in logarithms. Results were not materially different.

Time dimension

The onset of a disease is often related to factors beginning years earlier. As an illustration, smoking causes cardiovascular disease with relatively short lags and lung cancer with much longer lags and nutrition decades ago could be having its full effect only today. The empirical analysis carried out in this paper does not include lagged input variables; contemporaneous lifestyles are taken as proxies for earlier habits. This rather heroic assumption was adopted because time series for lifestyle variables, but also for education and pollution, are relatively short, precluding the introduction of relevant lagged effects. This may lead to underestimate the impact of lifestyle factors. Replacing contemporaneous GDP per capita by the same variable lagged 15 years, assuming that an individual's health condition is affected by economic conditions prevailing at earlier stages of its life in particular during infancy, yields a significant coefficient and does not alter other coefficients materially.

Autocorrelation and heteroskedasticity

Residuals from equations estimated by Ordinary Least Squares are both heteroskedastic and serially correlated. Therefore, the equations have been estimated by Generalised Least Squares (GLS), with correction for heteroskedasticity and first order autocorrelation (with a specific autoregressive coefficient for each country). In this context, the R^2 statistic is irrelevant.

Country fixed-effects

In addition to the level of the exogenous variables described above, countries differ according to a number of characteristics which may also affect the health status of their population. Institutional features of their health system may play an important role. Failing to account for these country specificities would lead to biased estimates of the model coefficients. The introduction of country fixed-effects allows taking into account cross-country heterogeneity not reflected in other explanatory variables.

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* Due to the lack of data, seven OECD countries were excluded from the regression analysis and for some of the 23 countries the estimation period is shorter.

Table 2.A3.1. **Health status determinants with health practitioners as one input**

Econometric results with health care resources measured by the number of practitioners[1]

Dependent Variables[2] / Explanatory Variables[2]	Life expectancy at birth			Life expectancy at 65		Premature mortality (adjusted)			Infant mortality
	Female	Male	Total	Female	Male	Female	Male	Total	
Constant	3.940***	3.650***	3.800***	2.090***	1.570***	11.600**	12.000***	12.000***	10.600***
Practitioners[3]	0.013***	0.017***	0.015***	0.032**	0.043***	-0.089**	-0.062	-0.072*	-0.440***
Smoking	-0.007***	-0.018***	-0.014***	-0.028***	-0.070***	0.060**	0.190***	0.150***	0.072
Alcohol	-0.011***	-0.018***	-0.015***	-0.024*	-0.010	0.290***	0.040	0.130**	0.370***
Diet	0.003	0.004	0.004	0.002	0.008	0.088**	0.030	0.055*	0.120*
Pollution	-0.003	-0.012***	-0.006**	-0.032***	-0.058***	0.150***	0.170***	0.160***	0.190***
Education	0.040***	0.045***	0.042***	0.056***	0.046***	-0.250***	-0.300***	-0.260***	-0.500***
GDP	0.035***	0.066***	0.051***	0.099***	0.170***	-0.480***	-0.480***	-0.510***	-0.870***
Number of observations	254	254	254	254	254	236	237	236	254
Number of countries	22	22	22	22	22	21	21	21	22

Notes:

1. Generalised least square regressions, with country-fixed effects, error terms following a country-specific AR(1) and correction for heteroskedasticity. *** indicates significance at 1%; ** indicates at 5% and * indicates significance at 10%.
2. Details on individual variables are provided in Annex 1.A1.
3. Practitioners are calculated as the number of practising physicians and half the numbers of practising nurses.

Source: OECD calculations.

Table 2.A3.2. **Health status determinants with spending as one input**

Econometric results with health care resources measured by spending[1]

Dependent variables[2] / Explanatory variables[2]	Life expectancy at birth			Life expectancy at 65		Premature mortality (adjusted)			Infant mortality
	Female	Male	Total	Female	Male	Female	Male	Total	
Constant	4.009***	3.641***	3.825***	2.178***	1.638***	11.172***	12.871***	12.244***	8.516***
Spending	0.035***	0.045***	0.041***	0.051***	0.061***	-0.272***	-0.300***	-0.282***	-0.572***
Smoking	-0.000	-0.006**	-0.004	-0.019***	-0.057***	0.063***	0.088***	0.077***	0.077*
Alcohol	-0.011***	-0.014***	-0.011***	-0.017	-0.004	0.234***	0.082*	0.115***	0.327***
Diet	0.003	0.004	0.004	0.013*	0.028***	0.044*	0.001	0.014	0.044
Pollution	-0.009***	-0.018***	-0.012***	-0.037***	-0.068***	0.169***	0.153***	0.162***	0.320***
Education	0.029***	0.031***	0.030***	0.064***	0.045***	-0.107**	-0.227***	-0.182***	-0.378***
GDP	0.006	0.035***	0.019***	0.044***	0.107***	-0.285***	-0.292***	-0.292***	-0.379***
Number of observations	325	325	325	325	325	307	307	307	325
Number of countries	23	23	23	23	23	22	22	22	23

Notes:

1. Generalised least square regressions, with country-fixed effects, error terms following a country-specific AR(1) and correction for heteroskedasticity. *** indicates significance at 1%; ** indicates at 5% and * indicates significance at 10%.
2. Details on individual variables are provided in Annex 1.A1.

Source: OECD calculations.

Chapter 3

Health care policies and institutions – A new set of indicators

This chapter presents indicators of health care policies and institutions, drawing on new data collected by the OECD. It focuses on those policies and institutional features which most affect the supply and demand of care, equity in access and the ability of governments to control public spending. This chapter also provides a snapshot of OECD countries' scores for each of the 20 policy and institutional indicators.

Introduction

An important question for both policy makers and citizens is how the design of institutions and health care policy affect the efficiency of health care systems. However, consistent cross-country information on health policies and institutions had been missing. To fill this void, the OECD has collected detailed information on health policies and institutions governing health insurance and coverage, health care delivery, and the allocation and management of public health care spending. Responses to a questionnaire launched in 2008 have been received from 29 OECD countries (the US government has not responded). This wide-ranging dataset (269 mainly qualitative variables, referred to below as the Survey on Health System Characteristics) was transformed into 20 core indicators on health policies and institutions that take values ranging from 0 to 6.[1]

Policy settings as seen through the prism of indicators

In pursuing the two core policy objectives – improving the population health status and promoting equity in access – under a budget constraint, OECD countries have relied on various instruments. In describing this set of market mechanisms, regulations and management principles, a tree structure has been adopted (Figure 3.1 and Table 3.1). The main considerations shaping this tree structure are as follows:

- The main policies and institutions affecting the health status of the population are those governing the behaviour of providers, payers and users. Policy approaches differ considerably across countries. Some countries have relied on a command-and-control approach while others have given market signals a more prominent role to steer the demand and supply of health care services. However, given the market failures in the health care sector, market-orientation and regulation are often complementary (Smith, 2008*a*). In practice, many countries that typically relied mainly on a command-and-control approach have gradually introduced market mechanisms. And the United States, where market mechanisms for health insurance have been prevalent, has now tightened regulations.[2]
- The level of basic health insurance coverage is a key determinant in promoting equity in access. While a vast majority of OECD countries have reached almost universal coverage, there are still some differences in the scope of goods and services covered, as well as the level and distribution of out-of-pocket payments.
- In controlling public spending, approaches to set and share the spending envelope and the allocation of responsibilities across levels of government play a key role. The regulation of prices paid by third-party payers and of the workforce and equipment is also important.

1. Paris *et al.* (2010) present the information collected through the questionnaire in great detail.

2. The 2010 health reform included provisions that limit insurance companies' ability to charge premiums based on individuals' characteristics and prohibit them refusing to sell or renew insurance contracts due to an individual's health status.

Steering demand and supply of care: indicators on market mechanisms and regulations

In regulating the demand for, and supply of, health care services, countries have relied on command-and-control approaches and market mechanisms or a mix of the two. *Command-and-control approaches*, including public delivery of health care services and controls on health care employment and prices, have contributed to keep public spending under control but have often had adverse side effects, including low productivity, long waiting times and dissatisfaction with health care systems. On the other hand, the pervasiveness of serious *market failures* (Annex 3.A1) in the health care sector means that markets alone cannot produce efficient outcomes (Arrow, 1963; Docteur and Oxley, 2003; Ennis, 2006; Hsiao and Heller, 2007). The Survey on Health System Characteristics reveals that the actual mix between command-and-control approaches and market mechanisms differs significantly across countries. Also, countries relying intensively on market mechanisms tend to implement simultaneously various regulations to steer the demand and supply of health care services.

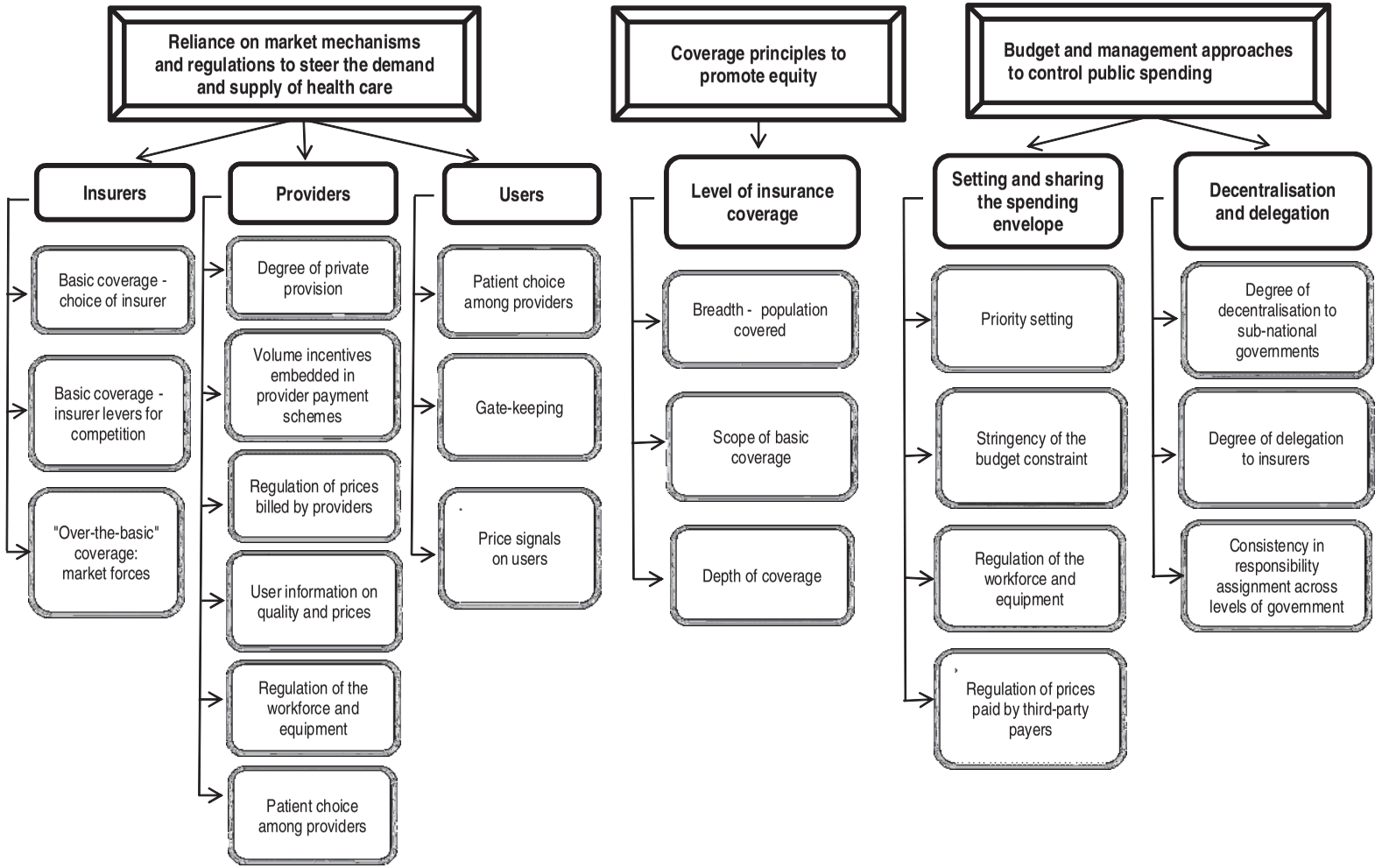
Market signals and regulations affecting users

Countries have relied on various instruments to steer user demand for health care services. Three indicators have been built (Annex 3.A2 explains how policy and institutional indicators have been built from the qualitative responses to the questionnaire and other data):

- *Price signals for users*. In some countries, patients pay for a significant share of the health care costs through out-of-pocket payments and this may contribute to contain excessive demand for health services. However, increasing out-of-pocket payments can lower demand not only for health care services of limited value, but also for necessary services, reducing the chance of early diagnoses and risking higher future care costs (OECD, 2004). Inequity has also been a cause of concern as at least some disadvantaged patients will suffer catastrophic financial or health effects if charges are not capped (Smith, 2008*b*).[3] Out-of-pocket payments accounted for over 30% of total health care spending in Greece, Korea, Mexico and Switzerland and less than 7% in France, Luxembourg and the Netherlands (Figure 3.2, Panel A).
- *Gate-keeping*. To steer patient demand, in many countries patients are required, or face incentives, to register with a general practitioner (GP) and/or they need a GP's referral to access specialist care.

3. The RAND experiment studied health care costs, utilisation and outcomes in the United States between 1974 and 1982. It randomly assigned 5 809 persons to insurance plans that either had no cost-sharing, 25%, 50% or 95%, with a maximum cap of USD 1 000; and 1 149 persons to a HMO with no cost-sharing. The experiment showed that cost-sharing reduced "appropriate or needed" medical care as well as "inappropriate or unnecessary" medical care. The reduction in use harmed the health status of those who were both poor and sick (Manning *et al.*, 1988).

Figure 3.1. **The tree structure for the indicators on health policies and institutions**



Source: OECD.

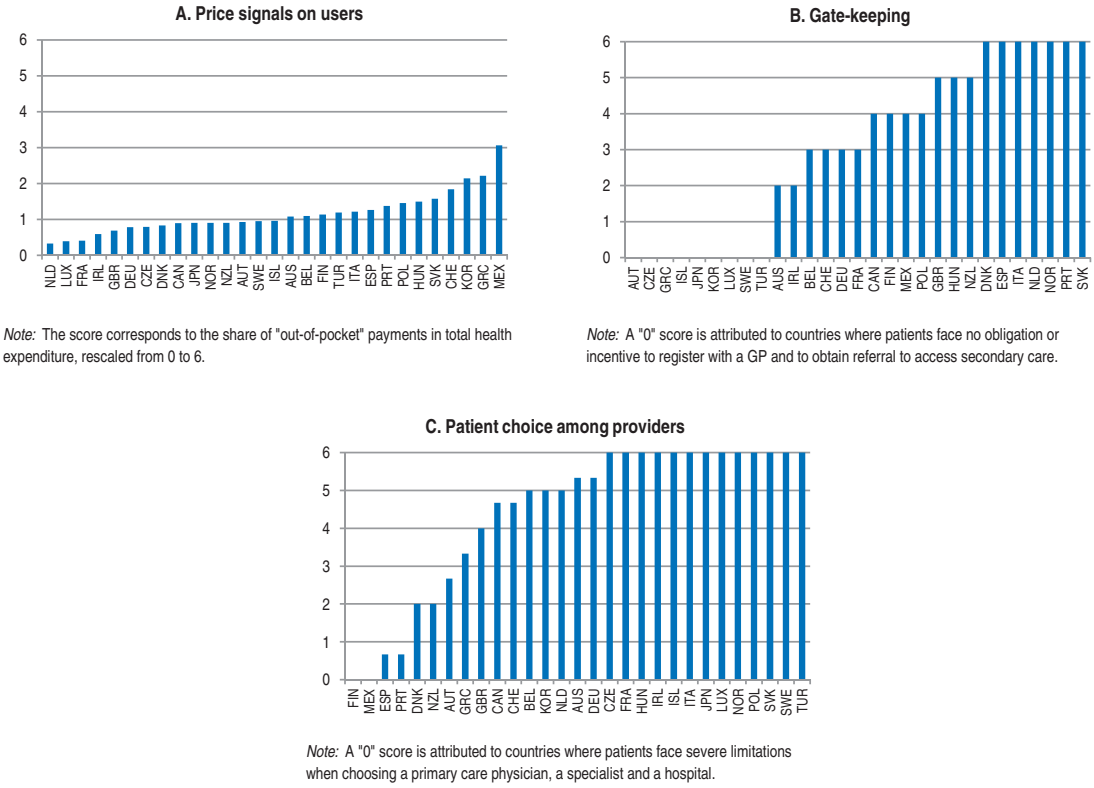
Table 3.1. **Overview of the indicators on health policies and institutions**

Reliance on market mechanisms and regulations to steer the demand and supply of health care	Main criteria taken into account
1. Insurers	
1.1 Basic coverage - choice of insurer	Type of coverage (single national or local schemes, multiple insurers). In case of multiple insurers, number of insurers, market shares and ability of people to choose their insurer.
1.2 Basic coverage - insurer levers for competition	Insurers' ability to modulate the benefit basket, the level of coverage or premiums and to contract with providers. Existence of a risk-equalisation scheme. Availability of information for consumers on premiums/coverage and on insurers' performance.
1.3 "Over the basic" coverage: market forces	Share of population covered by non-primary insurance (duplicate, complementary or supplementary private health insurance) - share of health care expenditures financed out of private health insurance and degree of market concentration.
2. Providers	
2.1 Degree of private provision	Breakdown of physicians and hospital services according to their nature (public or private).
2.2 Volume incentives embedded in provider payment schemes	Physician and hospital payment modes scored according to incentives to generate volume of services.
2.3 Regulation of prices billed by providers	Regulation of drug prices and of prices billed by physicians and hospitals.
2.4 User information on quality and prices	User information on quality and prices of various health care services.
2.5 Regulation of the workforce and equipment	Quotas for total number of medical students and by speciality; regulation of practice location; policies to address perceived shortages; regulation of hospital high-tech equipment and activities (number of hospitals and beds, specific services, high cost medical equipment) and control of recruitment and remuneration of hospital staff.
2.6 Patient choice among providers	Degree of freedom in choosing among primary care physicians, specialists and hospitals.
3. Users	
3.1 Patient choice among providers	Degree of freedom in choosing among primary care physicians, specialists and hospitals.
3.2 Gate-keeping	Obligation or incentive to register to a GP and/or to get referrals to access secondary care.
3.3 Price signals on users	Extent to which patients face out-of-pocket expenses (cost-sharing and "over-the-counter").
Coverage principles to promote equity	
4. Level of insurance coverage	
4.1 Breadth - population covered	Proportion of the population covered by basic health insurance.
4.2 Scope of basic coverage	Range of goods and services covered by basic health insurance.
4.3 Depth of coverage	Level of the costs covered for key goods and services included in the basic benefit package, actual level of coverage by health insurance (including PHIs) and out-of-pocket payments for essential care.
Budget and management approaches to control public spending	
5. Setting and sharing the spending envelope	
5.1 Priority setting	Definition of the health benefit basket; criteria taken into account in defining it; effective use of health technology assessments (HTA); definition and monitoring of public health objectives.
5.2 Stringency of the budget constraint	Rules and/or targets to fix the health budget and its allocation across sub-sectors and/or regions.
5.3 Regulation of the workforce and equipment	Quotas for total number of medical students and by speciality; regulation of practice location; policies to address perceived shortages; regulation of hospital high-tech equipment and activities (number of hospitals and beds, specific services, high cost medical equipment) and control of recruitment and remuneration of hospital staff.
5.4 Regulation of prices paid by third-party payers	Regulations of prices paid by third-party payers for primary care physicians, specialists, hospital services and drugs.
6. Decentralisation and delegation	
6.1 Degree of decentralisation to sub-national governments	Number of key decisions taken at a sub-national government level.
6.2 Degree of delegation to insurers	Number of key decisions taken at the insurer level.
6.3 Consistency in responsibility assignment across levels of government	Number of decisions falling under the responsibility of more than one government level and consistency in responsibility assignment.

Source: OECD.

- *Patient choice among providers.* Another approach to contain demand is to restrict patient choice. Figure 3.2 (Panels B and C) reveals that most countries restrain user choice (*e.g.* to providers settled in a given geographical area and/or a network of providers) and/or have gate-keeping arrangements – the Czech Republic, Iceland, Japan, Luxembourg, Sweden and Turkey are the exceptions.[4]

Figure 3.2. **Market signals and regulations impacting on users' behaviour**



Note: The score corresponds to the share of "out-of-pocket" payments in total health expenditure, rescaled from 0 to 6.

Note: A "0" score is attributed to countries where patients face no obligation or incentive to register with a GP and to obtain referral to access secondary care.

Note: A "0" score is attributed to countries where patients face severe limitations when choosing a primary care physician, a specialist and a hospital.

Source: OECD Survey on Health Systems Characteristics 2008-2009; OECD Health Data 2009.

Market mechanisms and regulations affecting providers

Enhancing competitive pressures on providers can have a number of positive impacts, such as increasing productivity, reducing costs and improving the quality of care. There are potentially adverse effects as well, reflecting market imperfections, including the risk of promoting services that are unnecessary and of losing control over public spending. The approaches followed – *i.e.* the mix of market mechanisms and regulations imposed on providers – are very diverse. They include:

- *Volume incentives embedded in provider payment schemes* have long varied significantly across countries (Simoens and Hurst, 2006). Some have paid physicians through salaries and hospitals on the basis of a prospective global

4. In the absence of a regulatory constraint, user choice may still be restricted *de facto* by geographical constraints – in those regions where the distance to alternative providers is long – by the limited number of providers and/or by long waiting times.

budget and both are expected to make providers less responsive to demand than fee-for-services traditionally used in other countries. There has been some convergence in policy settings in recent years, however, as many countries have adopted payment per case for hospitals (Busse *et al.*, 2006) and/or have moved to a mixed physician payment system (combination of fee-for-services and capitation). Still, the Survey reveals that payment schemes for providers embody few incentives to respond to demand for health care services in some countries, including Iceland, Portugal, Spain and Turkey (Figure 3.3, Panel A). For out-patient care, the countries relying mostly on wages to compensate both primary and specialist physicians (including Finland, Mexico, Portugal and Sweden) are also among those with the lowest number of consultations *per capita*. In contrast, reliance on fee-for-services and payment per procedure is widespread in Belgium, Canada, France, Germany, Japan and Switzerland, creating strong incentives for providers to adjust to demand, though with a risk of "supply-induced demand".[5]

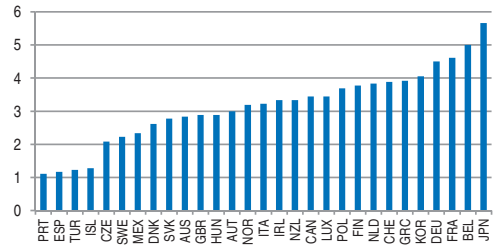
- The *regulations of prices billed by providers* also shape provider incentives. On the one hand, low prices may trigger a substitution effect and lower the volume of health services as treating patients becomes less lucrative. On the other hand, an income effect may result in more care as physicians attempt to compensate for the income loss. In practice, fee changes in Norway have had little income effect (Grytten, 2008), while in Japan, strict regulation of physician fees has been accompanied by very short and repeated physician consultations (OECD, 2009*b*). The Survey suggests a wide cross-country variation in the stringency of price and fee regulations (Figure 3.3, Panel B), with little regulation of providers' prices in Australia, Germany and Mexico and frequent under-the-table payments, which are by definition unregulated, in Greece and Hungary.

- *Regulations of the health workforce and equipment* have been used intensively in some countries. The Survey reveals that many governments cap the number of medical students and their mix by specialty, implement a national pay scale for hospital staff, regulate practice location or the opening of new hospitals, while addressing perceived shortages and regional imbalances. Italy and Turkey intervene most while Iceland and Korea are located at the other extreme (Figure 3.3, Panel C). It should be noted, however, that there is only a weak correlation between the degree of regulation of the physician workforce and either the number of physicians *per capita* or the growth in the number of physicians over recent years.

5. The so-called physician-induced demand arises when patients are poorly informed and do not know how much health care they need while doctors have an incentive to push patients to consume more to boost their incomes (Delattre and Dormont, 2003; Grignon *et al.*, 2002; OECD, 2004; Shafrin, 2010).

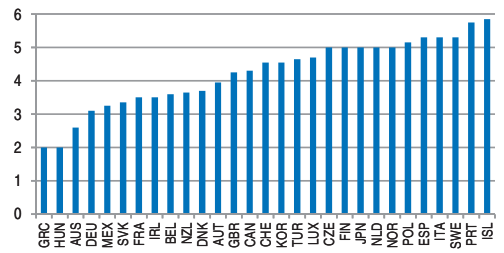
Figure 3.3. **Market signals and regulations impacting on providers' behaviour**

A. Providers' incentive to raise the volume of care



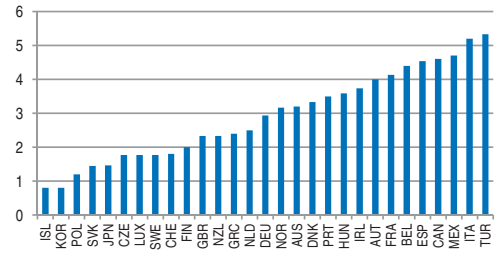
Note: A low score indicates that compensation systems for providers create few incentives to increase volumes of care (e.g. wages for physicians and global budget for hospitals).

B. Regulation of prices billed by providers



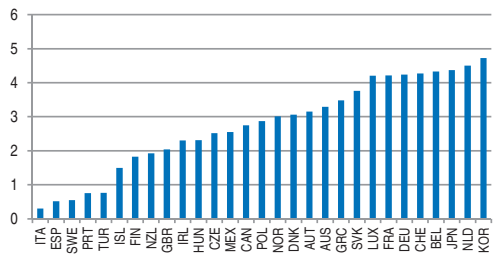
Note: A low score is attributed to countries with few regulations on drug prices and prices billed by physicians and hospitals.

C. Regulations of health workforce and equipment



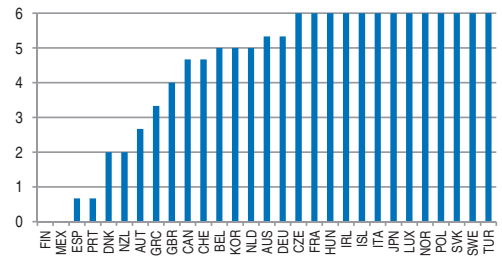
Note: A low score reflects low levels of regulation on in-patient high-tech equipment, activities and staff as well as out-patient physicians.

D. Degree of private provision



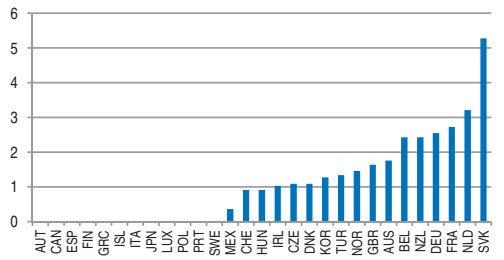
Note: A low score reflects that most health care providers belong to the public sector.

E. Patient choice among providers



Note: A "0" score is attributed to countries where patients face severe limitations when choosing a primary care physician, a specialist and a hospital.

F. User information on quality and prices



Note: A high score is attributed to countries where information on the quality of care and on prices allows patients and/or purchasers to discriminate among providers.

Source: OECD Survey on Health Systems Characteristics 2008-2009.

- By increasing rivalry among suppliers, the *degree of private provision* in both the in-patient and out-patient care sectors strengthens competitive pressures, potentially reducing costs of provision, improving quality and fostering innovation (OECD, 2006*b*; Ennis, 2006). In the presence of market failures, however, such positive developments may not materialise. The Survey shows that the share of private hospital beds in the total number of acute care beds varies greatly across countries. It is virtually non-existent in some countries (including Canada, Denmark, Iceland, Norway, Poland, Sweden and the United Kingdom) and is above 50% in Belgium, Germany, Japan, Korea and the Netherlands. The indicator on the degree of private provision (Figure 3.3, Panel D) combines this

information with information on the predominant mode of provision for different types of out-patient physician services – from public centres to private solo practice.

- Providing *patient choice among providers* enhances consumer empowerment and stimulates competition. It thus strengthens provider incentives to improve quality and/or contain prices, in particular if money follows the patient and if information on the quality and price of services is made publicly available. Many countries have recently increased patient choice over where and by whom they will be treated (including Norway, Sweden and the United Kingdom). Still, the Survey reveals that patient choice among providers is very limited, if existing at all, in several countries, including Finland, Mexico, Portugal and Spain (Figure 3.3, Panel E).
- Improved *user information on the quality and prices* of health care services should reinforce competitive pressures by helping users to choose the most effective providers and thus motivate performance improvements.[6] Ample information may also be important where user choice is limited because purchasers and users can benchmark providers and push for an improvement in case of poor performance – *i.e.* yardstick competition. The difficulty in understanding the information may, however, limit its use, as seems to have been the case in the United States (Hurst, 2002; Hanoch *et al.*, 2009). Overall, the Survey suggests that user information on prices is still limited in some of the countries where providers do not apply the same price (including Belgium, the Netherlands, New Zealand and Turkey). Also, there is virtually no information on the quality of services of individual providers in the majority of OECD countries (Figure 3.3, Panel F).

Market signals and incentives affecting insurers

The availability of several publicly or privately financed options for basic health coverage increases consumer choice and thus competitive pressures. The higher the degree of user choice for basic coverage, the higher the pressures to adapt to consumer preferences (Colombo and Tapay, 2004) and to adopt new medical technologies (Dormont *et al.*, 2007). But multi-payer systems may also come with costs compared with an integrated system of financing (OECD, 2004): they may entail a loss of monopsonistic power for payers when negotiating with providers;[7] they may result in higher administrative costs (Woolhandler *et al.*, 2003); they may generate frustration among people when choice becomes overly complex (Hanoch *et al.*, 2009); and they may make it difficult to maintain equity in access and in financing. These have been important reasons for the Integration Reform in Korea which merged a large number of insurance companies into a single payer in July 2000 (OECD, 2003*a*). In addition, individual switching among insurers has often been limited by high transaction costs, a lack of

6. In the United Kingdom, Primary Care Trusts have been obliged to offer most patients a choice among hospitals. To help patients make effective choice, "NHS Choices" is a website that facilitates comparisons by providing information on items, such as waiting times, re-admission rates, as well as comments and ratings by patients (OECD, 2009*e*).

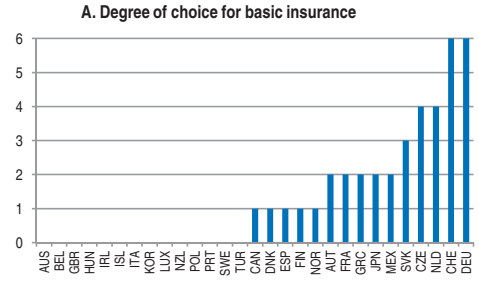
7. In the United States, however, private health insurers have been quite active in negotiating with providers, in particular in the context of managed care initiatives (OECD, 2004).

portability of coverage and the absence of comparative information on insurers' performance.

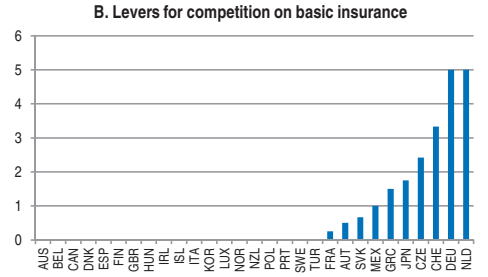
Three main indicators have been built to characterise countries' reliance on market signals and regulations in delivering health insurance coverage. They are as follows:

- *User choice for basic insurance coverage*. Some countries have introduced or strengthened competition across insurers since the early 1990s. The Czech Republic, Germany, the Netherlands, the Slovak Republic and Switzerland are clear cases.[8] Still, the Survey shows (Figure 3.4, Panel A) that in most OECD countries, competition is virtually inexistent, as citizens have no choice among insurers for basic coverage (*e.g.* NHS countries and countries with a unique social insurance system). In some countries (*e.g.* France, Greece, Japan and Spain), the basic health coverage is linked to employment status or set at the regional/local level and, although there is no formal market, yardstick competition may arise.

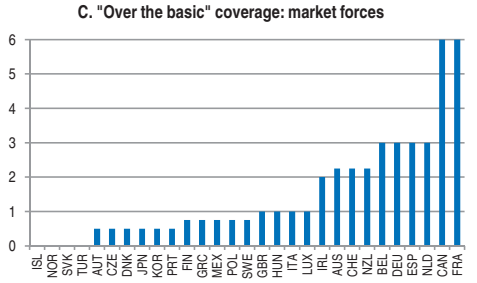
Figure 3.4. **Market signals and regulations impacting on insurers' behaviour**



Note: A "0" score is attributed to countries with a single national scheme (NHS or single-payer system).



Note: A "0" score is attributed to countries with a single national scheme (NHS or single-payer system) or to countries with multiple schemes but no degree of freedom to change the scope, premium, etc. for the basic insurance package.



Note: Countries are given a higher score when the share of PHI in total expenditure is high, when the share of the population covered by a PHI is high and when the degree of market concentration is low.

Source: OECD Health Data 2009; Survey on Health Systems Characteristics 2008-2009.

- *Levers for competition on basic insurance.* Those countries with wide user choice have relied on competitive levers to varying degrees. Competition tends to be stronger if insurers can adjust the benefit basket, depth of coverage and/or premia and can negotiate and contract with providers. In the Netherlands, for instance, the selective contracting clause, which allows health insurers to select health care

8. In Switzerland, free choice of insurer and open enrolment were introduced in 1996. In 2007, the Parliament decided to refine the risk equalisation scheme. This amendment will come into force in 2012.

providers and negotiate with hospitals and pharmaceutical companies, is considered as a central pillar of the recent market-oriented health care reform (RIVM, 2008; Leu and Matter, 2009). In those countries where there is competition in the basic insurance market, fair competition is underpinned by risk-adjustment schemes between insurance pools with a low risk and a high risk population, and competition is strengthened by the availability of information on insurance packages. The Survey confirms that levers for competition in the insurance market for basic coverage are virtually inexistent in most OECD countries (Figure 3.4, Panel B).

- *"Over-the-basic" coverage*. The share of both the population and spending covered by private insurers, over and above the "basic" insurance package – here called *"over-the-basic" coverage* – affects the intensity of market pressures in the health insurance market. Canada and France stand out in this respect, with more than two thirds of the population covered, private health insurance spending accounting for over 10% of total health expenditure and a rather low degree of market concentration (Figure 3.4, Panel C).

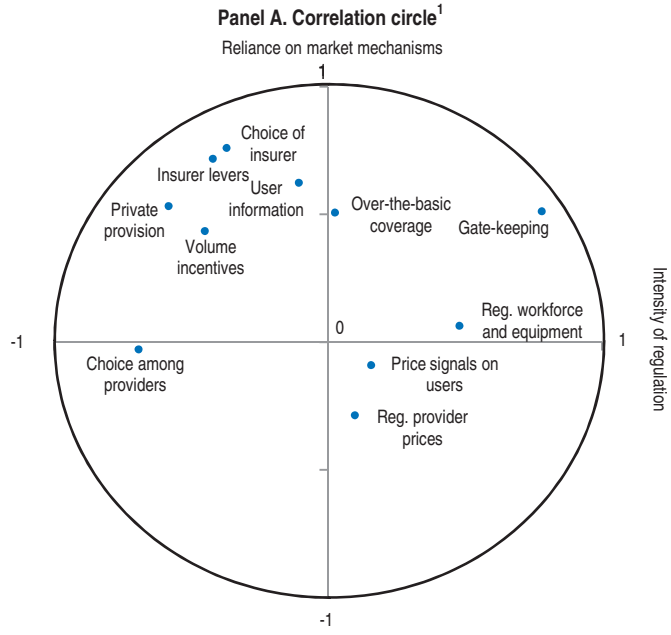
Overall, countries rely on different mixes of regulations and market instruments

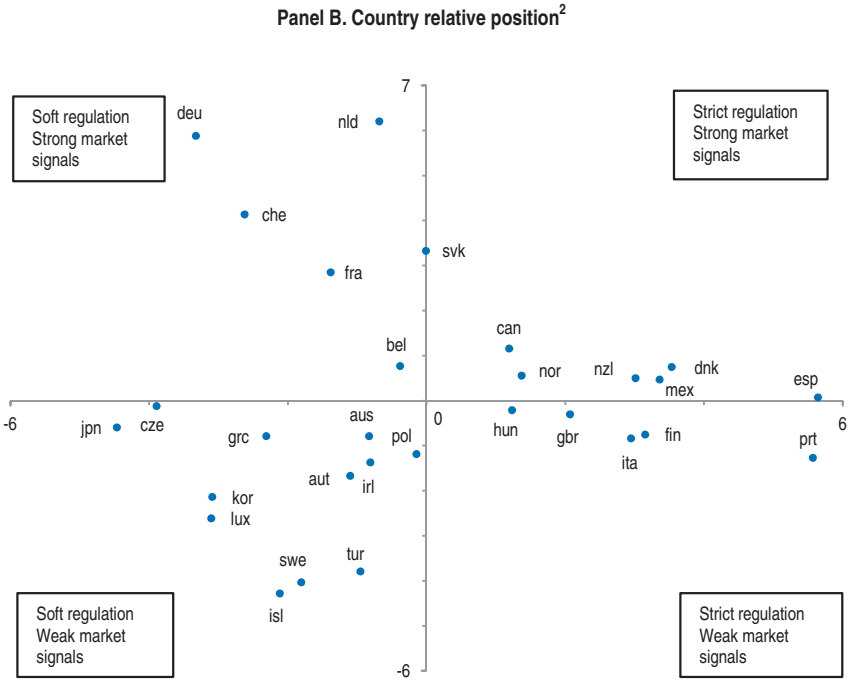
To assess how regulations and market mechanisms steering the demand and supply of health care services are combined within countries and to identify those which most differentiate countries, a principal component analysis (PCA) has been conducted (Annex 3.A3 provides technical details on the PCA). The PCA reveals that the main dimension differentiating countries is the degree of reliance on regulations, which corresponds to the horizontal axis (Figure 3.5, Panel A). Gate-keeping arrangements and regulations of health care resources and prices have the highest weights for the first principal component; they tend to be implemented simultaneously across countries (Table 3.2). In contrast, the degree of user choice among providers appears with a high but negative weight – those countries relying most on regulation tend to offer users little choice among providers. Countries which lie on the right side of Figure 3.5 (Panel B) are those with a high intensity of regulation – Portugal and Spain appear as highly regulated countries with very limited or no choice of providers.

The degree of reliance on market mechanisms to steer the behaviour of insurers and health care providers is the second main dimension differentiating countries. The second principal component (corresponding to the vertical axis) is mainly driven by the degree of competition in insurance markets (choice of insurers and insurance levers for the basic coverage package as well as market forces on the "over the basic" segment) and in provider markets (degree of private provision, volume incentives for providers and user information). The PCA thus suggests that countries most often combine various market instruments. Countries which lie in the upper part of Figure 3.5 (Panel B) are those with a high intensity of market forces on the provider and insurance markets. France, Germany, the Netherlands, the Slovak Republic and Switzerland are clear examples.

Figure 3.5. **Reliance on market mechanisms and regulations to steer demand and supply of care**

Results of a principal component analysis





1. The axes of the chart correspond to the first two factors of the PCA, *i.e.* those that explain the greatest part of the cross-country variance of policy instruments. The values on the horizontal (respectively vertical) axis correspond to the correlation coefficients with the first (respectively second) factor of the PCA.
2. The values on the horizontal axis (resp. vertical) correspond to weighted averages of policy instruments, weights being determined by the eigenvector associated with the first (respectively second) factor of the PCA.

Source: OECD Survey on Health Systems Characteristics 2008-09.

Table 3.2. **Principal component analysis on market mechanism and regulation indicators**

	Principal components				
	1	2	3	4	5
Eigenvalue	7.7	6.6	3.6	2.7	1.9
Share of the variance explained (%)	29.8	25.5	14.1	10.5	7.2
Cumulative share of the variance explained (%)	29.8	55.4	69.5	80.0	87.2
Eigenvectors					
Choice of insurers	-0.24	0.53	-0.40	-0.09	0.31
Insurer levers	-0.22	0.40	-0.28	-0.11	0.28
Over-the-basic coverage	0.01	0.31	0.27	0.68	0.17
Private provision	-0.28	0.28	0.01	0.09	-0.51
Volume incentives	-0.18	0.19	0.09	0.18	-0.38
Regulation of provider prices	0.04	-0.12	-0.06	-0.22	0.34
User information	-0.05	0.31	0.24	-0.18	-0.21
Regulation of the workforce and equipment	0.23	0.03	0.15	0.44	0.36
Choice among providers	-0.51	-0.02	0.70	-0.28	0.30
Gate-keeping	0.68	0.48	0.30	-0.35	-0.04
Price signal on users	0.03	-0.02	-0.13	-0.01	-0.11

Source: OECD calculations.

The PCA also suggests that the degree of reliance on price signals for users hardly helps differentiating countries when due account is taken of other regulatory and market approaches. The variable is located very close to the centre of the circle (Figure 3.5, Panel A), signalling very weak correlations with the first two principal components which account for more than half of the variance.[9] And its weights on the next three main principal components are very low (Table 3.2). In practice, the level of out-pocket payments is low in many countries giving extensive choice to users, *e.g.* the Czech Republic, France, Germany and Luxembourg but high in several others (including Korea, the Slovak Republic and Switzerland). Put differently, market mechanisms to discipline providers (including user choice, private provision and compensation systems which create incentives to increase the volume of care) are not systematically accompanied by market mechanisms to discipline demand (price signals on users) or gate-keeping arrangements. This may suggest that, when setting user fees, political economy, fiscal and/or equity considerations play a greater role than willingness to ensure consistency in policy settings.

The mix of market instruments and regulations displays significant cross-country variation. While market-based and regulatory approaches are often presented as two distinct models, in practice they are more often combined than used in isolation. Some of the countries relying intensively on regulation also use market instruments to steer the demand and supply of health care services:

- Germany, the Netherlands and Switzerland all rely intensively on market mechanisms for managing both the basic coverage package and the supply of

9. Changing the coding system for the variable *price signals on users* – so as to magnify its dispersion by giving the maximum score of six to the country with the highest out-of-pocket payment to spending ratio and adjusting the other country scores consistently – does not alter this result.

services. But the Netherlands regulates prices billed by providers more tightly than the others.

- Canada and France also rely heavily on market mechanisms in managing the supply of health care services and health insurance, but only for the "over-the-basic" coverage, and rely on regulations simultaneously, though more for the health workforce and equipment than for provider prices.
- In Iceland, Sweden, and Turkey, competitive pressures are weak – private provision and incentives for providers to respond to demand are rather limited. Users are given an extensive choice among providers but regulation of provider prices is strict.
- Denmark, Finland, Mexico, Portugal and Spain are countries characterised by a monolithic, command-and-control, approach – little private provision, no choice of providers, little incentive for providers to respond to demand and strict gate-keeping.
- The other countries rely on a mix of relatively soft regulation and low competitive pressures for providers.

Promoting equity in health care access: indicators on health care coverage

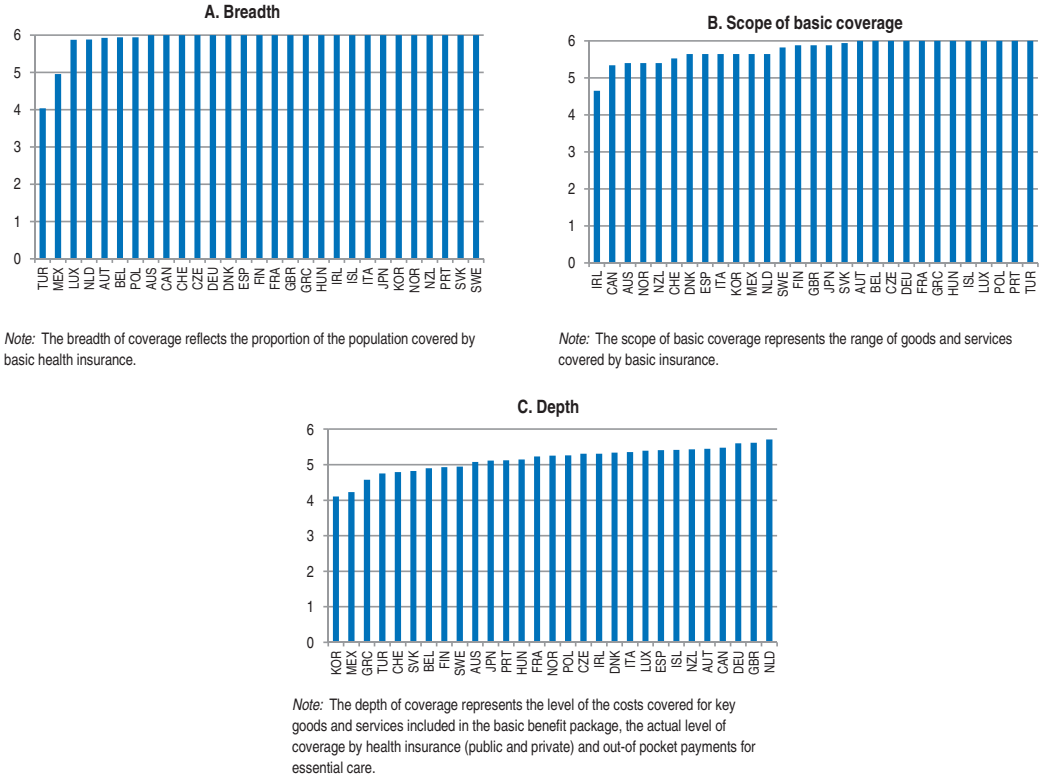
Adequate access to essential health care services has long been a health policy goal in virtually all OECD countries. The comprehensiveness of insurance coverage is a key factor shaping access to health care services by disadvantaged groups. It largely depends on three key dimensions:

- The *breadth of basic insurance coverage*. OECD countries have now achieved close to universal coverage of the population for a core set of health services. Among the 29 OECD countries which responded to the Survey, Mexico and Turkey are exceptions (Figure 3.6, Panel A).[10]
- The *scope of basic coverage*. In virtually all the 29 countries covered, acute in-patient care, consultations for out-patient general practitioners and specialists, clinical laboratory tests as well as diagnostic imaging are included in the basic insurance package – Ireland is the exception as visits to GPs in the out-patient care sector are not covered by the basic package. Several countries exclude eyeglasses, dental care and dental prostheses from the basic coverage (Australia, Canada, Ireland, New Zealand and Norway) or some of these (Denmark, Finland, Italy, Japan, Korea, Mexico, Netherlands, Spain, Sweden, Switzerland and the United Kingdom). Overall, however, eyeglasses, dental care and dental prostheses account for a rather small share of total health care spending and the data suggest that there is very limited variation in the scope of basic coverage across OECD countries (Figure 3.6, Panel B).
- The *depth of insurance coverage*. Costs of in-patient and out-patient care are fully covered by the basic package in 11 countries while in several others out-patient care costs are covered at between 51 and 75%. Coverage by

10. Turkey has been moving towards universal, contributory social health insurance for many years and has now achieved that goal in legislation passed in April 2008 (OECD, 2008*b*).

complementary, supplementary and/or duplicative insurance further contributes to reducing the level of out-of-pocket payments in several countries (in particular Canada, France, Ireland and Switzerland).[11] Overall, the depth of insurance coverage is lowest in Greece, Korea, Mexico, Switzerland and Turkey and highest in Germany, the Netherlands and the United Kingdom (Figure 3.6, Panel C).

Figure 3.6. **Health insurance coverage**



Note: The breadth of coverage reflects the proportion of the population covered by basic health insurance.

Note: The scope of basic coverage represents the range of goods and services covered by basic insurance.

Note: The depth of coverage represents the level of the costs covered for key goods and services included in the basic benefit package, the actual level of coverage by health insurance (public and private) and out-of pocket payments for essential care.

Source: OECD Survey on Health Systems Characteristics 2008-2009.

Controlling public spending: indicators on budget and management approaches

The sustainability of public spending on health care has become, and continues to be, a pressing policy issue in most countries. The following indicators cover two key aspects: the features for the setting and sharing of the spending envelope and the degree of decentralisation and delegation of decision-making.

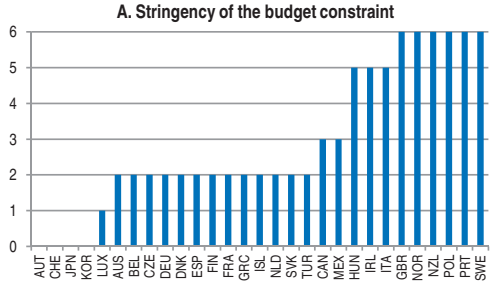
11. Almost 90% of the French population benefits from a *complementary* private health insurance to cover cost-sharing in the social security system and private insurances finance more than 13% of total health expenditure. The Netherlands and Canada have a large *supplementary* insurance market whereby private insurance pays for items that are not included in the basic coverage. *Duplicative* insurance provides faster access to medical services where there are waiting times in public systems. These markets are largest in Ireland, Australia and New Zealand (OECD, 2009*a*).

Setting the budget envelope, prices and volumes

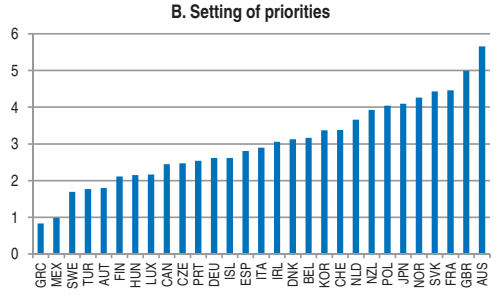
To contain spending pressures, countries have adopted a variety of instruments:

- Some have tightened the *stringency of the budget constraint*, imposing caps on health spending either overall or by sector. The Survey shows that budgetary caps and controls have been widely used, in particular in countries where health care delivery is mainly a public sector responsibility (for instance, in New Zealand, Norway, Poland, Portugal, Sweden and the United Kingdom). In contrast, Austria, Japan, Korea and Switzerland do not impose a constraint on public spending on health *via* the budget process (Figure 3.7, Panel A).
- *Regulations of prices paid by third-party payers* and of the *health workforce and equipment* have also been used (Figure 3.7, Panels C and D). As an example, Belgium has set an aggregate budget cap since the mid-1990s to determine the global budget, complemented by budgetary targets for sub-sectors. Corrective measures – such as adjustment of fees and reimbursement rates – are taken when there is a risk of overrun (OECD, 2005*a*).
- Another, and sometimes complementary, approach has been to reinforce the *setting of priorities* (Figure 3.7, Panel B) – in particular through an effective use of health assessment technologies and well-defined criteria for the scope of the benefit basket.

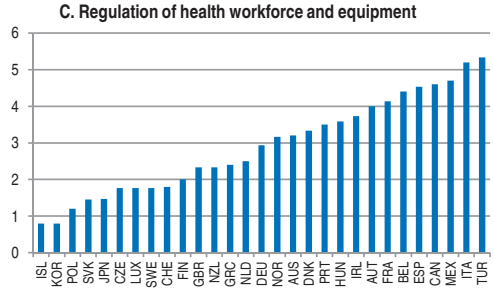
Figure 3.7. **Budget and management approaches – Setting and sharing the spending envelope**



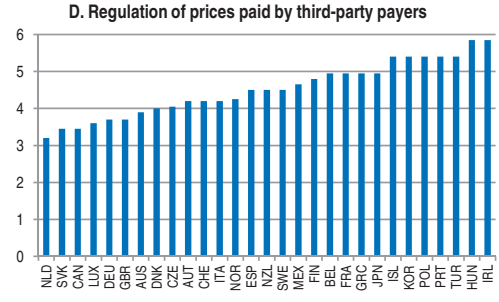
Note: A "0" score is attributed to countries with a soft budget constraint.



Note: The scores reflect whether a health benefit basket is defined, criteria taken into account to define it, the definiton and monitoring of public health objectives.



Note: A low score reflects low levels of regulation on in-patient high-tech equipment, activities and staff as well as out-patient physicians.



Note: A low score is attributed to countries with few regulations on prices paid by third-party payers for primary care physicians, specialists and hospital services.

Source: OECD Survey on Health Systems Characteristics 2008-2009; OECD Health Data 2009.

Distributing responsibility across levels of government or bodies

The allocation of health care responsibilities across government levels and/or to insurers shapes the degree of control over public spending on health care. Decentralisation could raise the responsiveness of the health care system to local needs, stimulate competition across jurisdictions and promote experimentation.[12] On the other hand, decentralisation might also result in undue institutional complexity, waste through duplication, lax control over spending when responsibilities overlap and insufficient exploitation of economies of scale (Diderichsen, 1995; Joumard and Kongsrud, 2003).[13] A few countries have recently transferred some responsibilities to sub-national governments (*e.g.* Italy and Spain) but many others (including Denmark, Ireland, Norway and Poland) have recentralised health care responsibilities (Bach *et al.*, 2009; Saltman, 2008).

To capture the degree and quality of decentralisation/delegation across levels of government or bodies, three indicators have been built:

- The *degree of decentralisation to sub-national governments* in decision-making over key health policy issues is shown in Figure 3.8 (Panel A). It reflects the actual decision autonomy of sub-national governments on key health care spending issues (including setting remuneration methods for providers and financing new health care facilities). It is the highest in Canada, Finland, Spain, Sweden and Switzerland.[14]
- *The degree of delegation to insurers*. Decision-making is, in some countries, also devolved to health funds. As an illustration, in Korea, insurance funds are involved in setting the basis and level of social contributions for health, remuneration methods for physicians and hospitals; they also finance new hospital buildings and high cost-equipment as well as their maintenance. Highly decentralised countries also tend to delegate little decision autonomy to insurers, Switzerland being the main exception (Figure 3.8, Panel B).
- The indicator on the degree of *consistency in responsibility assignment* across levels of governments measures the extent to which responsibilities are clearly defined, allocated consistently and with a minimal degree of overlap (Figure 3.8, Panel C). The degree of consistency in responsibility assignment declines when several levels of government are involved in key health care decisions (as it is for

12. In Sweden, county councils have significant responsibilities for managing the health care system. They manage hospitals, control the establishment of private practices and set the fees that must be adhered to by private providers to be reimbursed by the social insurance system. Decentralisation is considered to have raised the flexibility of the health care system and made it more innovative (OECD, 2005*b*).

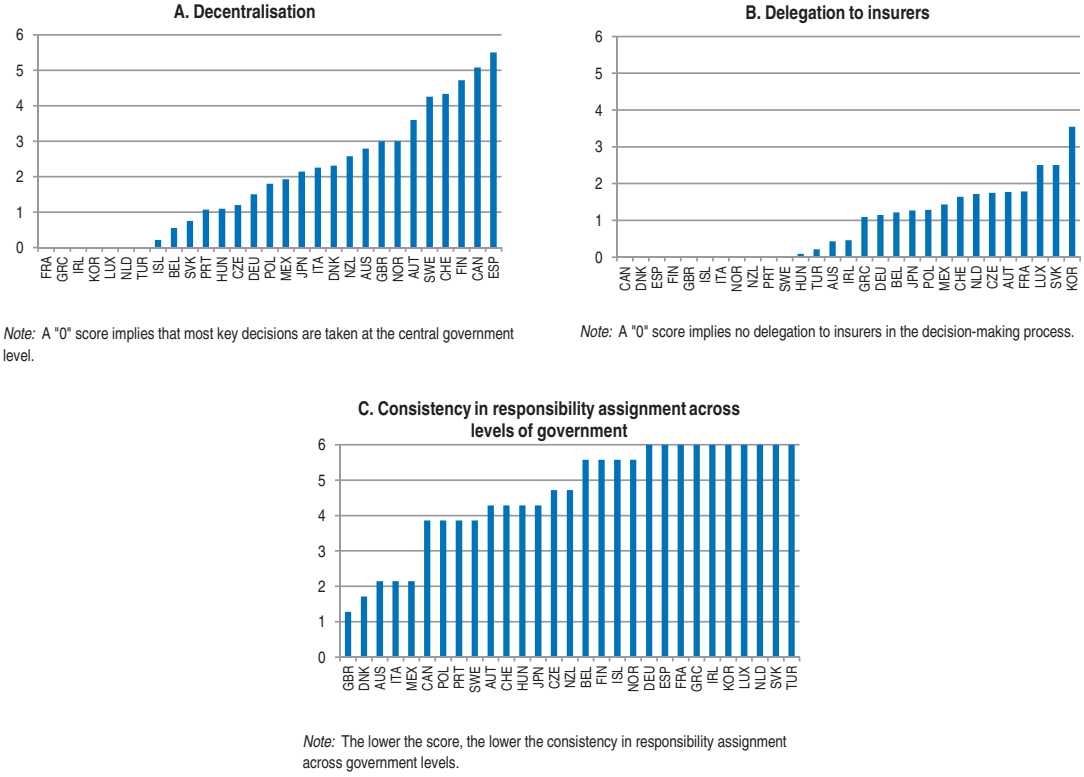
13. Fragmented decision making and funding arrangements often create cost- and blame-shifting between government levels. The *OECD Economic Surveys* for Australia and Norway provide examples (OECD, 2006*a*; OECD, 2002).

14. In most cross-country empirical studies, the degree of decentralisation is measured by the share of public spending of sub-central governments. However, a large spending share may not coincide with true spending autonomy since sub-central government spending may be influenced by central government regulations (Bach *et al*., 2009). For health care, however, sub-central government spending shares are closely related with the actual decision autonomy of sub-central governments as defined by the Survey.

example the case for financing high-cost equipment in Australia, Canada, the Czech Republic, Denmark, Italy, Japan, Mexico, New Zealand, Poland, Portugal, Sweden, Switzerland and the United Kingdom). It also declines when the assignment of different responsibilities may create inappropriate incentives (*e.g.* the financing of new hospitals at one government level and the maintenance of existing hospitals at another level, potentially resulting in duplication and/or under-provision and blame-shifting).

Overall, the stringency of the budget constraint and the degree of decentralisation are the two policy variables that most differentiate countries' budget and management approaches in controlling public spending. The PCA carried out on the subset of variables depicting budget and management approaches further suggests that consistency in responsibility assignment across levels of government tend to be lower in the most decentralised countries – Finland and Spain are exceptions – and that the delegation of responsibilities to health insurers is higher in centralised countries.[15]

Figure 3.8. **Budget and management approaches – Decentralisation and delegation**



Note: A "0" score implies that most key decisions are taken at the central government level.

Note: A "0" score implies no delegation to insurers in the decision-making process.

Note: The lower the score, the lower the consistency in responsibility assignment across government levels.

Source: OECD Survey on Health Systems Characteristics 2008-2009.

15. The main results of the PCA on budget and management approaches are presented in Annex 3.A4.

Annex 3.A1

Market failures and imperfections in health care systems

Competitive markets have long been considered by mainstream economists as leading to an efficient allocation of resources and maximisation of social welfare in many situations. The neo-classical economic theory demonstrates that the equilibrium attained in a perfectly competitive market is optimal in the Pareto sense, *i.e.* no other allocation of resources can make all market participants better off.[1] However, such a competitive equilibrium can only be achieved under certain conditions, many of which are violated in the health care sector. Since the pioneering work by Arrow (1963), a large body of literature has investigated the reasons for market failures in both health care services and insurance. This Annex provides an overview of these market failures and reviews government interventions designed to address them.

Market failures and imperfections in health care services

Externalities

The consumption of health care services can provide benefits not only for an individual but also to others. An obvious example is the treatment for communicable diseases and immunisation. In the presence of such externalities, consumption determined by the market is socially sub-optimal, calling for public intervention. In addition, some health-care related activities, in particular in research and development, have public goods characteristics (Smith, 2008*a*).

Informational asymmetries

The assumption of consumer sovereignty is generally violated in health care markets,[2] as providers often have a dominant market position over patients and payers (either insurers or government) because they have more information on the need for and appropriateness of medical care. Furthermore, there are limited opportunities for individuals to assess the quality of care from experience and individuals often have to make decisions while being vulnerable (Hurley, 2000). As a result, patients mainly rely

1. The Pareto-optimal allocation of resources might not be optimal from a social point of view. A change in allocation of resources which would greatly improve the situation of most market participants, while deteriorating modestly that of a few, would certainly be desirable from a social standpoint. In perfectly competitive markets, money transfers (tax and subsidies) can be used to achieve an equilibrium in line with social preferences (Arrow, 1963).

2. Consumer sovereignty refers to the fact that, in a perfectly competitive market, consumers ultimately dictate what is to be produced.

on medical advice. Hence, demand can be supply-induced, eventually leading to over-consumption.[3] A number of policies can mitigate informational problems. On the demand side, information on the quality of health care can be made available to patients. On the supply side, providers' autonomy can be limited through utilisation reviews, pre-authorisation programmes, practice guidelines and promotion of prevention – as in managed care settings. Compensation systems can also be designed to limit incentives to increase the volume of care – *e.g.* paying physicians by capitation or wages rather than fee-for-service.

Informational asymmetries also exist between health regulators and providers. Medical expertise is required to assess the effectiveness of medical practice. Hence, governments have granted health professionals large powers of self-regulation, thereby strengthening their position. Similarly, health care providers have an informational advantage over insurers, limiting the ability of the latter to assess the value of health care.

Barriers to entry and exit

Competitive markets assume free entry and exit. In the health care sector, entry of providers is highly regulated to ensure the quality of care.[4] In many cases, health care providers do not face a credible threat of closure. It is, for instance, politically difficult to close local hospitals (Smith, 2008).

Monopoly power

In many cases, health care providers enjoy some monopoly power, stemming either from technical characteristics of health care – *e.g.* economies of scale – or from government intervention aimed at guaranteeing the quality of care or by granting intellectual property rights. Economies of scale in the hospital sector imply that "in many specialties and geographic locations there exists little realistic choice of provider" (Smith, 2008). Patent laws grant a monopoly to new drugs and medical technologies (Hsiao and Heller, 2007).

Market failures and imperfections in the insurance sector

Uncertainty is a central feature of health care: individuals are facing uncertainties about the occurrence of a disease and the effectiveness of treatment. The ability to reach a competitive equilibrium in health insurance markets depends on the existence of a full set of markets covering these risks, but this proves impossible in practice because of a number of market failures, such as adverse selection and moral hazard.[5]

3. Behavioural economics suggests that a number of additional factors – *e.g.* limited ability of patients to process information or the desire to avoid regret – might contribute to what appears as demand inducements (Frank, 2004).

4. There may be technical obstacles to market entry: for instance, training doctors and building hospitals take a considerable amount of time.

5. Arrow (1963) argues that the fact that a full set of insurance markets does not exist explains the development of non-market social institutions.

Risk selection

The asymmetry of information between the consumer and the insurer about the former's health condition results in *adverse selection* – those with greater risks are more likely to subscribe to health insurance at a higher level than those in good health. Premiums set according to average risk will thus not be sufficient to cover claims. And rising premiums will lead low-risk individuals to cancel their insurance policies. Compulsory insurance is an obvious answer to adverse selection.

Cream-skimming or risk selection by insurers designates the ability of insurers to select low-risk individuals and avoid covering high-risk ones. Cream-skimming can be addressed through regulation limiting risk selection practices and/or by creating systems of risk-equalisation which allow redistribution between low- and high-risk insurance pools.

Moral hazard

When patients do not bear the full cost of medical care, they might be inclined to consume more than necessary. Similarly, health providers, knowing that their patients are well insured, might tend to prescribe more care than required, especially if they can derive a financial benefit. Avoiding compensation systems which provide incentives for providers to increase volumes of care and promoting evidence-based medical practice can mitigate moral hazard. Increasing cost-sharing can also reduce moral hazard, but with the risk of putting some individuals at risk financially and raising equity concerns.

Economies of scale

Fixed administrative costs and efficiency gains associated with risk-pooling generate economies of scale. Hence, having a large number of small firms will lead to technical inefficiencies, while having a small number of large firms will produce monopolistic positions. A single-payer is sometimes seen as a remedy in the presence of economies of scale (Hurley, 2000).

Annex 3.A2

Coding indicators on health policy and institutions – examples

To draw cross-country comparisons on a reasonable number of indicators on health policy and institutions, the wide ranging dataset obtained from the questionnaire (269 mainly qualitative variables) was transformed into a smaller number of quantitative indicators, bound between 0 and 6. In addition, some policy indicators were built directly from existing OECD databases (mainly Health Data and System of Health Accounts), with the implicit assumption that these captured well a policy dimension. Overall, the number of quantitative indicators for policies and institutions was restricted to 20. The rest of this Annex describes the principles and underlying assumptions to build three quantitative indicators as an illustration, the first two from the questionnaire and the last one using data from the System of Health Accounts.

Patient choice among providers

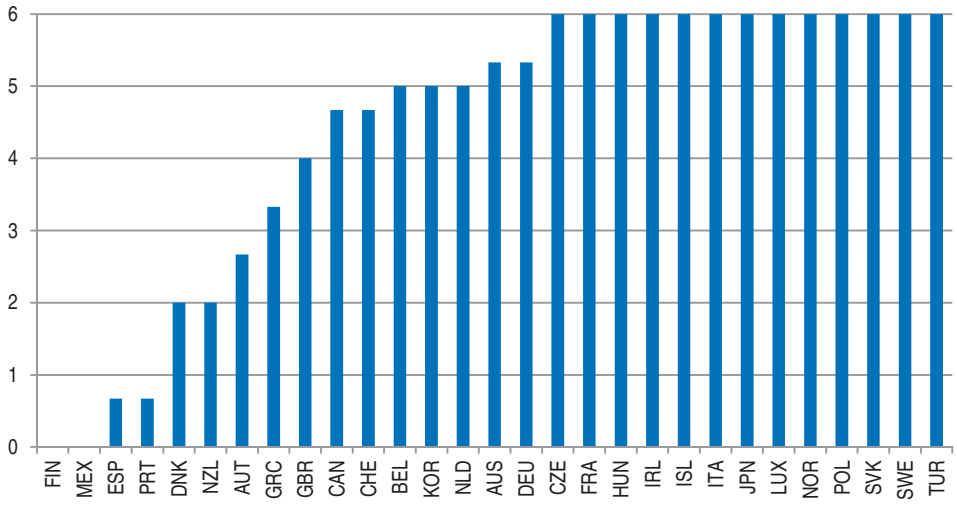
The questionnaire investigated whether patients are free to choose any doctor (or hospital), face incentives to choose one doctor (hospital) over another one, or have a limited choice, restricted to a geographical area or a network of providers for instance. The score was computed as an additive score, according to the rules presented in Table 3.A2.1. Countries with the highest scores are the ones where patients are offered the widest choice among providers (Figure 3.A2.1).

Table 3.A2.1. **Scoring the degree of patient choice**

Questions	Replies	Additive score
How is the choice of a primary care physician for patients?	Free	2
	Financial incentives (*e.g.* reduced co-payments) influence patient choice	1
	Limited (*e.g.* to a geographical area or a network of providers)	0
How is the choice of a specialist for patients?	Free	2
	Financial incentives (*e.g.* reduced co-payments) influence patient choice	1
	Limited (*e.g.* to a geographical area or a network of providers)	0
How is the choice of hospital for patients?	Free	2
	Financial incentives (*e.g.* reduced co-payments) influence patient choice	1.33
	Limited but with exceptions (*e.g.* waiting time)	0.67
	Limited (*e.g.* to a geographical area or a network of providers)	0

Source: OECD Survey on Health System Characteristics 2008-2009 (see Paris *et al.,* 2010 for more details).

Figure 3.A2.1. **Patient choice among providers**



Source: OECD Survey on Health Systems Characteristics 2008-2009.

Gate-keeping

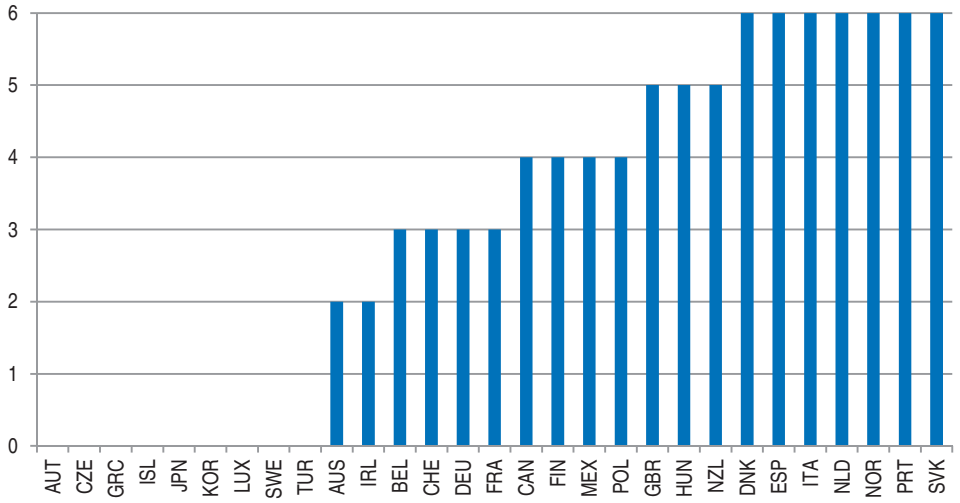
Information on the obligation or incentives to both register with a primary care physician and obtain referral to access secondary care was collected *via* the questionnaire. In transforming this qualitative information to a quantitative indicator bound between 0 and 6, the assumptions described in Table 3.A2.2 have been used. Those countries with the highest score for gate-keeping are those where constraints are the most stringent (Figure 3.A2.2).

Table 3.A2.2. **Scoring the level of gate-keeping**

Score in brackets		Referral to access secondary care by general practitioners		
		Required	Incentives	Not requirement, no incentive
Registering with a primary care physician	Obliged	Denmark, Spain, Italy, Netherlands, Norway, Portugal, Slovak Republic [6]	[4]	[2]
	Incentives	United Kingdom, Hungary, New Zealand [5]	Belgium, Switzerland, Germany, France [3]	[1]
	No obligation, no incentive	Canada, Finland, Mexico, Poland [4]	Australia, Ireland [2]	Austria, Czech Republic, Greece, Iceland, Japan, Korea, Luxembourg, Sweden, Turkey [0]

Source: OECD Survey on Health System Characteristics 2008-2009 (see Paris *et al.,* 2010 for more details).

Figure 3.A2.2. **Gate-keeping**



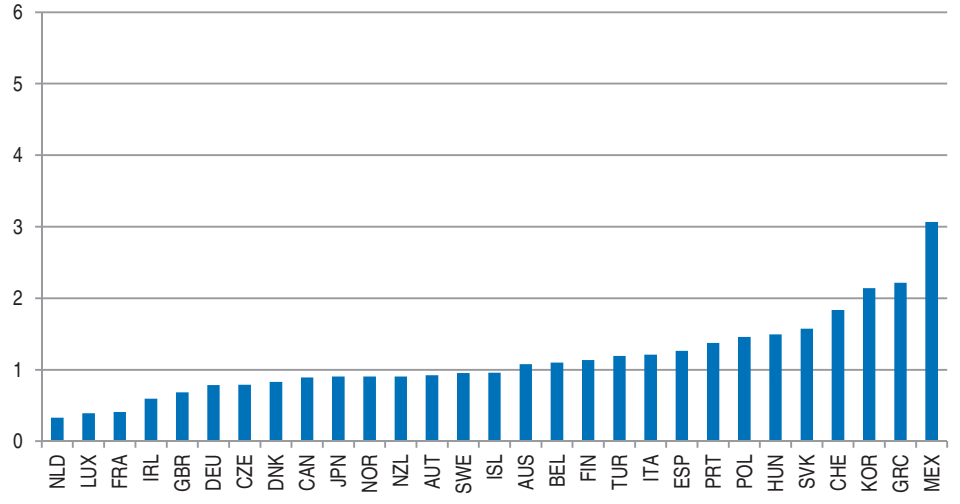
Source: OECD Survey on Health Systems Characteristics 2008-2009.

Price signals on users

The indicator *Price signals on users* reflects the degree to which patients face out-of-pocket payments (OOPs). Data are extracted from the System of Health Accounts, with the indicator defined as the share of OOPs to total health expenditure. In this database, OOPs include both cost-sharing for goods and services covered by the basic health insurance package, as well as the consumption of other health goods and services. For Mexico and Turkey, they also include health spending of the non-insured.

Out-of-pocket payments as a share of total health expenditures range from 5.5% to 51.1% across the OECD. Figures were rescaled on a 0 to 6 range. OOPs as a share of total health expenditure are the lowest in the Netherlands, Luxembourg and France while they are the highest in Mexico and Greece, followed by Korea and Switzerland (Figure 3.A2.3).

Figure 3.A2.3. **Price signals on users**



Source: OECD Health Data 2009.

Annex 3.A3

Principal component and cluster analyses

Going beyond the analysis of simple (bilateral) correlations, Principal Component Analysis (PCA) can be used to identify those institutional features which most differentiate OECD countries and to assess empirically how various institutional features are combined across countries. Cluster analysis can be used to group countries with comparable policy settings, *i.e.* specific combinations of policy instruments.

Principal component analysis (PCA)

PCA condenses the information contained in a set of indicators into a smaller number of uncorrelated principal components, which are linear combinations of the original indicators. If X is a (n,p) matrix of n countries and p indicators, the first principal component (eigenvector) v_1 is obtained by maximising the variance explained $v_1'X'X\ v_1$ under a normalisation constraint $v_1'v_1 = 1$. The second principal component is obtained by maximising $v_2'X'X\ v_2$ under the normalisation constraint $v_2'v_2 = 1$ and the condition that it is orthogonal to the first principal component $v_1'v_2 = 0$. Other principal components are derived in the same way. One can demonstrate that v_1 corresponds to the eigenvector associated with the largest eigenvalue of the covariance matrix X'X, v_2 to the eigenvector associated with the second largest eigenvalue and similarly for the other principal components. The eigenvalues represent the percentage of variance explained by each principal component and the p elements of the eigenvectors reflect the weights attributed to each indicator in the calculation of principal components (*e.g.* Table 3.2 in the main text).

The circle of correlations is a standard way to illustrate the relationship between principal components and indicators. The correlation coefficient between indicator i and principal component j is derived as $\sqrt{\lambda_j}.v_{ij} / \sigma_i$, where λ_j is the eigenvalue associated with principal component j, v_{ij} the component of eigenvector j corresponding to variable i and σ_i the standard deviation of variable i. These coefficients – sometimes referred to as factor loadings – are reported in the correlation circle (*e.g.* Figure 3.5, Panel A). The variables which exhibit the strongest correlations with the principal components, and hence have most weight in this analysis, are represented close to the circle. Variables situated in the centre of the circle have little significance on the dimensions identified by the principal components – they are little correlated with most of the other variables.

Country coordinates on principal components can be computed using the relevant eigenvectors v_j to weight indicator values, showing how countries score relative to each other on the dimensions associated with the axes (*e.g.* Figure 3.5, Panel B).

Cluster analysis

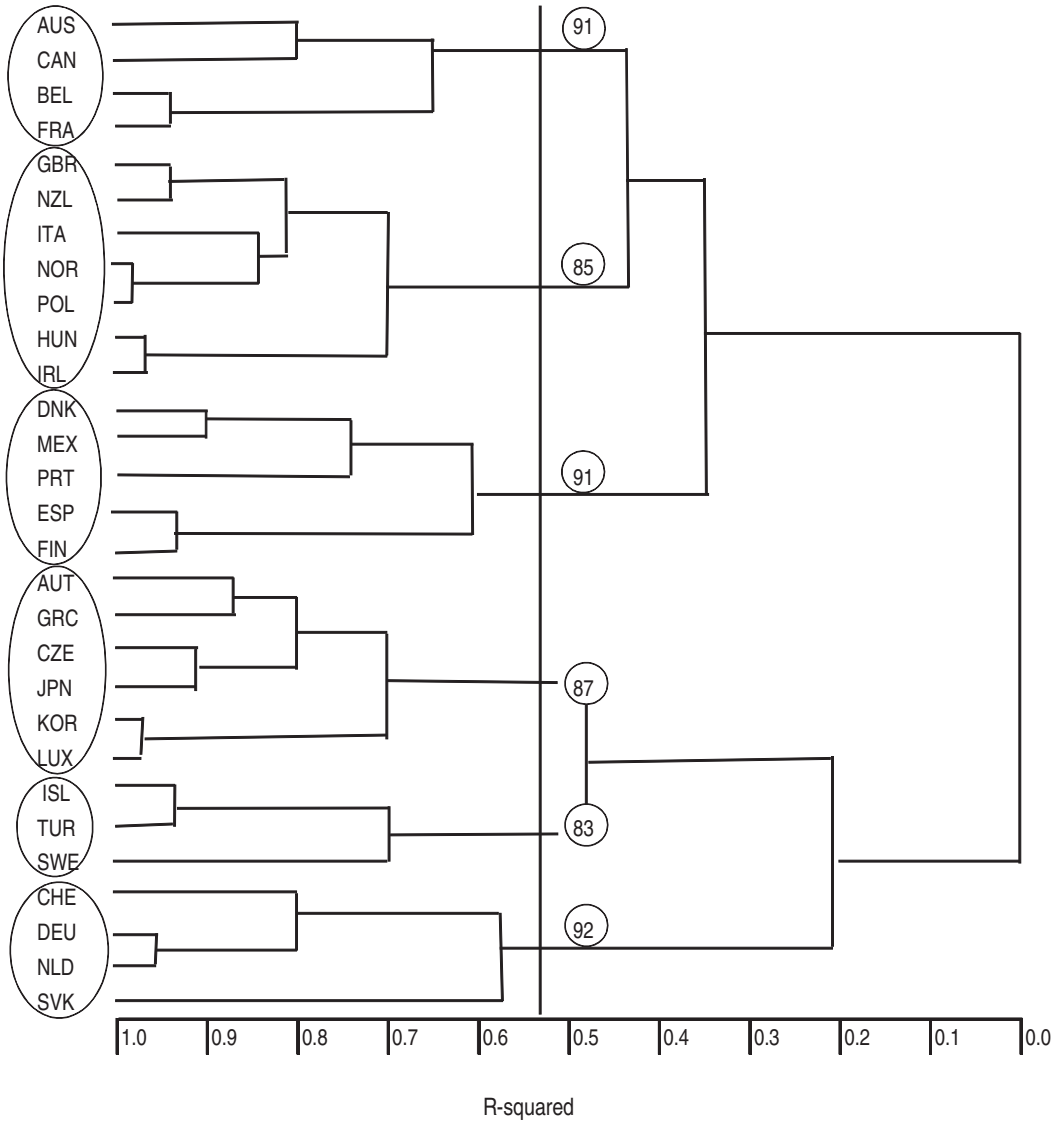
Cluster analysis provides a hierarchical and agglomerative (bottom-up) classification. The algorithm begins with each country as a separate cluster and successively groups countries into larger clusters, so as to minimise the within-cluster variance (Ward's Minimum-Variance Method).[1]

A tree diagram – also called dendogramme (Figure 3.A3.1) – showing successive clusters provides information on the loss of information resulting from each aggregation. It also allows partitioning the sample into groups of countries which share common characteristics on the variables included in the analysis.

The robustness of the clusters identified can be assessed with the approximately unbiased (AU) p-values calculated using the *pvclust* package (Suzuki and Shimodaira, 2006). The calculation of AU p-values is based on multi-scale bootstrap re-sampling, which is more accurate than the simple bootstrap (Efron *et al*., 1996; Shimodaira, 2002, 2004). The p-value represents the percentage of occurrence of a given cluster when a large number of bootstrap replications (*e.g.* 10 000) are performed.

1. PCA and cluster analysis are often performed on standardised variables. This is necessary when variables are measured in different units, because non-standardised variables would be assigned weights proportional to their variance. The indicators on health policies and institutions are on the same scale (0 to 6). Standardising the variables would give the same weight to small differences in variables that vary little across countries (*e.g.* breadth of coverage) and to large variations in variables that vary widely across countries (*e.g.* gate-keeping). Therefore, PCA and cluster analysis on health policies and institutions have been carried out without prior standardisation of the variables.

Figure 3.A3.1. **Dendogramme**



Note: This dendogramme reflects the results of the cluster analysis performed on the twenty institutional indicators (see Figure 3.1). The R-squared measures the ratio of the between-clusters variance to the total variance of the data. Hence, the reduction in the value of the R-squared resulting from each clustering step can be interpreted as the loss of information caused by the grouping of countries.

The numbers in the circles represent the confidence level in percentage associated with each cluster, *i.e*. the Approximately Unbiased (AU) p-values generated through multiscale bootstrap resampling.

Source: OECD.

Annex 3.A4

Principal component analysis on budget and management approaches

A principal component analysis (PCA) on the budget and management indicators identifies two main dimensions along which countries can be differentiated. The first one is mainly driven by the intensity of the budget constraint and, negatively correlated with it, the degree of delegation to insurers and consistency in responsibility assignment across levels of governments (Table 3.A4.1 and Figure 3.A4.1, Panel A). The countries on the right of the first (horizontal) axis are those where health coverage is mainly managed at the government level, with a tight budget constraint (Figure 3.A4.1, Panel B). Countries where the government has devolved health policy responsibilities to social security or individual insurance funds tend to be on the opposite side of the axis. The second important dimension relates to the degree of decentralisation across levels of governments. Decentralised countries score high on the second (vertical) axis. In most of them, coverage is mainly managed at the government level – *i.e.* they are situated in the right part of the chart – with Austria and Switzerland being exceptions.

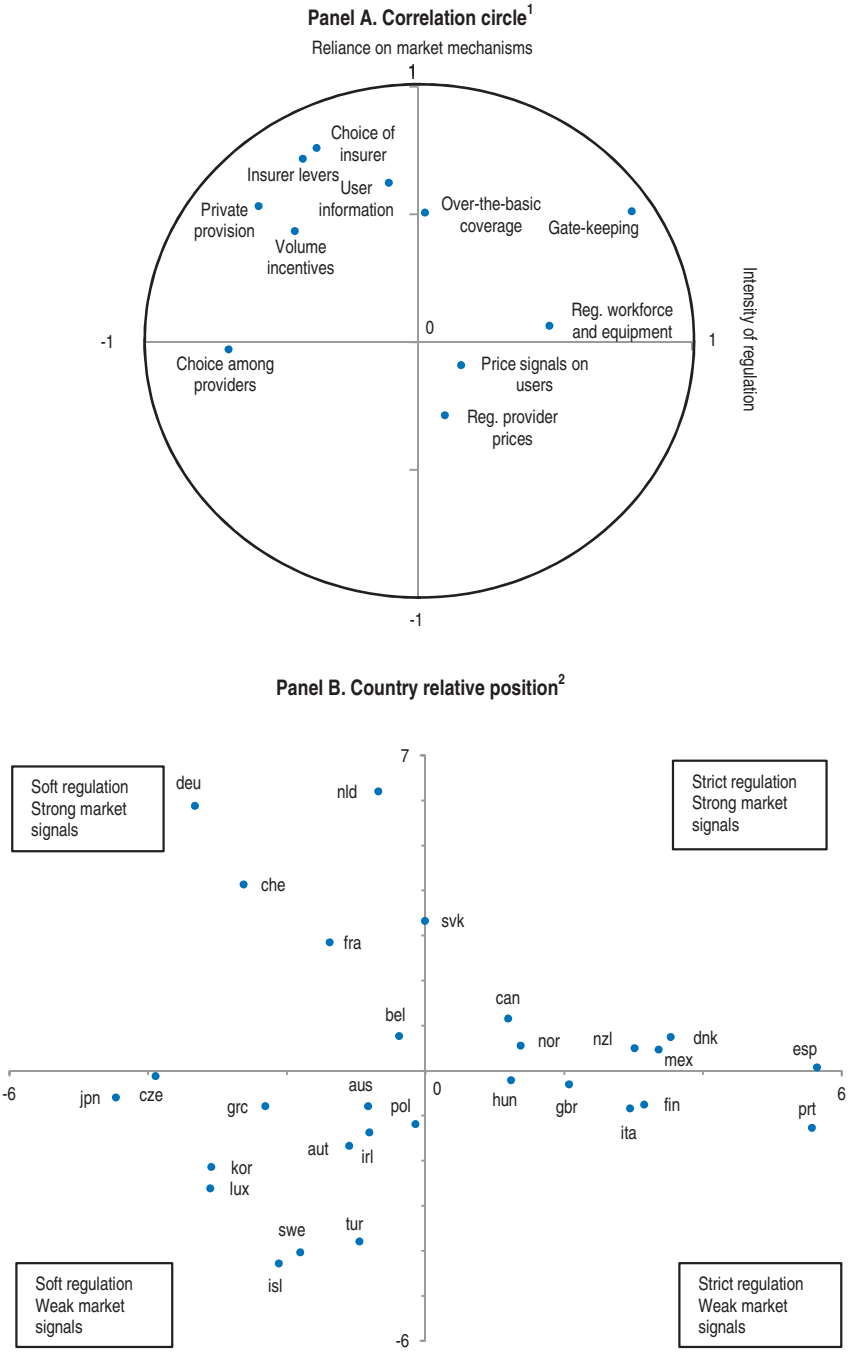
Table 3.A4.1. **Principal component analysis on budget and management indicators**

	Principal components			
	1	2	3	4
Eigenvalue	5.6	3.2	2.0	1.5
Share of the variance explained (%)	39.5	22.9	14.3	10.8
Cumulative share of the variance explained (%)	39.5	62.5	76.8	87.6
Eigenvectors				
Priority setting	0.06	0.02	-0.57	-0.21
Budget constraint	0.75	0.55	-0.07	0.21
Regulation of workforce and equipment	0.17	-0.09	0.76	-0.34
Regulation of prices paid by third-party payers	0.00	0.19	0.14	0.08
Decentralisation	0.36	-0.75	-0.05	0.48
Delegation	-0.32	0.03	-0.18	-0.12
Consistency	-0.41	0.29	0.20	0.73

Source: OECD calculations.

Figure 3.A4.1. **Budget and management approaches to control public spending**

Results of a principal component analysis



Panel B. Country relative position[2]

1. The axes of the chart correspond to the first two factors of the PCA, *i.e.* those that explain the greatest part of the cross-country variance of policy instruments. The values on the horizontal (respectively vertical) axis correspond to the correlation coefficients with the first (respectively second) factor of the PCA.
2. The values on the horizontal axis (respectively vertical) correspond to weighted averages of policy instruments, weights being determined by the eigenvector associated with the first (respectively second) factor of the PCA.

Source: OECD Survey on Health Systems Characteristics 2008-09.

Chapter 4

Linking efficiency and policy across health care systems

After a brief overview of existing typologies, this chapter provides an empirical characterisation of health care systems based on the new OECD indicators for health policies and institutions. Six groups of countries sharing broadly similar institutions have been identified. None of these health care systems performs systematically better than another in improving the population health status in a cost-effective manner. Still the chapter shows that international comparisons allow the spotting of strengths and weaknesses for each country and of those policy reforms which could yield efficiency gains.

Introduction

A key contribution of this book is to provide an empirical characterisation of health care systems, based on the new and rich OECD dataset on health institutions and policies. This dataset, presented in Chapter 3, assembles information on incentives and regulations affecting the behaviour of producers, users and insurers. It also covers some dimensions often neglected in most other frameworks and typologies, such as the degree of decentralisation in health care policies as well as the comprehensiveness and nature of health insurance coverage. It thus allows going beyond the traditional health care system typologies most often based on financing criteria, such as the public/private funding mix, or the insurance model (Bismarck, Beveridge and private insurance). Principal Component Analysis (PCA) and cluster analysis allow identifying groups of countries with comparable policy setting, *i.e.* characterised by a specific combination of policy instruments.[1]

Identifying health care systems

Various "health care system models", consisting of a set of consistent institutional features, have been identified in the literature (Box 4.1) but few attempts have been made to produce an empirical characterisation of them.[2] An additional complication is that different features of the various models can co-exist (Burau and Blank, 2006), even if one form is dominant. And health care systems have evolved over time. Social insurance systems have for instance tended to incorporate features guaranteeing universal coverage, while the so-called "public-integrated systems" have often incorporated some market mechanisms. An additional limitation of these typologies is that they often focus on one or two institutional characteristics, *e.g.* dominant financing and/or delivery modes, but fail to account for the interactions between institutional characteristics. In practice, there may be more differences across countries which finance their health care spending mainly through social contributions than with those that rely on tax financing.

1. Wendt (2009) relies on a cluster analysis carried out on 2001 data for 15 European countries. He identified three groups of countries plus two outliers (Greece and the Netherlands). Institutional indicators included in the analysis are: *i*) the remuneration mode of general practitioners (GPs) – with three categories: fee-for-service, capitation, salary; *ii*) registration requirement with a GP – with two categories reflecting whether or not patients have to sign onto the list of a certain GP; *iii*) gate-keeping arrangements (four categories), and; *iv*) out-of-pocket payments.

2. Kotzian (2006), Pommer *et al.* (2004), Nixon (2000) and Wendt (2009) are the main exceptions. It should be noted, however, that some work has been carried out to characterise empirically welfare systems – see for instance Bambra (2007) as well as Arts and Gelissen (2002).

Box 4.1. **Health care systems: a wide variety of frameworks and typologies**

As noted by Shakarishvili (2009), "to date, there has been a proliferation of multiple approaches to thinking about health systems". They vary in particular in their focus, scope and taxonomy. The World Health Organisation (WHO) identified three main goals of health systems in the 2000 World Health Report (WHR): better health, fairness in financial protection and responsiveness to people's expectations (WHO, 2000; Evans, 2002). The Report also focused on four main functions which contribute to attaining these goals: delivering services (provision), financing (collecting, pooling and purchasing), creating resources (investment and training) and stewardship (oversight). The WHO's framework for action (WHO, 2007) proposes a framework with six building blocks: service delivery; health workforce; information; medical products; vaccines and technologies; financing; and leadership and governance (stewardship). The World Bank Institute's Flagship Programme on Health Sector Reform focuses on reform strategies, bundled into five health system "control knobs": financing; payment; organisation; regulation and behaviour. Other approaches, including by the OECD, focus more on actors and interactions between them.[1]

Focusing on relations across providers, payers and users, Docteur and Oxley (2003) and OECD (2004) identified three main "models" of health systems:

1. The *public-integrated model* combines budget financing of health-care provision with hospital providers that are part of the government sector.[2] The insurance and provision functions are merged and the system is organised and managed like a government department. The employees are generally salaried (although, in some cases, doctors can have private patients as well) and are most often public-sector employees. Ambulatory doctors and other health-care professionals can be either public employees or private contractors to the health-care authority, with a range of remuneration packages. Ensuring complete population coverage is particularly easy under such systems, and as they face a budget constraint, the growth of overall costs has been contained more easily. However, they have weak incentives to adapt output to demand, improve efficiency, or raise quality and responsiveness to patient needs. This may be less the case in the ambulatory sector, where payment systems are more often linked to provider output.

2. In the *public-contract* model, public payers contract with private health-care providers. The payers can be either a state agency or social security fund.[3] Single-payers have a stronger negotiating position *vis-à-vis* providers (as in the public integrated model) and tend to have lower administrative costs than do multiple payer systems. In many public-contract systems, the private hospitals and clinics operate on a non-profit basis. Independent private contractors generally supply ambulatory care. In the past, payment of providers has been often on an *ex post* basis, although contract arrangements have been evolving. These systems are generally considered to be more responsive to patient needs than public-integrated arrangements, but less successful in containing health-care costs, requiring additional regulation and control by the public authorities.

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5. A *private insurance/provider model* uses private insurance combined with private (often for-profit) providers. In Switzerland, the insurers have to be not for-profit for compulsory insurance and are for-profit for supplementary insurance; private providers can be for-profit or not for-profit. In the United States, insurance is voluntary and may not be affordable for some individuals. Payment methods have traditionally been activity based, and the systems have featured a high degree of choice and responsiveness to patient needs, but cost control has been weak. In response, managed care plans, which provide incentives for volume and price control, expanded rapidly in the United States during the 1990s. Under these arrangements, insurers selectively contract with competing providers and restrict patient choice of providers and services.

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1. Wendt *et al.* (2009) provide a review of the literature on health care system typologies and propose their own typology with 27 possible models, characterised by three dimensions – financing, provision and regulation of health care – and three categories of actors – the state, non-governmental organisations and private actors.
2. Broadly speaking, public-integrated systems exist in the Nordic countries, Australia (public hospitals), Italy, Greece and Portugal and, before reforms of the early 1990s, the United Kingdom. New Zealand introduced a purchaser-provider split in the 1990s similar to developments in the United Kingdom, but it has since moved closer to an integrated model following reforms in 2000.
3. Canada, most of the remaining continental European countries, Japan, and, now, the United Kingdom and, to some extent, New Zealand, belong to the public-contract category.

Identifying institutional patterns empirically

What are those institutional features which most differentiate OECD countries? How are institutional features and policies combined across countries? To respond to these questions, Principal Component Analysis (PCA) has been carried out, on the basis of the 20 policy and institutional indicators presented in Chapter 3. PCA allows capturing multidimensional issues without requiring an *ex-ante* assumption on the most relevant dimensions to be accounted for. It also avoids some of the tricky issues raised by the use of composite indicators (Box 4.2).

Box 4.2. **Pros and cons of composite indicators for policies and institutions**

Composite indicators can be used to summarise complex and multidimensional issues, a very attractive feature given the richness of the information on health policies and institutions now available. But composite indicators also have weaknesses and there are pros and cons for using them, especially for assessing policy issues (Table 4.1).

Table 4.1 **Pros and cons of composite indicators**

Pros	Cons
• Summarise complex or multidimensional issues in view of supporting decision-making • Are easier to interpret than many separate indicators • Facilitate the task of benchmarking countries • Monitor progress of countries over time on complex issues • Place issues of country performance and progress at the centre of the policy debate • Facilitate communication with the general public (*i.e.* citizens, media, etc.) and promote accountability	• May disguise serious failings in some dimensions and increase the difficulty of identifying remedial action • May send misleading policy messages, be misinterpreted or misused, *e.g.* to support a desired policy, if they are poorly constructed or lack transparency • Invite simplistic policy conclusions and may lead to inappropriate policies if dimensions of performance that are difficult to measure are ignored or poorly represented • The selection of indicators and weights is not straightforward and could be subject to political pressures • May make it difficult to account for complementarities across policies

Source: Adapted from Saisana and Tarantola (2002) and Smith (2002).

A limitation of composite indicators is that aggregation methods may have a non-negligible impact on results. This problem can partly be addressed by providing sensitivity analysis (OECD, 2008). More importantly, additive aggregation implies compensability – poor performance in some indicators can be compensated by sufficiently high values for other indicators. Most composite indicators are built by adding various low-level indicators assuming some substitutability/compensability across them. In the presence of complementarities across policy instruments, however, there may be no compensation and the impact of a specific institutional feature or policy ultimately depends on scores for other institutional features. In the context of analysing health institutions, the compensability assumption would imply for instance that countries implementing very tight regulations of the number of health care practitioners and very loose regulations of the fees for their services would get, all else equal, a similar score as countries with a more balanced approach in regulating the delivery of health care services. Tight regulation of prices is assumed to compensate (or be a substitute) for a very loose regulation of volumes. This implicit assumption of compensability needs to be challenged: policy instruments interact with each other and cannot be analysed in isolation.

1. The institutional indicators on education built by the OECD (Gonand *et al.*, 2007) are among the exceptions: the additive approach contains conditionalities and an alternative multiplicative approach has been implemented.

Carrying out a principal component analysis on the 20 indicators on health policies and institutions suggests that the degree of reliance on market mechanisms and regulations to steer the demand and supply of health services is key to characterise health care systems. Adding the indicators depicting budget and management approaches and coverage principles to those on market mechanisms and regulations affecting users, providers and insurers (see Chapter 3) does not change the results of the PCA much (Table 4.2).[3] Some variables are strongly correlated with one of the axis identified in the first PCA (*e.g.* the budget constraint with the regulatory axis). Several indicators vary little across countries (*e.g.* the scope, breadth and depth of coverage all have a low weight on both axes) and thus provide little information for differentiating countries. Others are largely uncorrelated with all other indicators (*e.g.* priority setting); they increase the overall variance but do not allow identifying clearly any additional institutional patterns.

Table 4.2. **Principal component analysis on the full set of health policy indicators**

	Principal components					
	1	2	3	4	5	6
Eigenvalue	11.0	7.1	5.4	3.0	2.9	2.3
Share of the variance explained (%)	28.6	18.4	14.1	7.7	7.4	6.0
Cumulative share of the variance explained (%)	28.6	46.9	61.1	68.8	76.2	82.2
Eigenvectors						
Private provision	-0.30	0.21	0.08	0.04	-0.08	-0.35
Volume incentives	-0.16	0.14	0.09	0.19	0.00	-0.23
Regulation of provider prices	0.05	-0.09	-0.05	-0.07	0.26	0.10
User information	-0.09	0.27	0.29	-0.14	-0.17	-0.09
Regulation of the workforce and equipment	0.16	0.07	-0.05	0.33	-0.36	0.30
Choice among providers	-0.31	-0.16	0.63	0.22	0.36	0.18
Gate-keeping	0.50	0.58	0.22	-0.22	-0.13	-0.09
Price signals on users	0.01	-0.02	-0.10	-0.11	-0.07	-0.06
Choice of insurer	-0.27	0.45	-0.18	-0.19	0.27	0.32
Insurer levers	-0.23	0.33	-0.06	-0.21	0.21	0.34
Over-the-basic coverage	-0.02	0.30	0.06	0.68	-0.19	0.18
Priority setting	0.01	0.15	0.28	0.09	0.16	-0.39
Budget constraint	0.46	-0.11	0.43	-0.12	0.17	0.28
Regulation of prices paid by third-party payers	0.02	-0.16	0.02	-0.03	-0.16	0.04
Decentralisation	0.24	0.14	-0.36	0.36	0.51	-0.08
Delegation	-0.22	0.05	0.00	-0.11	-0.09	-0.18
Consistency	-0.24	0.00	0.06	-0.08	-0.33	0.36
Breadth	0.00	0.04	0.03	0.03	0.07	-0.08
Scope of coverage	-0.02	-0.02	-0.02	-0.05	0.00	0.00
Depth	0.02	0.04	0.04	0.05	0.07	0.06

Source: OECD calculations.

3. The correlations between the country co-ordinates with respect to the first two axes of the PCA using the full set of indicators and those of the PCA based only on market mechanisms and regulation stand at above 0.9.

Incorporating all the policy indicators into the PCA still provides interesting insights into the structure of health systems. In particular:

- The variables related to the level of insurance coverage do not play an important role in differentiating countries, as most of the 29 OECD countries which responded to the Survey have now achieved close to universal coverage for a core set of health services, the exceptions being Mexico and Turkey. These variables are located near to the centre of the circle (Figure 4.1, Panel A).
- Those countries relying mainly on command-and-control approaches to steer the demand and supply of health care services – strict regulations on workforce and equipment, mostly public providers, little user choice among providers – also tend to impose limits on public health care spending via the budget process (*e.g.* through expenditure targets or norms).
- The most decentralised countries tend to regulate health care resources and/or prices more than the OECD average.[4] A high degree of decentralisation is often associated with a relatively weak consistency of responsibility assignments across levels of governments, suggesting that overlap in responsibilities for health care management tends to be present in decentralised systems.
- Among the countries that are close to the centre of Figure 4.1, Panel B, results should be interpreted with special care. The position for Australia and Ireland partly reflects the heterogeneous nature of their health care system.[5] The position of some Eastern European countries could, to some extent, reflect an ongoing reform process (Medved *et al.*, 2005).

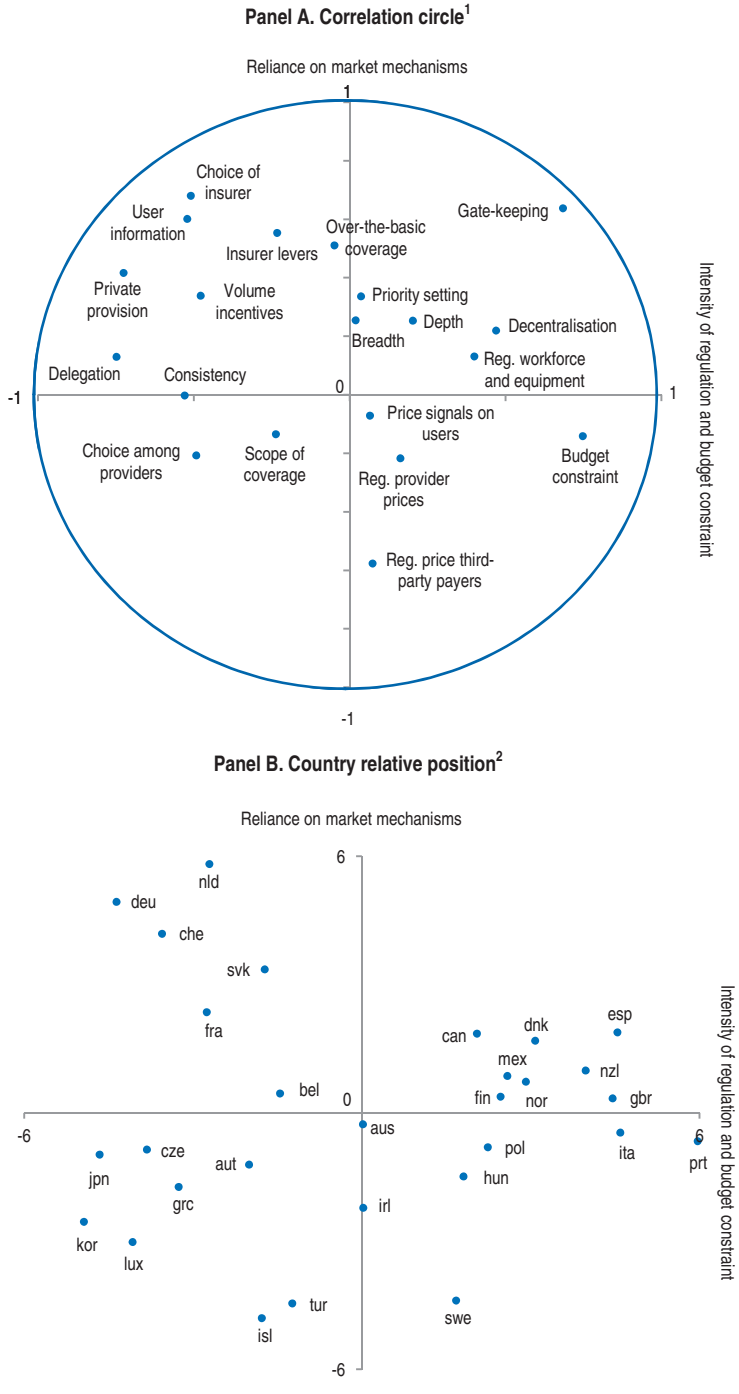
Grouping countries with similar institutions

Which countries have most similar health policies and institutions? Or, put differently, can health care models be identified empirically on the basis of a wide enough set of indicators and without assuming ex-ante which dimension matters most to differentiate countries? To respond to these questions, a cluster analysis has been implemented on the 20 policy and institutional indicators presented in Chapter 3.

4. Decentralisation is often seen as introducing some form of competitive pressures. Citizens can observe differences in the quality of public services and associated taxes across jurisdictions. They can "vote with their feet" (Tiebout model) and/or "voice" so as to put pressures on local officials to improve the efficiency of public services.

5. Wendt (2009) also notes that due to its heterogeneous structure, the Irish health system is difficult to classify.

Figure 4.1. **Indicators on health policy and institutions: results of the PCA**



1. The axes of the chart correspond to the first two factors of the PCA, *i.e.* those that explain the greatest part of the cross-country variance of policy instruments. The values on the horizontal (respectively vertical) axis correspond to the correlation coefficients with the first (respectively second) factor of the PCA.
2. The values on the horizontal axis (respectively vertical) correspond to weighted averages of policy instruments, weights being determined by the eigenvector associated with the first (respectively second) factor of the PCA.

Source: OECD Survey on Health Systems Characteristics 2008-09.

Cluster analysis can be used to identify groups of countries with similar institutions. While there is always some judgement needed to define the optimal number of clusters because of the trade-off between the number of groups and the degree of heterogeneity within groups, the cluster analysis suggests that OECD countries can reasonably be grouped into six clusters.[6] These country clusters display the following key institutional features (Figure 4.2 and Table 4.3):

- Germany, the Netherlands, the Slovak Republic and Switzerland rely extensively on market mechanisms in regulating the basic insurance coverage. Private providers play an important role and are mostly paid through fee-for-service schemes. Users are offered ample choice among providers but gate-keeping arrangements are in place. There is no strict spending rule and little reliance on regulation of prices paid by third-party payers to control public spending growth. These countries still differ significantly in the degree of decentralisation: sub-national governments have extensive autonomy in managing health care services in Switzerland, while the Netherlands is at the opposite side of the spectrum.

- A second group of countries – Australia, Belgium, Canada and France – features public basic insurance coverage combined with heavy reliance on market mechanisms at the provider level: users are given a wide choice among providers; private provision of both in-patient and out-patient care is relatively abundant; incentives for providers to produce high volumes of services tend to be important, and user information on quality and prices may act as a disciplining factor. Over-the-basic insurance coverage plays a significant role in these countries. In France and to a lesser extent in Belgium, the basic coverage package imposes significant cost-sharing on users, which is largely covered by complementary insurance. Canada has a large supplementary market (67% of the population) whereby private insurance pays for prescription drugs and dental care that are not publicly reimbursed. In Australia, over-the-basic coverage both takes the form of supplementary and duplicative private insurance. In this group of countries, cost control generally takes the form of moderate gate-keeping, but strict priority setting arrangements (benefit basket defined at the central government level by a positive list and/or effective use of health technology assessment in determining which goods and services should be included in the basic coverage package).

- The third group – which includes Austria, the Czech Republic, Greece, Japan, Korea and Luxembourg – is also characterised by extensive private provision of care and wide patient choice. But, compared to the second group, there is no gate-keeping system in place. And the available information on quality and prices is scarce, creating little competitive pressure on providers. Over-the-basic coverage is limited. The budget constraint tends to be less stringent than in other country groups.

6. With six groups, the ratio of the between-cluster variance to the total variance is over 50%, as indicated on the horizontal axis (R-squared) of the dendogramme (see Annex 3.A3, Figure 3.A3.1). Increasing the ratio significantly would require a much larger number of groups. Reducing the number of groups to less than six would result in highly heterogeneous clusters. A more formal assessment of the robustness of the cluster analysis can be done by looking at the approximately unbiased (AU) p-values which indicate the confidence level associated with each cluster (Annex 3.A3 provides more detail on cluster analysis and p-values). All the six country clusters which have been identified show p-values above 80%.

- The health care systems of Iceland, Sweden and Turkey offer free choice of provider to patients in all three areas of care – primary, specialist and hospital care – with no gate-keeping, though user choice may be fairly recent (Sweden) and/or *de facto* limited by geographical constraints and by the actual number of providers.[7] Private provision is very limited, suppliers have few incentives to increase volumes and their prices tend to be tightly regulated. The budget constraint is weak, except in Sweden, where it is very strict.
- In the group consisting of Denmark, Finland, Mexico, Portugal and Spain, health care is mainly provided by a heavily regulated public system. Patient choice among providers is extremely limited and the role of gate-keeping is important. There is a public spending target for health care but no strict budget constraint, except in Portugal. Among these countries, Spain and Finland are clearly more decentralised than the OECD average.
- The last group also consists of heavily regulated public systems – Hungary, Ireland, Italy, New Zealand, Norway, Poland and the United Kingdom. The budget constraint is more stringent than in most other OECD countries. Compared with the previous group, the provider choice for patients tends to be large and sub-national government autonomy tends to be lower. Over-the-basic coverage is very limited, except in Ireland and New Zealand, where duplicative coverage is significant and provides faster private-sector access to medical services.

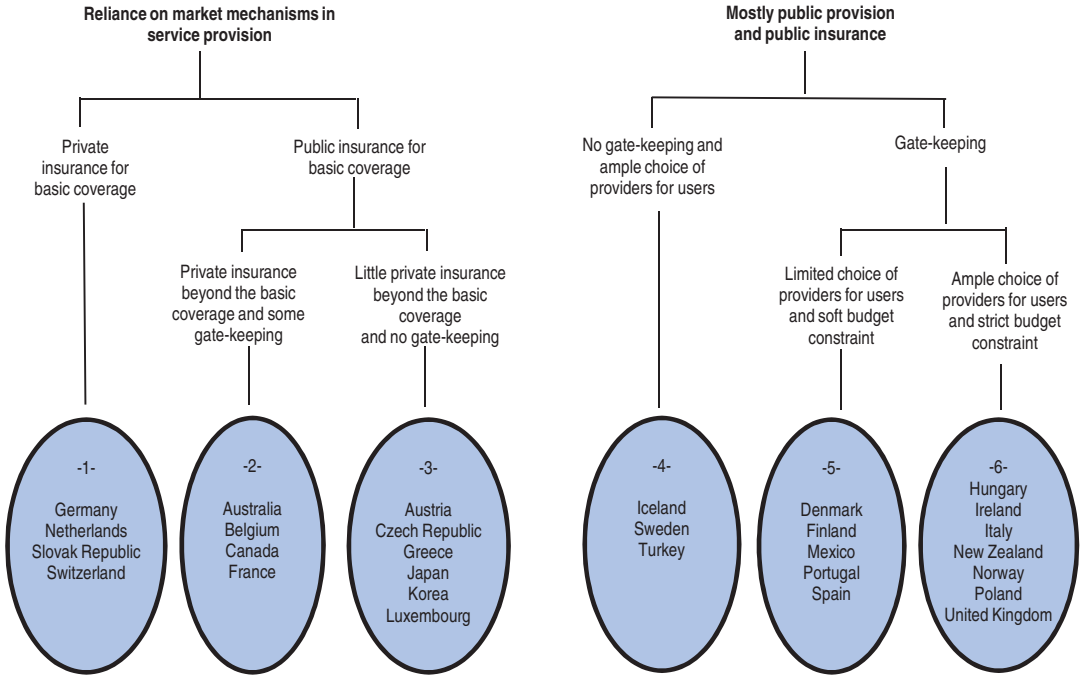
7. In Iceland and Turkey, user choice among providers may be *de facto* constrained by geographical factors and/or by the number of providers (in Iceland in particular). In Sweden, initiatives to promote user choice have developed since the mid-1990s. In 2007, the County Council of Halland was the first to allow the accreditation of both private and public providers. In 2009, many counties had also implemented a choice of care scheme and since 2010, all County Councils are obliged to implement user choice and allow private provision. User choice is still restricted, however, by geographical constraints, the low number of private providers and/or political factors (Ahgren, 2010).

Table 4.3. **Characterising country groups**

	User choice of insurer	Insurer levers	Over-the-basic	Private provision	Provider incentives	Reg. provider prices	User information	Reg. workforce and equipment	Choice among providers	Gate-keeping	User prices	Priority setting	Budget constraint	Reg. price paid by third-party payer	Decentra-lisation	Dele-gation	Consis-tency	Breadth	Scope of coverage	Depth
Germany	6.0	5.0	3.0	4.2	4.5	3.1	2.5	2.9	5.3	3.0	0.8	2.6	2.0	3.7	1.5	1.1	6.0	6.0	6.0	5.6
Netherlands	4.0	5.0	3.0	4.5	3.8	5.0	3.2	2.5	5.0	6.0	0.3	3.7	2.0	3.2	0.0	1.7	6.0	5.9	5.6	5.7
Slovak Republic	3.0	0.7	0.0	3.8	2.8	3.4	5.3	1.5	6.0	6.0	1.6	4.4	2.0	3.5	0.8	2.5	6.0	6.0	5.9	4.8
Switzerland	6.0	3.3	2.3	4.3	3.9	4.6	0.9	1.8	4.7	3.0	1.8	3.4	0.0	4.2	4.3	1.6	4.3	6.0	5.5	4.8
Average - Group 1	**4.8**	**3.5**	**2.1**	**4.2**	**3.8**	**4.0**	**3.0**	**2.2**	**5.3**	**4.5**	**1.1**	**3.5**	**1.5**	**3.6**	**1.6**	**1.7**	**5.6**	**6.0**	**5.8**	**5.2**
Australia	0.0	0.0	2.3	3.3	2.8	2.6	1.8	3.2	5.3	2.0	1.1	5.7	2.0	3.9	2.8	0.4	2.1	6.0	5.4	5.1
Belgium	0.0	0.0	3.0	4.3	5.0	3.6	2.4	4.4	5.0	3.0	1.1	3.2	2.0	5.0	0.5	1.2	5.6	5.9	6.0	4.9
Canada	1.0	0.0	6.0	2.8	3.4	4.3	0.0	4.6	4.7	4.0	0.9	2.4	3.0	3.5	5.1	0.0	3.9	6.0	5.3	5.5
France	2.0	0.3	6.0	4.2	4.6	3.5	2.7	4.1	6.0	3.0	0.4	4.5	2.0	5.0	0.0	1.8	6.0	6.0	6.0	5.2
Average - Group 2	**0.8**	**0.1**	**4.3**	**3.6**	**4.0**	**3.5**	**1.7**	**4.1**	**5.3**	**3.0**	**0.9**	**3.9**	**2.3**	**4.3**	**2.1**	**0.9**	**4.4**	**6.0**	**5.7**	**5.2**
Austria	2.0	0.5	0.5	3.2	3.0	4.0	0.0	4.0	2.7	0.0	0.9	1.8	0.0	4.2	3.6	1.8	4.3	5.9	6.0	5.4
Czech Republic	4.0	2.4	0.5	2.5	2.1	5.0	1.1	1.8	6.0	0.0	0.8	2.5	2.0	4.1	1.2	1.8	4.7	6.0	6.0	5.3
Greece	2.0	1.5	0.8	3.5	3.9	2.0	0.0	2.4	3.3	0.0	2.2	0.8	2.0	5.0	0.0	1.1	6.0	6.0	6.0	4.6
Japan	2.0	1.8	0.5	4.4	5.7	5.0	0.0	1.5	6.0	0.0	0.9	4.1	0.0	5.0	2.1	1.3	4.3	6.0	5.9	5.1
Korea	0.0	0.0	0.5	4.7	4.1	4.6	1.3	0.8	5.0	0.0	2.1	3.4	0.0	5.4	0.0	3.5	6.0	6.0	5.6	4.1
Luxembourg	0.0	0.0	1.0	4.2	3.4	4.7	0.0	1.8	6.0	0.0	0.4	2.2	1.0	3.6	0.0	2.5	6.0	5.9	6.0	5.4
Average - Group 3	**1.7**	**1.0**	**0.6**	**3.7**	**3.7**	**4.2**	**0.4**	**2.0**	**4.8**	**0.0**	**1.2**	**2.5**	**0.8**	**4.5**	**1.2**	**2.0**	**5.2**	**6.0**	**5.9**	**5.0**
Iceland	0.0	0.0	0.0	1.5	1.3	5.9	0.0	0.8	6.0	0.0	1.0	2.6	2.0	5.4	0.2	0.0	5.6	6.0	6.0	5.4
Sweden	0.0	0.0	0.8	0.6	2.2	5.3	0.0	1.8	6.0	0.0	1.0	1.7	6.0	4.5	4.3	0.0	3.9	6.0	5.8	4.9
Turkey	0.0	0.0	0.0	0.8	1.2	4.7	1.3	5.3	6.0	0.0	1.2	1.8	2.0	5.4	0.0	0.2	6.0	4.0	6.0	4.8
Average - Group 4	**0.0**	**0.0**	**0.3**	**0.9**	**1.6**	**5.3**	**0.4**	**2.6**	**6.0**	**0.0**	**1.0**	**2.0**	**3.3**	**5.1**	**1.5**	**0.1**	**5.1**	**5.3**	**5.9**	**5.0**
Denmark	1.0	0.0	0.5	3.1	2.6	3.7	1.1	3.3	2.0	6.0	0.8	3.1	2.0	4.0	2.3	0.0	1.7	6.0	5.6	5.3
Finland	1.0	0.0	0.8	1.8	3.8	5.0	0.0	2.0	0.0	4.0	1.1	2.1	2.0	4.8	4.7	0.0	5.6	6.0	5.9	4.9
Mexico	2.0	1.0	0.8	2.6	2.3	3.3	0.4	4.7	0.0	4.0	3.1	1.0	3.0	4.7	1.9	1.4	2.1	5.0	5.6	4.2
Portugal	0.0	0.0	0.5	0.8	1.1	5.8	0.0	3.5	0.7	6.0	1.4	2.5	6.0	5.4	1.1	0.0	3.9	6.0	6.0	5.1
Spain	1.0	0.0	3.0	0.5	1.2	5.3	0.0	4.5	0.7	6.0	1.3	2.8	2.0	4.5	5.5	0.0	6.0	6.0	5.6	5.4
Average - Group 5	**1.0**	**0.2**	**1.1**	**1.7**	**2.2**	**4.6**	**0.3**	**3.6**	**0.7**	**5.2**	**1.5**	**2.3**	**3.0**	**4.7**	**3.1**	**0.3**	**3.9**	**5.8**	**5.8**	**5.0**
Hungary	0.0	0.0	1.0	2.3	2.9	2.0	0.9	3.6	6.0	5.0	1.5	2.2	5.0	5.9	1.1	0.1	4.3	6.0	6.0	5.3
Ireland	0.0	0.0	2.0	2.3	3.3	3.5	1.0	3.7	6.0	2.0	0.6	3.1	5.0	5.9	0.0	0.5	6.0	6.0	4.7	5.1
Italy	0.0	0.0	1.0	0.3	3.2	5.3	0.0	5.2	6.0	6.0	1.2	2.9	5.0	4.2	2.3	0.0	2.1	6.0	5.6	5.4
New Zealand	0.0	0.0	2.3	1.9	3.3	3.7	2.4	2.3	2.0	5.0	0.9	3.9	6.0	4.5	2.6	0.0	4.7	6.0	5.4	5.4
Norway	1.0	0.0	0.0	3.0	3.2	5.0	1.5	3.2	6.0	6.0	0.9	4.3	6.0	4.3	3.0	0.0	5.6	6.0	5.4	5.3
Poland	0.0	0.0	0.8	2.9	3.7	5.2	0.0	1.2	6.0	4.0	1.5	4.0	6.0	5.4	1.8	1.3	3.9	5.9	6.0	5.3
United Kingdom	0.0	0.0	1.0	2.0	2.9	4.3	1.6	2.3	4.0	5.0	0.7	5.0	6.0	3.7	3.0	0.0	1.3	6.0	5.9	5.6
Average - Group 6	**0.1**	**0.0**	**1.1**	**2.1**	**3.2**	**4.1**	**1.1**	**3.1**	**5.1**	**4.7**	**1.0**	**3.6**	**5.6**	**4.8**	**2.0**	**0.3**	**4.0**	**6.0**	**5.6**	**5.3**
Sample average	**1.3**	**0.7**	**1.5**	**2.8**	**3.1**	**4.2**	**1.1**	**2.9**	**4.4**	**3.1**	**1.2**	**3.0**	**2.9**	**4.5**	**1.9**	**0.9**	**4.6**	**5.9**	**5.8**	**5.1**

Note: Country groups shown here are derived from a cluster analysis carried out on the 20 indicators representing health policies and institutions.
Source: OECD calculations.

Figure 4.2. **Groups of countries sharing broadly similar institutions**



Note: These country groups are derived from a cluster analysis. The countries on the left, such as Germany and the Netherlands, tend to rely on market mechanisms to supply health care whereas those on the right, such as Finland and the United Kingdom, depend more on public command-and-control. Apparently diverse countries fit the same group: the rules in Iceland, Sweden and Turkey for instance all provide for ample user choice even if in practice there are geographical and other constraints. Note that the United States did not participate in the Survey.

Source: OECD.

Linking health system performance and policy indicators

Identifying the institutional features conducive to a well performing health care sector is a key objective of this book. In this section, the performance across and within groups of countries sharing similar institutional characteristics will be compared and policies which could contribute to differences in performance identified.

Efficiency varies more within groups of countries than across them

There is no clear indication that one health care system systematically outperforms another. On the contrary, countries performing well can be found in all institutional groups. Countries doing poorly are also present in most groups. Table 4.4 and Figure 4.3, based on efficiency levels as derived from the data envelopment analysis (DEA), provide an illustration but similar conclusions at the system level could be drawn with alternative performance indicators such as those presented in Chapter 2. The analysis focusing on the efficiency of health care systems can be summarised as follows:

- In the group of the four countries relying extensively on market mechanisms in regulating insurance coverage, efficiency is close to the OECD average but there are large differences between countries. Switzerland is one the best OECD performers; the performance of Germany and the Netherlands is close to the

OECD average while the Slovak Republic is performing poorly. These results should be interpreted with caution since, in addition to the uncertainties surrounding efficiency estimates, recent health care system reforms in Germany, the Netherlands and the Slovak Republic might not have had their full impact on efficiency yet.

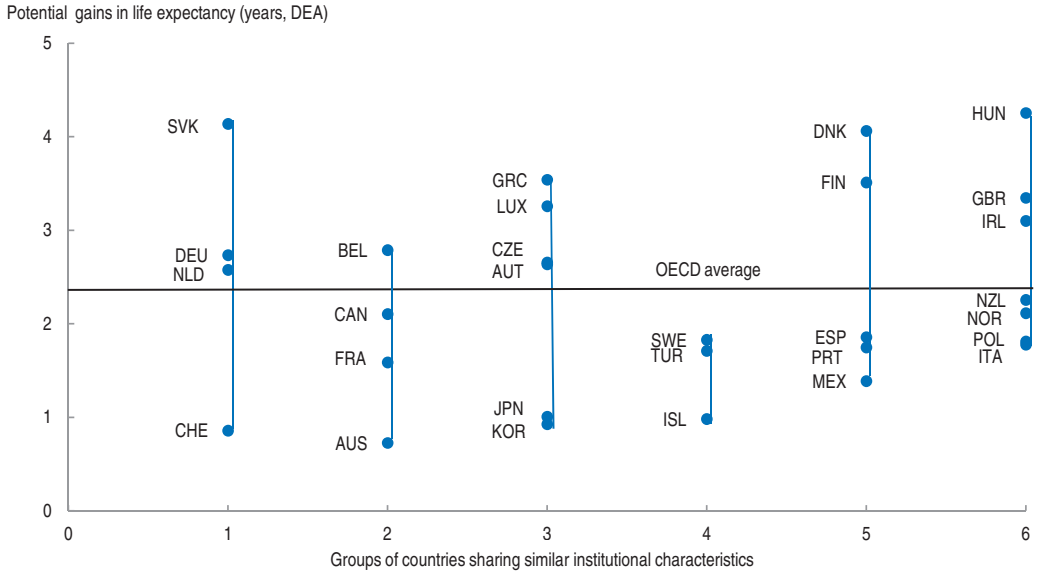
- In the second group, which is characterised by public basic insurance coverage, heavy reliance on market mechanisms at the provider level and gate-keeping arrangements, average efficiency is slightly above the OECD average.
- The third group, also characterised by an extensive use of market mechanisms at the provider level but less over-the-basic coverage and no gate-keeping, is split into two in terms of efficiency. The two Asian countries – Japan and Korea – are performing very well, whereas the results of the others are close to or below average.
- Efficiency is high in all countries in the group consisting of Iceland, Sweden and Turkey. In this group, users are given ample choice of providers but private supply is very limited and prices are tightly regulated.
- The fifth group, that includes the countries with heavily regulated public systems and with no choice of providers for the users and heavy gate-keeping, is heterogeneous. Mexico, Portugal and Spain are performing fairly well, while the efficiency of the Danish and Finnish systems is low.
- In the last group, consisting of countries with heavily regulated public systems and a stringent budget constraint, performance varies considerably. Italy, Norway, Poland and Portugal are doing quite well. Ireland, New Zealand and the United Kingdom are less efficient though performance scores should be interpreted with particular care in the case of New Zealand and the United Kingdom because recent reforms and increases in spending might require time to fully translate into better health outcomes. Finally, Hungary has been performing poorly.

Table 4.4. **DEA efficiency scores: means and variances within and across country groups**

Country groups	Potential gains in life expectancy, years	
	Mean	Variance
Group 1: Germany, Netherlands, Slovak Republic, Switzerland	2.6	1.35
Group 2: Australia, Belgium, Canada, France	1.8	0.57
Group 3: Austria, Czech Republic, Greece, Japan, Korea, Luxembourg	2.3	1.04
Group 4: Iceland, Sweden, Turkey	1.5	0.14
Group 5: Denmark, Finland, Mexico, Portugal, Spain	2.5	1.14
Group 6: Hungary, Ireland, Italy, New Zealand, Norway, Poland, United Kingdom	2.7	0.74
Total	**2.3**	**1.02**
of which		
Intra-group	-	0.87
Inter-group	-	0.15

Source: OECD calculations.

Figure 4.3. **DEA efficiency scores across and within country groups**



Note: Potential gains in life expectancy are derived from an output oriented DEA with *per capita* health care spending and a composite indicator of socio-economic environment and lifestyle factors as inputs for 2007. To facilitate the interpretation, the efficiency scores have been converted into potential gains in life expectancy, *i.e.* the gains that a country could achieve for a given level of spending if it were as efficient as the best performing country.
Source: OECD.

Going beyond comparisons of DEA efficiency scores, differences in outcome and spending levels across groups are worth noting:

- There is no clear pattern in life expectancy at birth across country groups and there are significant variations within-group (Figure 4.4, Panel A).
- Inequalities in health status (Figure 4.4, Panel B) tend to be lower in countries relying most on private insurance for the basic coverage (group 1), with the exception of the Slovak Republic. This should be interpreted with care, since Germany, the Netherlands and Switzerland have introduced equalisation mechanisms and regulations to mitigate the potential adverse impacts of insurance markets on equity. It should also be recognised that health inequalities are largely driven by socio-economic factors and thus determined outside the health care sector (see Chapter 1).
- Spending levels *per capita* (Figure 4.4, Panel C) tend to be high in countries relying extensively on market mechanisms in managing the basic insurance coverage (group 1) and in countries where private health insurance plays an important role for providing additional coverage (group 2).
- Administrative costs also tend to be higher in those countries relying most on private insurance (groups 1 and 2). At the other extreme, countries relying more on regulations and public providers tend to spend less on administration (Figure 4.4, Panel D).[8] Within some groups, however, differences in

8. For those countries financing health care spending mainly *via* tax revenues, the data may be slightly biased if tax collection costs are not included.

administrative costs are significant. In particular, the very large administrative costs – 7% or more of total health expenditure in 2007 – in Belgium, France, Luxembourg, Mexico and New Zealand may well signal inefficiencies.

Figure 4.4. **Health outcomes and spending levels across and within country groups**

1. Or latest year available.
2. Measured by the standard deviation in mortality ages for population older than 10.

Source: OECD Health Data 2009; Human Mortality Database (HMD).

Overall, the above analysis suggests that no "health system" is clearly superior in delivering gains in health status for a given level of spending and socio-economic factors. Thus, a "big bang" approach may not deliver much in terms of efficiency gains.

Drawing comparisons and identifying strengths and weaknesses

If a "big bang" approach may not be warranted to exploit efficiency gains, useful reform avenues can be derived from international benchmarking and comparisons across pair countries – *i.e.* within groups of countries sharing similar institutions. The rest of this section points to areas where achieving greater consistency in policy settings could potentially yield efficiency gains.[9] The analysis relies on the information on performance and policies presented above, as well as other data on health care resources, funding, activity and prices extracted from the OECD Health Database, to spot how each country differs from its peers and whether policy levers exist to improve consistency and thus efficiency. The information is summarised in Table 4.5 and is shown in more detail in the individual country profiles presented in Annex 4.A1. This wide-ranging set of indicators allows identifying weaknesses and strengths for both high and low performers and should serve as the starting point for an in-depth analysis of health care systems. To illustrate how this set can be used, the cases of France and Finland are examined below.

The case of France

France is in the group of countries – together with Australia, Belgium and Canada – which rely heavily on market mechanisms and where the basic coverage is provided by public insurers. The average performance of this group of countries is slightly above the OECD average. Within this group, France is characterised by a high efficiency at the system level (as derived by the DEA), a high quality of out-patient and preventive care, and an efficiency level in the acute care sector – as measured by the turnover rate for acute care beds as well as disease-specific ALOSs – that is slightly above the group average (Figure 4.5, Panel A). Still, the rather long ALOS in the in-patient sector and high share of cataract surgeries performed in the in-patient care sector points to a lack of co-ordination or mis-allocation of resources between the in- and out-patient care sectors. And inequalities in health status and administrative costs are very high both compared to the group and the OECD average.

Looking at the indicators of policies and institutions (Figure 4.5, Panel B), France stands out for relying heavily on complementary private health insurance as well as for the multiplicity of insurance funds providing the basic coverage. Hence, the role of both specificities in shaping health inequalities and leading to high administrative costs should be assessed.[10] On the demand side, France offers users more choice among providers while out-of-pocket payments are very low. This may make it difficult to contain

9. As the emphasis is put on within-group comparisons, it is impossible to pursue an econometric approach because of the very small sample size.

10. The very low level of *price signals on users* by OECD standards largely reflects the wide coverage by the so-called *mutuelles* and private health insurances (PHIs). In 2006, PHIs covered a large basket of medical goods and services for 88% of the population, reimbursing the cost-sharing in the social security system at a varying degree depending on goods and services concerned but also on individual insurance contracts. Out-of-pocket payments may still be high, and thus create difficulties in access, for those not covered by these PHIs or with minimal coverage.

excessive demand for health care services though the recently introduced gate-keeping should help in this respect. In the hospital sector, global budgeting has been gradually replaced by an activity-based payment system, which should prompt hospitals to seek efficiency gains and be more responsive to the needs. However, the hospital workforce and equipment have remained heavily regulated, which is an issue worth examining, because it may hamper the re-allocation of resources and thus limit the ability of hospitals to exploit efficiency gains.

The case of Finland

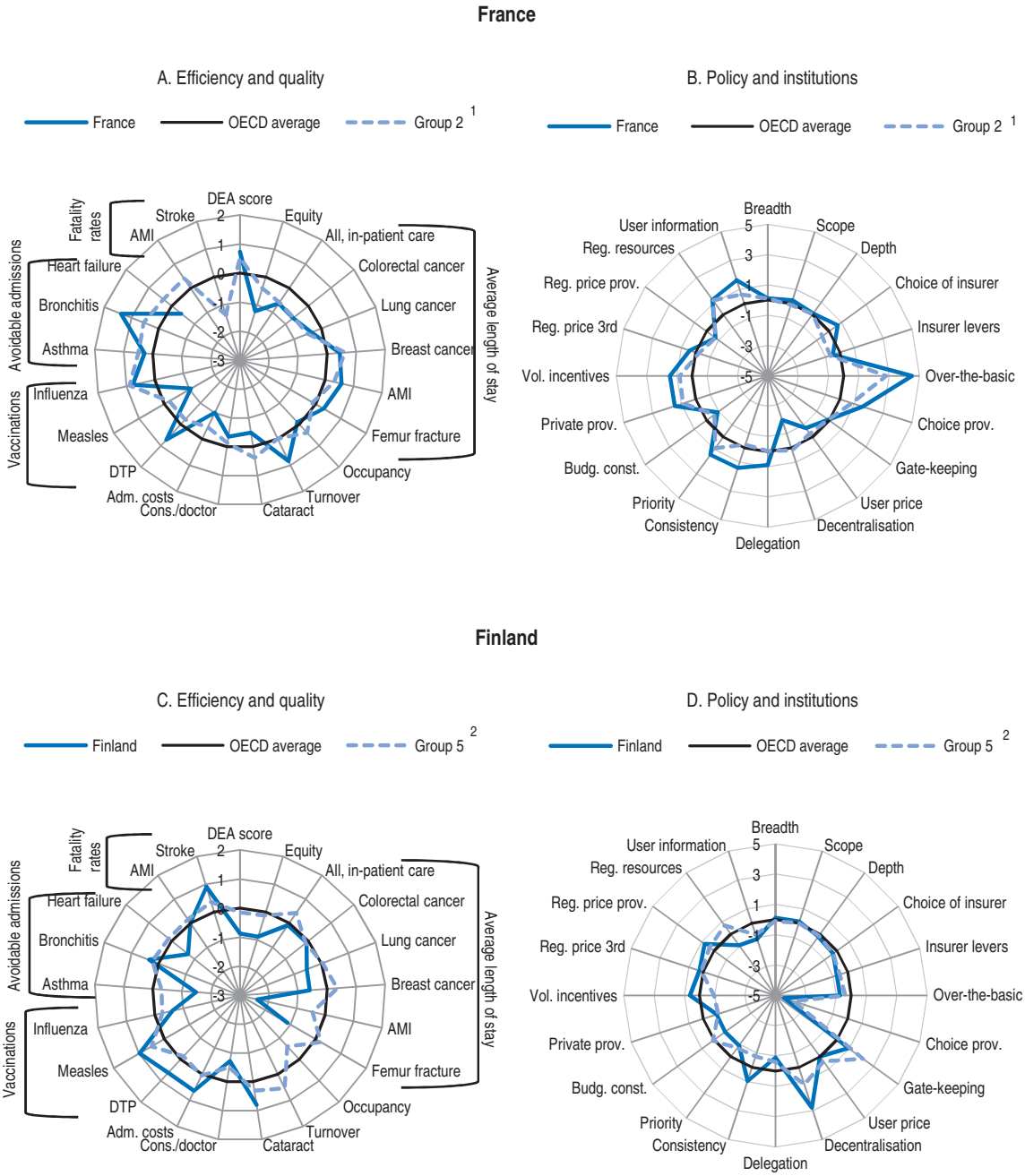
The Finnish health care system, which differs significantly from the French, has been chosen as the second country example. Finland is in the group of countries (with Denmark, Mexico, Portugal and Spain) with a heavily regulated public system, strict gate-keeping and very little choice among providers offered to users. For this group, health care system performance – as measured by the DEA efficiency score and more specific indicators on in-patient efficiency and quality in out-patient care – is slightly below the OECD average. Finland, on the positive side, stands out for its low administrative costs and for a low in-hospital case-fatality rate for stroke, both by OECD standards and compared with the group average. Still, it does not perform as well as the other countries of the group in several respects. The DEA efficiency score is lower and inequalities in health status are higher. Indicators on the quality of out-patient care deliver a mixed picture. In particular, the avoidable hospital admission rate for chronic obstructive pulmonary diseases falls slightly below the OECD and group average. But Finland is also characterised by high rates of avoidable hospital admission rates for asthma and heart failures (Figure 4.5, Panel C). And patients tend to stay longer in in-patient care for most of the specific diseases included in the set of indicators.

Finland's health institutions and policies deviate from its peer countries in a number of domains. And some of these specificities could contribute to create a bias in favour of the more expensive in-patient care sector. *First*, users are offered very limited choice among providers (Figure 4.5, Panel D). With doctors mostly paid on a salary basis and a very low relative income level for health professionals compared with the OECD and group average, incentives to deliver high quality services in the out-patient care sector are probably low.[11] The number of consultations per doctor is also below the OECD average. *Second*, gate-keeping arrangements are less well developed than in the other countries in the group. These two specificities may contribute to the large number of hospital discharges *per capita*. *Third*, incentives to increase the volume of activity in the hospital sector are higher than in the peer countries; the activity-based compensation system for hospitals (DRG system) creates incentives to respond to demand which may not have been catered for in the out-patient care sector. *Fourth*, regulations of the hospital workforce and equipment are soft compared to those in the peer countries and do not restrain the size of the hospital sector.[12] In practice, the in-patient care sector absorbs a very high share of total health care spending, as shown in the full set of indicators for Finland (Annex 4.A1).

11. The average working time of doctors is also low in Finland (Fujisawa and Lafortune, 2008).

12. The 2003 OECD *Economic Survey for Finland* noted that the lack of division between purchasing and providing roles was a source of inefficiency, with municipalities acquiring services from hospital districts they were themselves managing. It also recognised that the role of hospitals as large local employers influenced their relationship with municipalities, with hospitals facing a relatively soft budget constraint.

Figure 4.5. **Selected indicators for France and Finland**



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In Panels A and C, data points outside the average circle indicate that the group or the country under scrutiny performs better than the OECD average. In Panels B and D, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country. In Panels A and C, data represent the deviation from the OECD average and are expressed in number of standard deviations. In Panels B and D, data shown are simple deviations from the OECD average. Each indicator is defined in Annex 4.A1.

1. Group 2: Australia, Belgium, Canada, France.
2. Group 5: Denmark, Finland, Mexico, Portugal, Spain.

Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009.

Policy lessons from the international benchmarking exercise

The above analysis suggests that a "one-size-fits-all" approach to reform is not advisable, at least for some policy instruments: recommendations are clearly system-dependent. In particular, the analysis for Finland and France suggests that increasing consistency in policy settings may entail implementing different, and even seemingly opposite, approaches. The appropriate strength of *regulations on hospital workforce and equipment* provides an example. Some of the countries where recently reformed hospital payment systems are now mainly based on activity have maintained rather tight regulations of hospital employment and equipment compared to their country peers. These regulations likely reduce flexibility to respond to the new set of incentives and may need to be relaxed (*e.g.* Belgium, France and Ireland). In contrast, regulation of the hospital workforce and equipment may need to be strengthened in some countries characterised by little use of market mechanisms for service providers, and an above-average supply of hospital facilities (*e.g.* Finland and Iceland).

Some suggestions for policy improvements apply to several countries, independently of their group. These include the following:

- Countries have different approaches to *priority setting*. Some only outline principles to guide prioritisation of health care provision. Others explicitly recommend the services which should be provided, sometimes setting up special bodies to establish priorities and monitor outcomes (*e.g.* the National Institute for Health and Clinical Excellence [NICE] in the United Kingdom). While there is little evidence that establishing principles has significant effects on health care practice, priority setting bodies with decision making power seem to have been quite successful in some countries (Sabik *et al.*, 2008). Within groups, the most efficient countries tend to be those with the most rigorous priority setting. Hence, better priority setting should be envisaged in those countries where there is no precise definition of the health benefit basket, no effective health technology assessment and clear definition and monitoring of public health objectives.[13]
- The *consistency of responsibility assignment* could be reinforced in many countries to avoid duplication and ensure proper coordination across levels of government involved in health care management. This should be an area for investigation in Austria, Australia, Canada, Denmark, Italy, Mexico, Poland, Sweden, Switzerland and the United Kingdom.
- *Gate-keeping* could be introduced or reinforced in some countries to reduce the large number of consultations (*e.g.* in the Czech Republic, Japan and Korea) or to contain spending in the in-patient sector (*e.g.* Belgium and Iceland).
- *Price signals on users* could be increased where they are low and wide patient choice among providers might induce excessive activity, notably in the Czech Republic and Luxembourg.
- More *information on quality and prices* should be provided to users in many countries. In countries where abundant choice of treatment is available, it would

13. In the United Kingdom and the Slovak Republic, rigorous priority setting is not matched by a high level of efficiency. This may reflect fairly recent improvements in priority setting, which were undertaken as a response to unsatisfactory performance.

enhance competitive pressures. In those where less choice is available, it would allow benchmarking providers and thus help spread best practices.

- The merits of *reforming provider payment schemes* should be investigated in many countries, both in the in-patient and out-patient sector. In some of the countries where physicians are compensated mainly through fee-for-services, the level of activity is high in international comparison. Introducing an element of capitation could help to reduce the number of consultations and improve the quality of preventive care (Japan, Korea and Germany are examples). In contrast, an activity-based component could be introduced or strengthened in some of the countries relying mainly on salaries (*e.g.* Greece, Iceland and Sweden) or capitation (Ireland, Poland and the Slovak Republic). Adjusting the relative income level of health practitioners may further be warranted – they tend to be low in some eastern European and Nordic countries and are particularly high in the United Kingdom and the United States. Reinforcing the activity-based component and/or adjusting the relative income level of health practitioners would also reduce incentives for informal payments (*e.g.* Hungary). Likewise, the introduction of a DRG system in countries where it is absent may be an option to improve efficiency in the in-patient sector – notably in Greece, Iceland, Luxembourg, Portugal and Turkey.

Inequalities in health status are high in several countries. The reasons for such inequalities vary across countries and result from the health care system or from other socio-economic conditions. In any case, the factors behind health inequalities should be investigated, in order to devise the appropriate policy response. Mexico and Turkey should move further towards achieving universal coverage. It would also be useful to assess whether extensive reliance on over-the-basic coverage (Canada and France) and/or high out-of-pocket payments (Finland, Hungary, Poland and Slovak Republic) create inequities in access and hence inequalities in health status.

Limitations and suggestions for future work

Although conclusions drawn from the analysis above are often largely in line with those from an in-depth assessment contained in recent individual *OECD Country Surveys*, they should be interpreted with care for a number of reasons:

- Measuring performance remains challenging, and controversial, especially in a context of multiple policy objectives. A wide uncertainty margin surrounds the DEA efficiency estimates, in particular for those countries with atypical levels of health care inputs. It is thus important to complement the overall efficiency estimates by a broader set of performance indicators – efficiency measures based on hospital outputs and quality of care indicators. It should also be recognised that cross-country comparisons allow identifying best practice but may underestimate the full potential efficiency gains as the best performers may not be fully efficient.
- Recent health care reforms carried out in several countries may not have yet delivered their full impact on efficiency – the comprehensive health care reform in the Netherlands is a case in point.
- While policy indicators measure the existence of market mechanisms and/or regulations, they hardly reflect their intensity. For instance, the indicator on the

stringency of the budget constraint reflects the existence of spending limits embodied in the budget process, but not their levels and whether limits are complied with.

- The set of institutional and policy indicators does not currently allow a solid analysis of at least three domains often identified as priorities in the *OECD Economic Surveys* and *OECD Reviews of Health Systems*, namely the pharmaceutical sector (*e.g.* incentives for using generics), co-ordination of care (*e.g.* across in-patient, acute and long-term care settings) and sick leaves. In addition, the existing indicators may need to be refined in a number of areas, including the nature of health insurance markets (*e.g.* individual *versus* collective contracts) and the design of out-of-pocket payments (in particular the existence of cost-sharing exemptions, caps on deductibles and co-insurance payments, as well as their targeting).

These limitations clearly call for further work in regularly updating and developing the set of institutional and policy indicators and for complementing the work on indicators by an in-depth assessment of individual country health care systems.

Table 4.5. **Main characteristics emerging from within-group comparisons**

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
GROUP 1:	Extensive reliance on market mechanisms in regulating both basic and "over-the-basic" insurance coverage and abundant private provision of health care.					
Germany	About group-average DEA score			Large publicly funded share and lower out-of-pocket share	More competitive pressures in the insurance market	
	Mixed scores on output/hospital efficiency	More acute care beds *per capita*	More hospital discharges *per capita*		More choice among providers and less price signals on users	Assess the best balance between extensive user choice and low out-of-pocket payments in case clear signs of excessive demand for health care services emerge
	Mixed scores on the quality of out-patient and preventive care				More provider incentives and more regulation on resources	Consider whether reforming provider payment systems could help avoiding excessive activity, *e.g.* by combining existing fee-for-services for physicians with a capitation and/or salary element
	Administrative costs are broadly in line with the group average	High relative income level of GPs and nurses				
Netherlands	About group-average DEA score but lower inequalities in health status			More reliance on social insurance financing and less on out-of-pocket payments	Market mechanisms in delivering basic insurance coverage play an important role but the insurance market remains more concentrated than in the peer countries	Ensure that competitive pressures in the insurance market are strong enough
	Mixed scores on output/acute hospital care efficiency	Less high-tech equipment and acute care beds *per capita*	Low number of hospital discharges and consumption of pharmaceuticals *per capita*		Less volume incentives, in particular at the hospital level	Examine the relatively low activity levels of hospitals and whether reforming hospital payment systems could improve hospital incentives to better respond to needs
	High quality of out-patient and preventive care	More doctors and medical students		Lower out-patient share	Less choice among providers and more gate-keeping	
	Administrative costs are broadly in line with the group average	Higher relative income level of specialists and GPs			Less decentralisation, consistent responsibility assignment	

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
Slovak Republic	Low DEA score and high amenable mortality rate	Low health care spending *per capita* and as a share of GDP		Lower public spending share and higher out-of-pocket payments	No market for the "over-the basic" coverage	The Slovak health care system seems in transition with private provision and market instruments (payment per case for hospitals and user fees) introduced or increased recently
	Mixed scores on output/hospital efficiency	Less nurses and high-tech equipment, but more acute care beds	More hospital discharges *per capita*	Low in-patient share	Less choice of providers. More gate-keeping and price signals on users.	
	Mixed signals on quality of out-patient preventive care	Very low relative income level of GPs and nurses	More doctor consultations *per capita*	Very high drug share	Less volume incentives (physicians are paid on capitation and/or salary) and less regulation on resources	Reconsidering the payment system and, possibly, the level of income of health care practitioners could reinforce providers' incentives to respond to the need for higher quality health care services
Switzerland	High DEA score and low inequalities in health status	High health care spending *per capita* and as a share of GDP		Large share of out-of-pocket payments	Less levers for competition for insurers offering basic insurance cover as they are not allowed to contract selectively with providers	Assess the potential merits of selective contracting clauses
	Mixed scores on output/hospital efficiency	More high-tech equipment and less acute care beds		Higher in-patient share	Less information for users on the quality and prices of services	More information on the quality and prices of services could raise competition and contain health care prices
	High quality of out-patient and preventive care	More doctors and nurses *per capita*	Less doctor consultations *per capita*	Low drug share	Less gate-keeping and more out-of-pocket payments	The balance between gate-keeping and out-of-pocket payments, as mechanisms to avoid excessive demand, could be examined
	Administrative costs are broadly in line with the group average	High health care prices			More decentralisation but less consistency in responsibility assignment across levels of governments	Improved consistency in the allocation of responsibilities across levels of government could help exploiting efficiency gains

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
GROUP 2:	Public basic insurance coverage combined with private insurance beyond the basic coverage. Heavy reliance on market mechanisms at the provider level, with wide patient choice among providers and fairly large incentives to produce high volumes of services contained by gate-keeping arrangements.					
Australia	High DEA score	Less doctors *per capita*		Lower public share		
	Rather high output efficiency in the acute care sector but long stays in the in-patient care sector		Less hospital discharges		Less volume incentives, in particular in the in-patient care sector	Examine the reasons behind the long stays in the in-patient (non-acute) care sector
	Data missing on quality of care	Lower income level for GPs		Higher out-patient share; lower drug share	Less gate-keeping	Improve availability of internationally comparable data on quality of care
	Low administrative costs				More decentralisation, less consistency, more priority setting, less regulation of resources	Improved consistency in the allocation of responsibilities across levels of government could generate efficiency gains
Belgium	Below group-average DEA score			Higher social security share		
	Lower scores on output/acute care efficiency	More doctors, nurses, high-tech equipment and acute care beds *per capita*		Higher in-patient care share	Less gate-keeping but more user information on quality and prices of services	Assess the merits of stricter gate-keeping arrangements in containing the number of doctor consultations *per capita*
	Below group-average quality of out-patient care (but still above OECD average)	Higher income level of specialists and salaried nurses	More doctor consultations *per capita*		More provider incentives and private provision. More regulation of prices paid by third-party payers, and of physician workforce, hospital equipment and compensation levels	Reconsider government controls on labour, equipment and compensation levels, which may undermine hospital performance
	Very high administrative costs				Less decentralisation and less priority setting	Explore options to reduce administrative costs. Improved priority setting could help in delivering efficiency gains

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
Canada	High DEA score but slightly higher inequalities in health status. Low rate of amenable mortality			Higher PHI share	Lower scope of basic insurance coverage and heavy reliance on (supplementary) PHIs	Assess the main causes of the inequalities in health status and, in particular, the role of the supplementary insurance system and of the scope of the basic insurance package
	Mixed signals on output/hospital efficiency	Less high-tech equipment and acute care beds	Less hospital discharges *per capita*	Lower in-patient share	Less choice among providers and more gate-keeping	
	High quality of out-patient and preventive care	Less doctors and medical students	Less consultations of doctors *per capita*		Less private provision and volume incentives. More regulation on provider prices and on workforce and equipment	Regulations on hospital employment and equipment may need to be softened if hospitals are increasingly paid on the basis of their activity
	Lower administrative costs	Higher relative income level of GPs			Less regulation on prices paid by third-party payers. Higher decentralisation but less consistency in responsibility assignment. Less priority setting	Higher consistency in the allocation of responsibilities across levels of government could deliver efficiency gains
France	High DEA score and OECD best performer on amenable mortality but high inequities in health status	Higher health care spending as a share of GDP		Higher public, social security and PHI shares; less out-of-pocket payments	More reliance on market forces in the insurance sector	Explore the main causes for high inequities in health status, and in particular the role of over-the-basic coverage (complementary insurance)
	Mixed scores on output/hospital efficiency	Less nurses and high-tech equipment	More hospital discharges	Higher in-patient share	More choice among providers, less price signals	
	Rather high quality of (out-patient) care	Less medical students		Lower out-patient share	More private provision and incentives to increase volumes. More regulation of workforce and equipment, in particular in the hospital sector, and of prices paid by third-party payers.	Reconsider government controls on labour and equipment in the in-patient care sector (the reform of the hospital payment system may require more flexibility on labour and equipment for hospitals to adjust to the new set of incentives)
	Very high administrative costs				Less decentralisation	Explore options to reduce administrative costs, including the consolidation of social security funds

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
GROUP 3:	Public basic insurance coverage with little private insurance beyond the basic coverage. Extensive private provision of care, with wide patient choice among providers and fairly large incentives to produce high volumes of services. No gate-keeping and soft budget constraint. Limited information on quality and prices to stimulate competition.					
Austria	About average DEA score; low rates of amenable mortality	Higher health care spending *per capita* and as a share of GDP	More hospital discharges *per capita*	Lower out-of-pocket share	More generous insurance coverage	Consider whether rebalancing resources from the in-patient to the out-patient care sector could contribute to increasing health spending efficiency. Introducing gate-keeping arrangements and/or restricting the use of retrospective payment of costs for hospitals could be options to avoid excessive in-patient activity. Reforms should also aim at increasing the quality of out-patient/preventive care
	Rather high hospital (output) efficiency	More acute care beds *per capita* than the OECD average		Higher in-patient share	Less choice of provider	
	Below average scores on the quality of out-patient and preventive care	More doctors and students *per capita*. Higher relative income level of specialists and GPs		Lower drug share	Less private provision and volume incentives and more regulation of resources	
					More decentralisation and less consistency. Less priority setting and little constraint put on health care spending via the budget process	Enhanced priority setting, more choice among providers and information on the quality and prices of services could help. Improve consistency in the allocation of responsibilities across levels of government as decision-making and financing are still often divided among different levels of government

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
Czech Republic	Below average DEA score and higher rate of amenable mortality	Lower health care spending *per capita* and as a share of GDP	More hospital discharges *per capita*	Higher publicly funded share. Lower out-of-pocket payments	More market orientation of the basic insurance segment	The Czech health care system seems in transition with private provision and market instruments (global budget plus payment per case and per procedure for hospitals and user fees) introduced or increased recently
	Rather low acute care (output) efficiency	More acute care beds than the OECD average and less high-tech equipment			More choice of providers, no gate-keeping and low price signals on users	Increasing co-payments, which are currently relatively low, and/or introducing some gate-keeping could be envisaged. This would help containing the rather high level of health activity and consumption and balance the high degree of provider choice given to users
	Few data on the quality of out-patient care	More doctors *per capita*. Very low relative income level of health practitioners	More doctor consultations *per capita*	Lower out-patient share. Higher drug share	Less private provision and volume incentives but more regulation of provider prices	Assess whether the current compensation system for out-patient care (fee-for-services combined with capitation) should not be reformed so as to reduce the very high number of consultations *per capita* and to promote high quality of care
	Low administrative costs					Improve availability of internationally comparable data on the quality of care
Greece	Lower DEA score. About average amenable mortality rate		Higher level of health care spending to GDP ratio	Lower public funding share. Higher out-of-pocket payments	Rather low depth of coverage	The Greek health care system is difficult to assess with the existing set of indicators, given its very fragmented nature (including the rather large parallel system). Internationally comparable data are also often missing, in particular on the allocation of spending across sub-sectors and on the quality of care
	Mixed signals on acute care (output) efficiency				Less choice of provider and more price signals on users (often in the form of informal payments)	Improve information on prices for users
		More doctors and students *per capita*, less nurses			Regulation of provider prices are often not fully complied with	Introducing a hybrid compensation system for physicians (capitation payments and fee-for-services) should be considered. For hospitals, moving from a per-diem and retrospective payment approach to a DRG system could be an option to promote value for money
	Few internationally comparable data on the quality of care	Higher relative income of nurses			Less priority setting	To control health care spending better, stricter budget norms and better priority setting should be considered

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
Japan	High DEA score and low amenable mortality rate			Large public funding share and small share for out-of-pocket payments		Overall (DEA) efficiency is high. Two main features are however striking: the large reliance on hospitals for long-term care and the very large number of consultations *per capita* and per doctor
	Rather low output/hospital efficiency, with very low turnover rate for acute care beds	More acute care beds and high-tech equipment *per capita*	Less hospital discharges *per capita*		More private provision, higher volume incentives for providers coupled with strict regulation on provider prices	Consider options to reduce the use of hospitals for long-term stays. Reforming the hospital payment system (by extending the case-mix element) should be examined
	About average quality of out-patient care and very high number of consultations per doctor	Less doctors and medical students *per capita*	Much more doctor consultations *per capita*		More choice among providers but less information on quality and price of services. No gate-keeping	Consider introducing gate-keeping and/or a reform of the payment system (*e.g.* combining some capitation with the existing fee-for-services) to reduce the number of consultations. Increase information on quality and prices of services to reinforce pressures on providers to provide high quality services
	Low administrative costs				More decentralisation; less consistency; more priority setting; softer budget constraint	
Korea	High DEA score, with about average amenable mortality rate	Lower health care spending *per capita* and as a share of GDP		Lower public funded share; higher out-of-pocket payments	Lower depth of coverage	Assess the impact of the rather low scope and depth of the basic insurance package on equity in access to health care services
	Rather low output/acute care efficiency	More acute care beds and high-tech equipment *per capita* than the OECD average	Fewer hospital discharges *per capita*	Lower in-patient share	No gate-keeping and higher price signals on users	
	Rather high quality of out-patient and preventive care and very high number of consultations per doctor	Less doctors, nurses and medical students *per capita*	More doctor consultations *per capita*	Higher drug share	More private provision and provider incentives to raise volume coupled with strict regulation on provider prices. Lower regulation of resources	Consider introducing gate-keeping and/or a reform of the payment system for GPs (*e.g.* combining an element of capitation with the existing fee-for-services) to reduce the number of doctors' consultations
					Less decentralisation, higher consistency, delegation and priority setting; softer budget constraint	

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
Luxembourg	Lower DEA score; lower amenable mortality rate	Relatively low health care spending as a share of GDP but high in *per capita* terms		Higher public funded share. Lower out-of-pocket payments	Less market mechanisms for the basic insurance and additional coverage	
	Mixed scores on output/acute care efficiency	Less doctors *per capita*		Higher in-patient share	More private provision and little information on the quality and price of services. Soft regulation on prices reimbursed by third-party payers.	Develop strategies to increase efficiency in the in-patient care sector. Introducing a DRG payment system for hospitals and improving the availability of information on prices and quality of services would be useful
		More nurses *per capita*	Less doctor consultations *per capita*		Ample choice of providers with no gate-keeping	Introducing a gate-keeping system and/or increasing out-of-pocket payments for out-patient care may be options to control spending growth
	Very high administrative costs			Lower drug share	Little priority setting	Examine the reasons behind the very high administrative costs. Improve internationally comparable data on the quality of care

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
GROUP 4:	Mostly public insurance. Users are given ample choice of providers but private supply is limited and prices tightly regulated. Gate-keeping is virtually inexistent.					
Iceland	High DEA score, low amenable mortality rate and low inequalities in health status	Rather high spending to GDP ratio and *per capita*		Higher public share, largely tax-financed and low out-of-pocket share	Generous basic insurance coverage	In containing public spending on health, the focus should be on the in-patient care sector. Hospital budgets are largely independent on the level of activity. There are few regulations which apply to the level of human resources and equipment, which is high by OECD standards. Two alternative strategies may be envisaged: *i*) tightening both hospital budgets and controls on resources; *ii*) linking hospital budgets to their level of activity. The first approach will help better controlling health care spending and could be reinforced *via* a tougher budget constraint while the second approach would promote efficiency gains though with uncertain impact on public spending
		More doctors, nurses, medical students, MRIs and scanners *per capita*	About average number of consultations and hospital discharges *per capita*	Very high in-patient share	Ample user choice of providers and no gate-keeping with little information on prices and quality	Introducing gate-keeping could contribute to mitigate spending pressures in the in-patient care sector
	Rather high quality of out-patient and preventive care				Little private provision and provider incentives, with heavy regulation of prices. Less regulations of resources	The high number of health professionals and low number of consultations per doctor is striking. Achieving the same quality of health care services with fewer human resources could be an objective. Incorporating an activity-based component to the existing salary system for health professionals could be considered
		High relative income of (salaried) GPs but low relative income of specialists			Little decentralisation and rather soft constraint on public spending *via* the budget process	

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
Sweden	High DEA score compared to the OECD average, low amenable mortality rate and low inequalities in health status		Above average spending *per capita*	Large public share, mostly tax-financed, and very limited role of out-of-pocket payments and private health insurance	Basic insurance coverage is slightly less generous (physiotherapies and eyeglasses are not covered; large co-payments apply to dental care)	
	Rather high output efficiency in the in-patient care sector	More doctors and nurses *per capita*, less acute care beds			Ample user choice of providers and no gate-keeping	The high number of health professionals and low number of consultations per doctor is striking. Achieving the same quality of health care services with fewer human resources could be an objective. Incorporating an activity-based component to the existing salary system for health professionals could be considered
	Rather high quality of out-patient and preventive care but low number of consultations per doctor	Low relative income level of (salaried) GPs and specialists	Less consultations *per capita*	High share of out-patient care	Very little private provision, low volume incentives and little information on the quality of services. Heavy regulation of prices	Improving information on the quality of services could reinforce pressures on providers to increase the quality of care
	Low administrative costs				Tight budget constraint. High degree of decentralisation but low degree of consistency in responsibility assignment	Efforts to increase consistency in the allocation of resources across government levels could contribute to raise spending efficiency

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
Turkey	High DEA score but still lower health status (life expectancy)	Health care spending *per capita* and as a share of GDP both remain well below the OECD average			A large share of the population is still not covered by a basic insurance package	Pursue efforts to increase population coverage for the basic insurance package
	Rather high output efficiency in the in-patient care sector, except a low occupancy rate of beds	Less acute care beds, high-tech equipment and nurses *per capita*	Less hospital discharges *per capita*	Low share of in-patient care	Ample user choice of providers and no gate-keeping	Consider strategies to manage efficiently existing hospital beds. Incorporating some elements of activity-based funding to the current line-item funding for hospitals could be considered
	Data missing on the quality of care and on administrative costs	Less doctors *per capita*		High share of expenditure on drugs	Tight regulation of resources and prices, combined with little private provision and volume incentives	Improve availability of internationally comparable data on the quality of care, compensation levels of health professionals and administrative costs
					Less decentralisation coupled with little priority setting and expenditure control *via* the budget process	Strengthening the budget and prioritisation process (*e.g.* by introducing expenditure targets) could help better controlling both the level and allocation of public health care spending
GROUP 5:	Mostly public insurance. Health care is provided by a heavily regulated public system and the role of gate-keeping is important. Patient choice among providers is limited and the budget constraint imposed *via* the budget process is rather soft.					
Denmark	Lower DEA score but slightly below-average health inequalities	Spending *per capita* and as a share of GDP stand above the OECD and group averages		Higher tax-financed shares	Less market for the "over-the-basic" segment	
	Rather high output/hospital efficiency	More nurses and medical students *per capita*. Less acute care beds *per capita*	More hospital discharges	Higher in-patient share	Less price signals on users	
	Mixed scores on the quality of preventive and out-patient care	Lower income level for specialists, high income level for nurses	More doctor consultations	Higher out-patient share	More private provision	Introducing co-payments for visits to GPs could help avoid excessive demand
	Lower administrative costs				Less decentralisation and consistency in responsibility assignment, less regulation of resources	Enhanced priority setting (in particular the definition of the benefit basket and the monitoring of public health objectives) and greater consistency in the allocation of responsibilities across levels of government could deliver efficiency gains

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
Finland	Low DEA score and high inequalities in health status	About average health care spending *per capita*		Higher tax-financed shares	Less market orientation for the "over-the-basic" segment	Examine the reasons behind high inequalities in health status
	Rather low output/hospital efficiency	More acute care beds *per capita*	More hospital discharges *per capita*	Higher in-patient share	Less gate-keeping and choice of provider	Reinforcing control on resources, priority setting and gate-keeping arrangements could contribute to shift resources from in-patient to out-patient care
	Mixed scores on the quality of preventive and out-patient care		Less doctor consultations *per capita*	Lower out-patient share	Little private provision but more incentives to raise volume of care in the hospital sector. Out-patient physicians are paid on a salary basis	Assess whether reform of the compensation system for physicians could help to improve the quality of out-patient care
	Low administrative costs	Much lower relative income level of health care professionals			Less regulation of resources, priority setting and budget constraint. More regulation of prices	
Mexico	High DEA score but amenable mortality remains high and information on inequalities in health status is lacking	Spending *per capita* and as a share of GDP remain low		Lower public spending share and higher out-of-pocket payments	Less breadth and depth of the basic insurance coverage, despite some choice among insurers given to citizens	Continued efforts to achieve universal health insurance coverage would help improving the health status of the population. Developing internationally comparable data on inequalities in health status and on the quality of care should be considered
	High scores on output/hospital efficiency except a very low occupancy rate for acute care beds	Less nurses, high-tech equipment and acute care beds *per capita*	Less hospital discharges *per capita*	Lower in-patient share	More price signals on users but little choice across providers	Allowing insurers to contract with any provider would reinforce efficiency pressures on providers
	Little internationally comparable data on the quality of care	Less doctors *per capita*	Less doctor consultations *per capita*	Higher drug share	Less regulation of provider prices	
	Very high administrative costs	High relative income of salaried nurses and GPs			Less priority setting. Little decentralisation but some overlap in responsibilities across levels of government. Strict regulation of medical resources.	Explore ways to reduce administrative costs. Consolidating some insurance funds or establishing a unified claims management system could be options. Efforts to better set health care priorities and to improve consistency in responsibility assignment across levels of government should also be envisaged

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
Portugal	Above average DEA score	Below average health care spending *per capita*		High share of tax financing and out-of-pocket payments	Little market orientation for insurance coverage	
	Rather low efficiency scores in the in-patient (acute) care sector	Little acute care beds *per capita*	Less hospital discharges *per capita*	High out-patient share	Limited choice of provider and more gate-keeping	Devise strategies to improve efficiency in the in-patient care sector and raise the number of consultations per doctor. Combining the existing wage system for physicians and prospective global budget for hospitals with some elements of activity-based payments (fee-for-services or preferably DRGs) could be an option
		More doctors but less nurses and medical students *per capita*	Less doctor consultations *per capita*	High drug share	Very low private provision and volume incentives. More regulation of prices billed by providers. Low user information	Increasing the availability of information on the quality of services could create pressures on suppliers to increase quality
	Low administrative costs	High relative income of nurses and low income of specialists			Less decentralisation but still little consistency in responsibility assignment across levels of government	Efforts to increase consistency in the allocation of resources across government levels could contribute to raise spending efficiency
Spain	High DEA score and low inequalities in health status	Spending *per capita* remains below the OECD average			More reliance on PHI to provide additional health coverage	
	Mixed signals on output efficiency in the in-patient (acute) sector	Less acute care beds and nurses	Less hospital discharges *per capita*	Lower in-patient care		
	High quality of out-patient and preventive care	More doctors and less medical students	More doctor consultations *per capita*	Higher out-patient share	Little choice of providers. Less private provision (in particular for out-patient care) and volume incentives. Heavily regulated prices and resources	
	Low administrative costs				Higher decentralisation but high degree of consistency. User information on quality of price of services remains limited	Better sharing experiences and improving information on the quality of services across regions could strengthen pressures for improving efficiency in health care provision

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
GROUP 6:	Mostly public insurance. Health care is mainly provided by a heavily regulated public system, with strict gate-keeping, little decentralisation and a tight spending limit imposed *via* the budget process.					
Hungary	Low DEA score, high rate of amenable mortality, high inequalities in health status	Spending *per capita* and as a share of GDP remain below the OECD average		High share of out-of-pocket payments		Examine the main reasons behind high inequalities in health status, and in particular the role of large (largely unofficial) out-of-pocket payments and regional disparities in access
	Rather short durations of stay in the acute care hospitals but low occupancy rate of acute care beds	More acute beds but less high-tech equipment *per capita*	More hospital discharges *per capita*	Very low out-patient share	More choice of providers, combined with tight gate-keeping arrangements. Little incentives to increase volumes of care	Consider increasing the role of preventive and out-patient care, which would contribute to reducing drug consumption and in-patient care. Adjusting the level and mode of physician compensation (currently capitation for GPs and salary for specialists) may be warranted. This would in turn allow strengthening the gate-keeping role of GPs.
	A high rate of cataract surgery performed in the in-patient care sector which may signal a mis-allocation of resources across sectors	Less doctors and nurses but more medical students	More doctor consultations *per capita*		Less binding regulation on provider prices but more regulation on health care resources. Less priority setting	Improve internationally comparable data on health care quality
	Low administrative costs	Very low relative compensation level of health care professionals		High drug share	Little decentralisation but still some overlapping in responsibility assignment across levels of government	Reinforcing priority setting may also contribute to a better balance of health care spending between out-patient, preventive and in-patient care

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
Ireland	Low DEA score but high equity score	Spending *per capita* slightly above average		Higher tax-financed and private insurance share	More limited basket of goods and services included in the basic insurance package (out-patient primary care, eyeglasses and dental care are not covered)	The Irish health system is in transition, both in terms of policies and in terms of medical resources (fewer doctors but more students). Regulations on prices, physician workforce and hospital management remain more stringent than in most other countries of this group while market forces are reinforced
	Mixed signals on output/acute care efficiency	Less acute care beds. More nurses and medical students	Less hospital discharges	No full set of internationally comparable data to break down spending by sub-sector	More choice among providers, less gate-keeping and less price signals on users	
	Mixed scores on quality of out-patient and preventive care				Less private provision (in particular for out-patient care) and more regulation on workforce and equipment	
	No data on administrative costs				Less priority setting, more regulation on prices paid by third-party payers, no decentralisation	Better priority setting could help foster efficiency in resource allocation. Internationally-comparable data on the allocation of health care spending across sectors and on administrative costs should be developed
Italy	High DEA score, low amenable mortality rate and low inequalities in health status			Higher tax-financed share		
	Mixed signals on output/acute care efficiency	More doctors and medical students; less nurses	Slightly less hospital discharges *per capita*	Higher in-patient share	Less private provision (in particular for specialist services) and less information on the quality and prices of services	Strategies to increase efficiency in the in-patient care sector should be devised. Options to consider include: the publication of information on quality and price of services and the reform of payment systems for in-patient specialists
	Rather high quality of out-patient and preventive care	Less acute care beds *per capita* but more high-tech equipment			More gate-keeping and more choice of providers	
	Low administrative costs				Low consistency of responsibility assignment across government levels. More regulation of provider prices and resources	Efforts to increase consistency in the allocation of resources across government levels could contribute to raise spending efficiency

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
New Zealand	Average DEA score and lower rate of amenable mortality but higher inequalities in health status	Below average health care spending *per capita*		Higher public, tax-financed, share	More reliance on PHI for the "over-the-basic" segment	Examine the reasons behind high inequalities in health status
	Rather low scores on the efficiency in the acute care sector	Less doctors *per capita* and less medical students	Less hospital discharges *per capita*	Rather low out-of-pocket payment share	Less choice among providers	Examine the reasons behind the rather low performance of in-patient and out-patient care sectors. The degree of user choice among providers and the provider payment systems (in particular on the best mix between fixed and activity-based elements) should be examined
	Mixed signals on the quality of out-patient and preventive care	Fewer high-tech equipment *per capita*	Less consultations *per capita*	High out-patient share and low drug share	More information available on the quality of services	The high share of out-patient expenditure despite the low number of doctor consultations is striking
	Very high administrative costs	High relative income level of nurses				Examine options to reduce administrative costs
Norway	High DEA score, lower amenable mortality rates and lower inequalities in health status	Spending *per capita* is well above the OECD average		Large public share, mostly tax-financed	Lower scope of basic insurance coverage (dental care and eyeglasses are not covered)	Explore the reasons behind the relatively high number of hospital discharges and whether the very high number of doctors and nurses *per capita* corresponds to medical needs
	High efficiency of output/in-patient care sector	Less acute care beds *per capita*	More hospital discharges *per capita*	High in-patient care share	Both more choice among providers and more gate-keeping	
	Mixed signals on the quality of out-patient and preventive care	Large number of doctors *per capita* and very large number of nurses			More private provision than the group average and more information on the quality of services	
	Low administrative costs	Low relative income level of nurses and specialists			More decentralisation but higher consistency across levels of government. Better priority setting	

Table 4.5. **Main characteristics emerging from within-group comparisons** (continued)

	Efficiency and quality	Prices and physical resources	Activity and consumption	Financing and spending mix	Policies and institutions	Weaknesses and policy inconsistencies emerging from the set of indicators
Poland	Above average DEA score but higher amenable mortality rate and inequalities in health status	Low health care spending *per capita* and as a share of GDP		Low publicly-financed share	Large scope and depth of basic insurance coverage. Very limited market mechanisms in the insurance market	The Polish system relies on both more market mechanisms and more regulations to steer the supply of health care services. The reasons behind the high inequalities in health status should be examined
	Lower length of stay in the acute care sector	More acute care beds *per capita*	More hospital discharges *per capita*	High out-of-pocket payments	More private provision and volume incentives but also more regulation on provider prices and less information on the quality and prices of services	
	Low quality of out-patient care as measured by the number of avoidable in-patient admissions	Less doctors, nurses and medical students		High drug share	More choice of providers and less gate-keeping	Devise strategies to improve the quality of out-patient care. Combining the existing capitation system for GPs with some elements of fee-for-services could be an option
	Low administrative costs	Low prices			Less regulation on medical staffing and equipment	Efforts to increase consistency in the allocation of resources across government levels could contribute to raise spending efficiency
United Kingdom	Below average DEA score	About average spending *per capita*		Large public spending share, mostly tax-financed		The quantity and quality of health care services remain lower than the OECD average while compensation levels are higher. Reinforcing competitive pressures on providers could help mitigate price pressures, *e.g.* by increasing user choice further and reforming compensation systems
	Mixed scores on output efficiency in the acute care sector	Less acute care beds *per capita* and high-tech equipment	Less hospital discharges *per capita*		More restricted choice among providers	
	Mixed signals on the quality of out-patient and preventive care	Less doctors *per capita*	Less doctor consultations *per capita*			
	No internationally-comparable data on administrative costs	High relative income level of health professionals		Low out-of-pocket payments	High degree of priority setting but low consistency in responsibility assignment across government bodies	Efforts to increase consistency in the allocation of responsibility across government bodies could contribute to raise spending efficiency. Improve availability of comparable data on the allocation of spending across sub-sectors

Annex 4.A1

Individual country profiles

Definition of health indicators presented in each individual country profile

Limitations in data comparability are, in some cases, severe. For instance, the definition of acute care varies across countries and the low number of doctor consultations in some countries may reflect the fact that the first contact with the health care system is often with nurses. Similarly, statistics on the health workforce are expressed in numbers of persons rather than full-time equivalent. The definition of nurses, consultations, supply and use of medical technologies and hospital discharges also differs across countries. Data concern 2007 or the latest year available. For more details, see OECD (2009*a*).

Panel A: Efficiency and quality

DEA score	DEA performed with two inputs – health care spending and a composite indicator made of socio-economic conditions, consumption of fruits and vegetables, lagged consumption of alcohol and tobacco – and life expectancy at birth as the outcome.
Equity	Inverse of the inequality indicator based on the dispersion in mortality rates
Average length of stay (in-patient sector):	
All, in-patient care	*i.e.* including acute, psychiatric and long term care
Colorectal cancer	Malignant neoplasm of colon, rectum and anus
Lung cancer	Malignant neoplasm of trachea, bronchus and lung
Breast cancer	Malignant neoplasm of breast
AMI	Acute myocardial infarction
Femur fracture	Fracture of femur
Occupancy	Acute care occupancy rate – % available beds
Turnover	Acute care turnover rate – cases per available bed
Cataract	Cataract surgery – % performed as day cases
Cons./doctor	Number of consultations per doctor
Adm. costs	Total expenditure on health administration – % total expenditure on health
Vaccination rates:	
DTP	Diphtheria, tetanus and pertussis, children aged 2
Measles	Children aged 2
Influenza	Population aged 65 and over
Avoidable hospital admission rates:	
Asthma	Population aged 15 and over
Bronchitis	Chronic obstructive pulmonary disease, population aged 15 and over
Heart failure	Population aged 15 and over
In-hospital case-fatality rates:	
AMI	Acute myocardial infarction, age-sex standardised rates
Stroke	Ischemic stroke, age-sex standardised rates

Panel B. Amenable mortality by group of causes

Amenable mortality is defined as those deaths that were potentially preventable by timely and effective medical care (for more details, see Box 1.1).

Total	All causes
Infectious	Infectious diseases
Cancers	Cancers
Endocrine	Endocrine, nutritional and metabolic diseases
Nervous	Diseases of nervous system
Circulatory	Diseases of circulatory system
Genitory	Diseases of genitor-urinary system
Respiratory	Diseases of respiratory system
Digestive	Diseases of digestive system
Perinatal	Perinatal mortality

Panel C: Prices and physical resources

Spending *per capita*	Total health expenditure – *per capita*, US$ PPP
Doctors	Practising physicians – density per 1 000 population
Nurses	Practising nurses – density per 1 000 population
Students	Medical graduates – density per 100 000 population
MRIs	Magnetic resonance imaging units – per million population
Scanners	Computed tomography scanners – per million population
Hospital beds	Number of acute care beds per 1 000 population
Rem. nurses	Remuneration of hospital nurses - Salaried, income *per capita* GDP
Rem. GPs	Remuneration of general practitioners – Self-employed or salaried, income *per capita* GDP
Rem. spec.	Remuneration of specialists – Self-employed or salaried, income *per capita* GDP
HC prices	Relative health prices to GDP, 2005 PPPs

Panel D: Activity and consumption

Spending to GDP	Total health expenditure – % GDP
Consultations	Doctor consultations – number *per capita*
Discharges	Hospital discharges, all causes – per 100 000 population
Hip replac.	Hip replacement, number of procedures per 100 000 population
Knee replac.	Knee replacement, number of procedures per 100 000 population
Append.	Appendectomy, number of procedures per 100 000 population (in-patient)
Caesareans	Caesareans sections – per 100 live births
Antidepressants	Antidepressants – defined daily dosage per 1 000 population, per day
Anxiolytics	Anxiolytics – defined daily dosage per 1 000 inhabitants, per day
Analgesics	Analgesics – defined daily dosage per 1 000 population, per day
Anti-inflam.	Antiinflamatory, antirheumatism – defined daily dosage per 1 000 inhabitants, per day
Antibiotics	Antibacterials for systemic use – defined daily dosage per 1 000 inhabitants, per day
Cardiovasc.	Cardiovascular system – defined daily dosage per 1 000 inhabitants, per day
Antidiabetics	Drugs for diabetes – defined daily dosage per 1 000 inhabitants, per day

Panel E: Financing and spending mix

Public spending	Public spending – % of total health expenditure (THE)
Taxes	General government funding excluding social expenditure – % THE
SS	Social security funding – % THE
PHI	Private health insurance funding – % THE
OOP	Out-of-pocket payments – % THE
Drugs	Expenditure on medical goods – % THE
Out-patient	Expenditure on out-patient care, including home-care and ancillary services, % THE
In-patient	Expenditure on in-patient and day care – % THE
Collective	Expenditure on collective services (public health services and health administration) – % THE

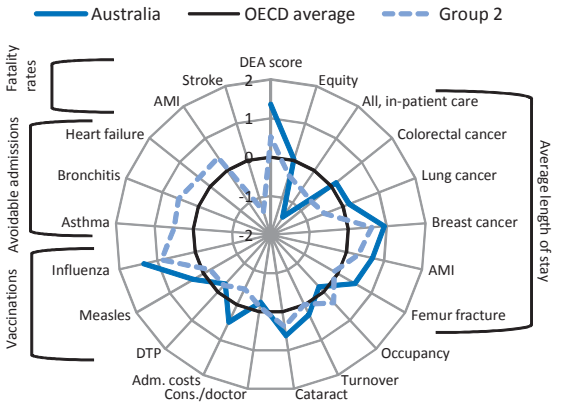
Panel F: Policy and institutions

Breadth	Breadth of coverage – population covered
Scope	Scope of basic coverage
Depth	Scope of coverage
Choice of insurer	User choice of insurer, basic coverage
Insurer levers	Levers for competition on the market for the basic insurance package
Over-the-basic	Over-the-basic coverage: market forces
Choice prov.	Patient choice among providers
Gate-keeping	Gate-keeping
User price	Price signals on users
Decentralisation	Degree of decentralisation to sub-national governments
Delegation	Degree of delegation to insurers
Consistency	Consistency in responsibility assignment across levels of government
Priority	Priority setting
Budg. const.	Stringency of the budget constraint
Private prov.	Degree of private provision
Vol. incentives	Volume incentives embedded in provider payment schemes
Reg. price 3rd	Regulation of prices paid by third-party payers
Reg. price prov.	Regulation of prices billed by providers
Reg. resources	Regulation of the workforce and equipment
User information	User information on quality and prices

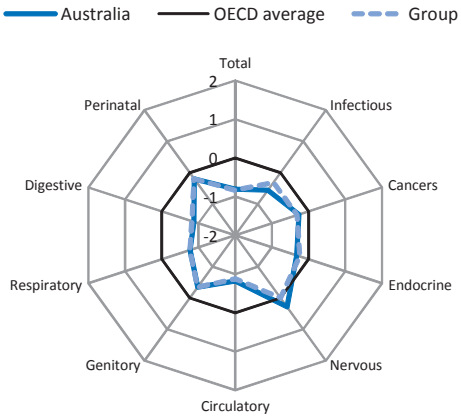
Australia: health care indicators

Group 2: Australia, Belgium, Canada, France

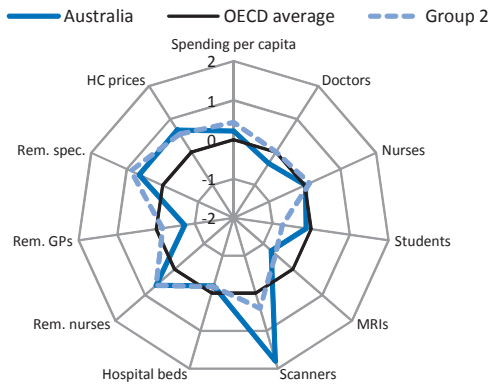
A. Efficiency and quality



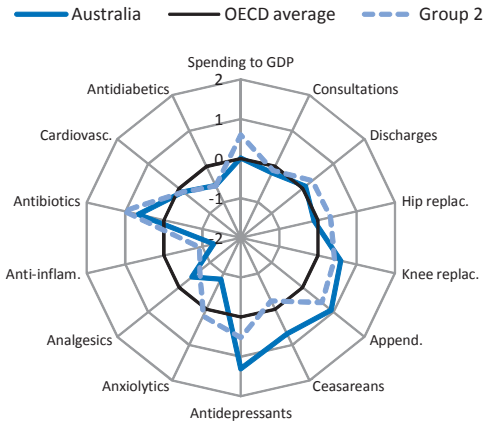
B. Amenable mortality by group of causes



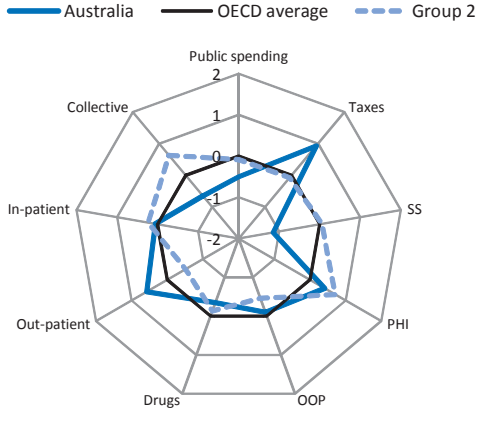
C. Prices and physical resources



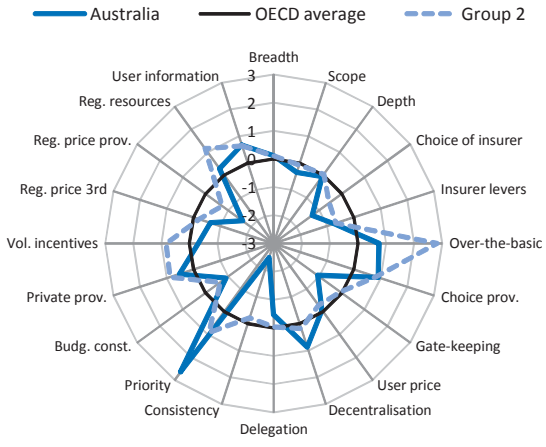
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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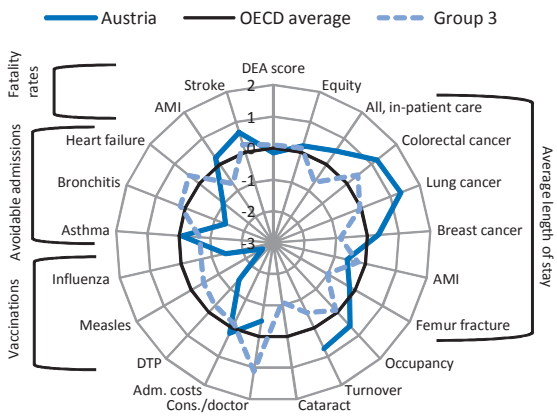
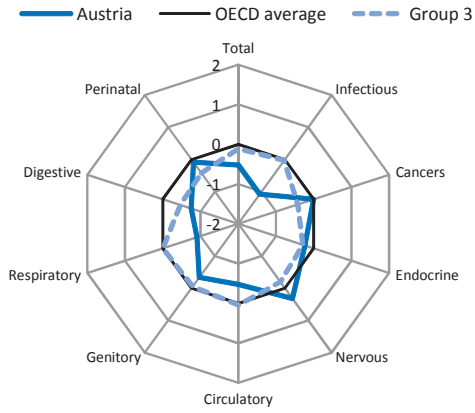
Austria: health care indicators

Group 3: Austria, Czech Republic, Greece, Japan, Korea, Luxembourg

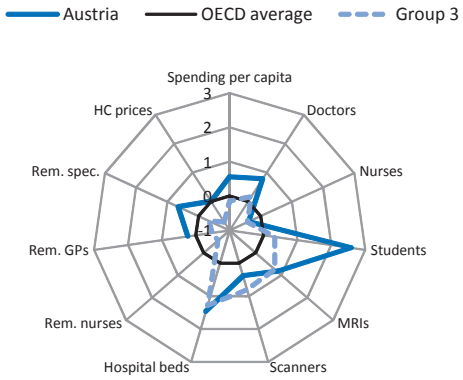
A. Efficiency and quality



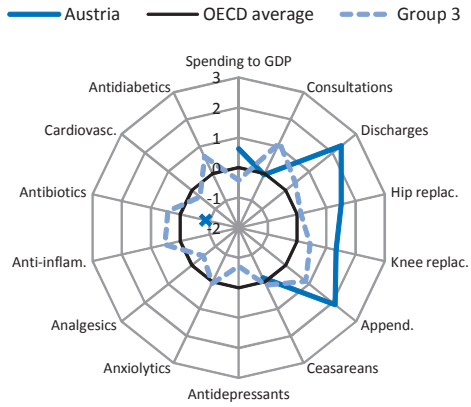
B. Amenable mortality by group of causes



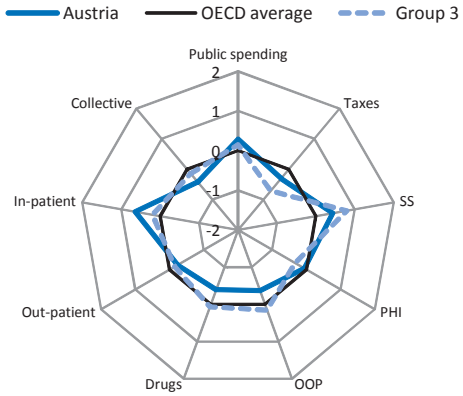
C. Prices and physical resources



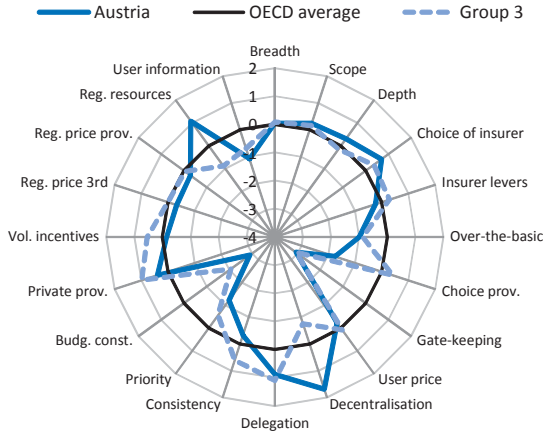
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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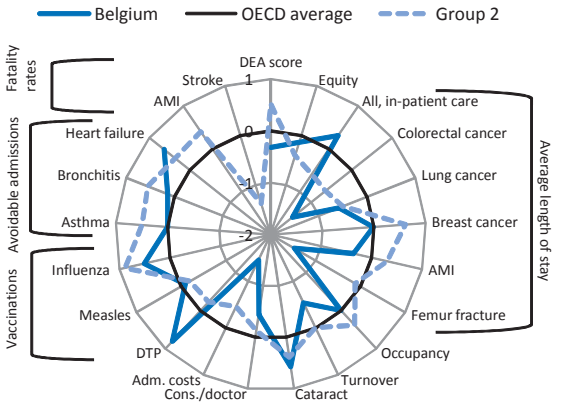
Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

Belgium: health care indicators

Group 2: Australia, Belgium, Canada, France

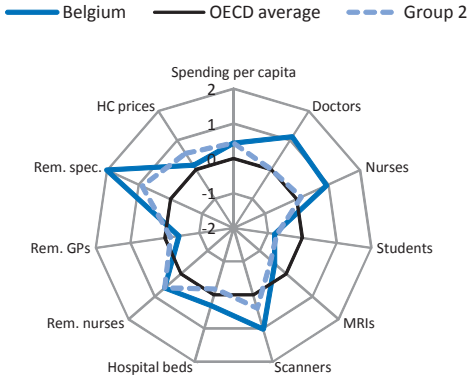
A. Efficiency and quality



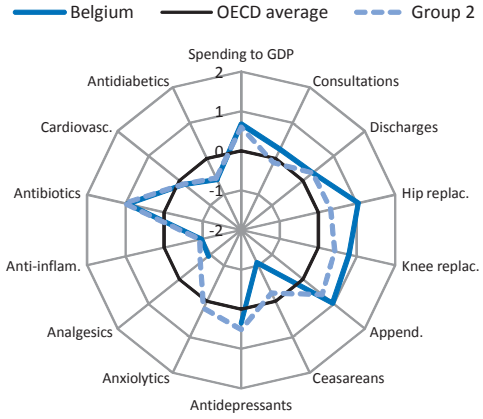
B. Amenable mortality by group of causes

Data not available

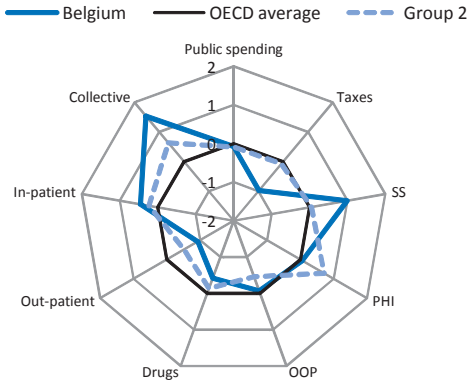
C. Prices and physical resources



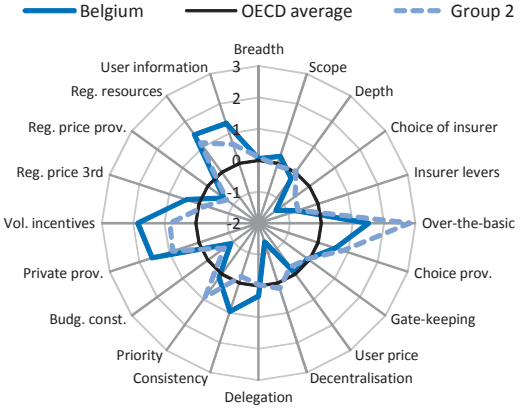
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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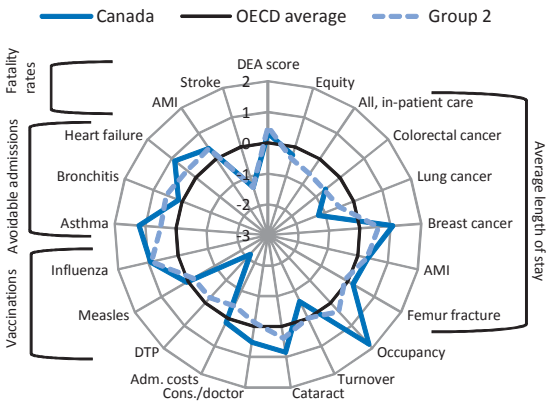
In Panel F, data shown are simple deviations from the OECD average.

Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

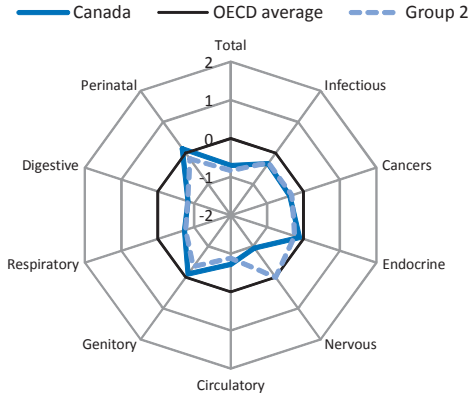
Canada: health care indicators

Group 2: Australia, Belgium, Canada, France

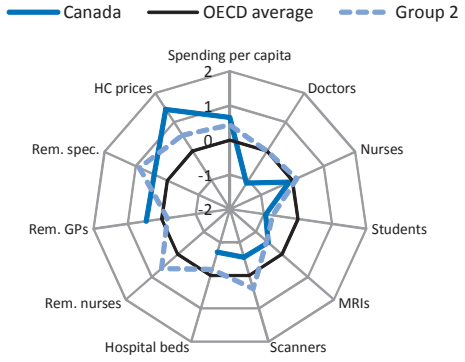
A. Efficiency and quality



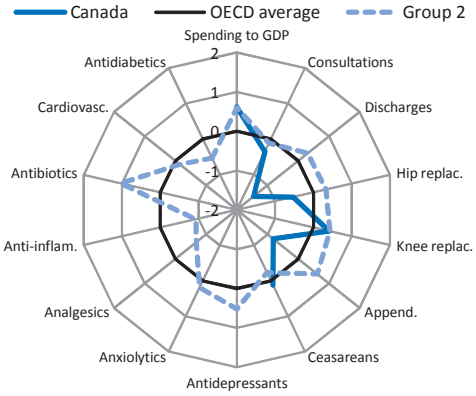
B. Amenable mortality by group of causes



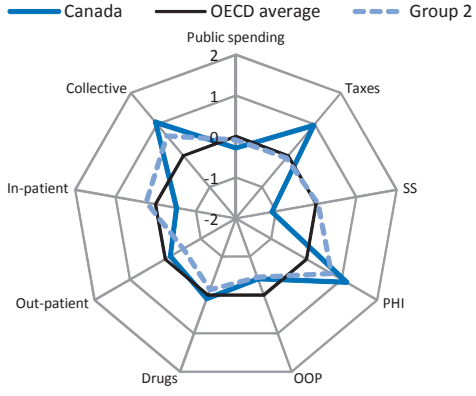
C. Prices and physical resources



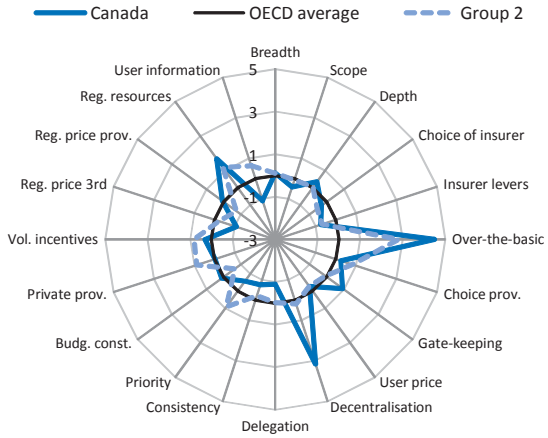
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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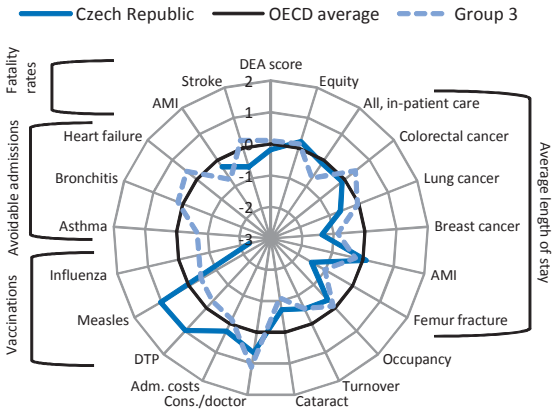
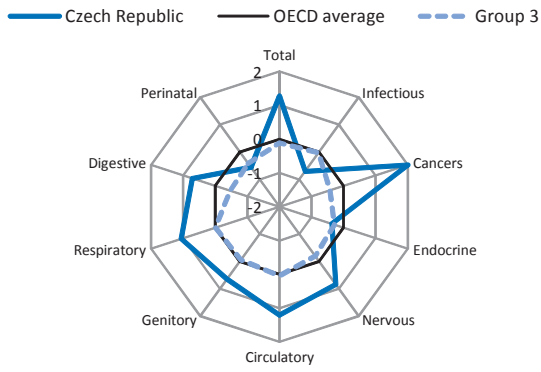
Czech Republic: health care indicators

Group 3: Austria, Czech Republic, Greece, Japan, Korea, Luxembourg

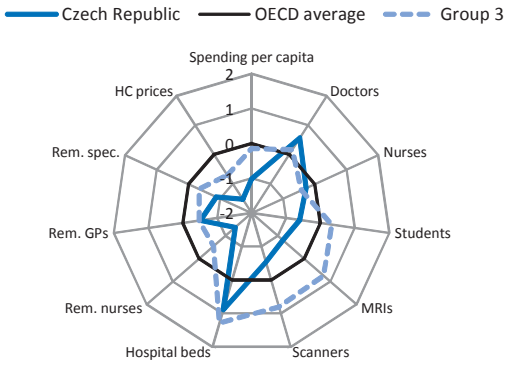
A. Efficiency and quality



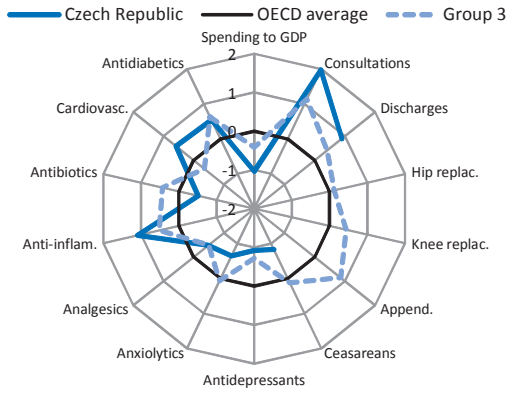
B. Amenable mortality by group of causes



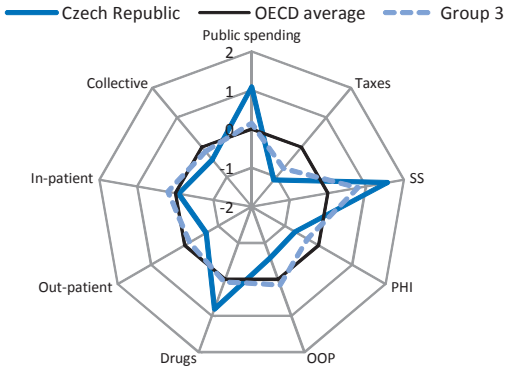
C. Prices and physical resources



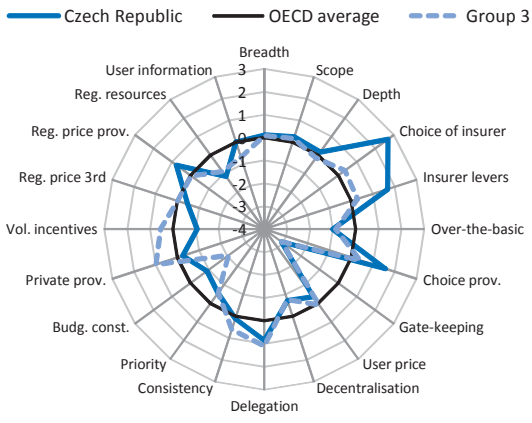
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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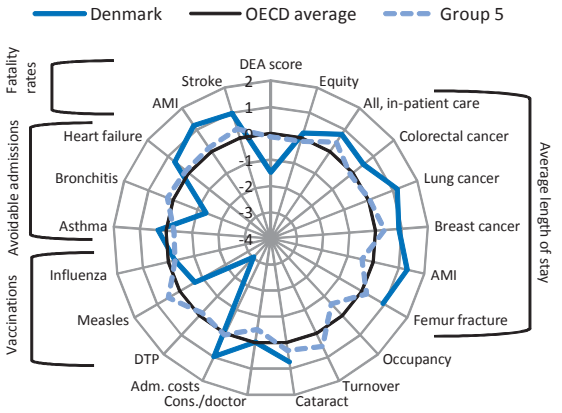
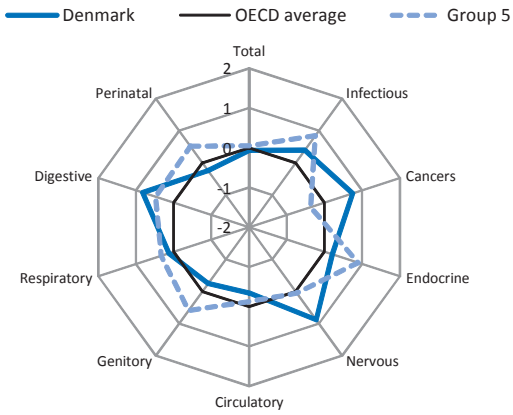
Denmark: health care indicators

Group 5: Denmark, Finland, Mexico, Portugal, Spain

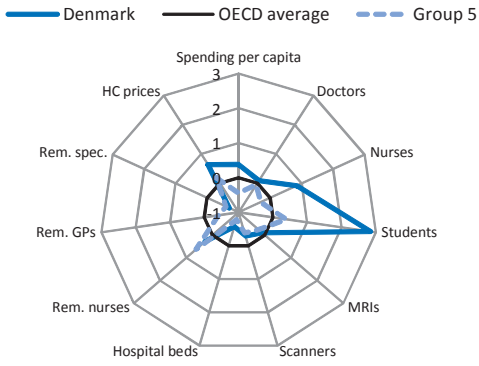
A. Efficiency and quality



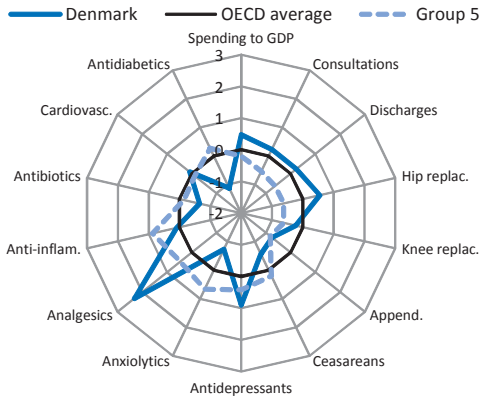
B. Amenable mortality by group of causes



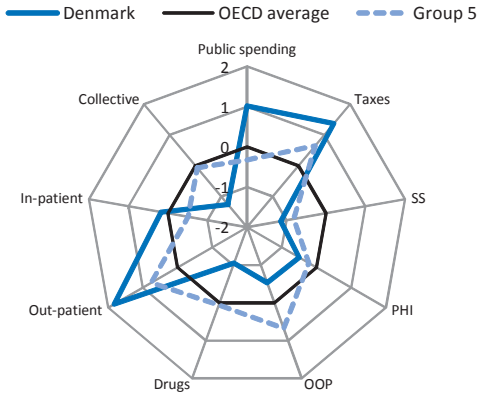
C. Prices and physical resources



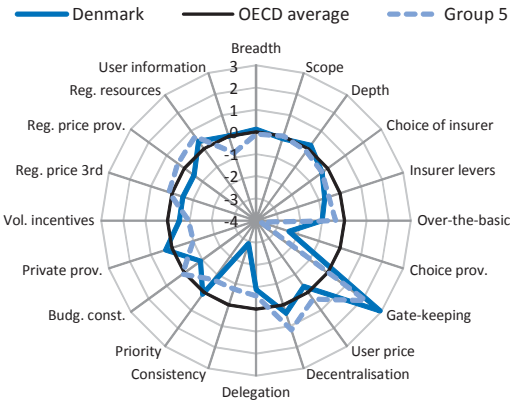
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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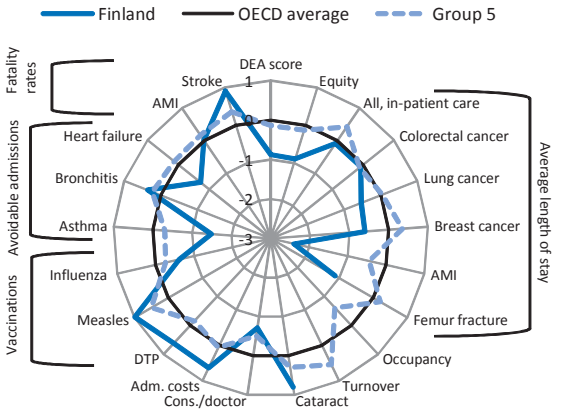
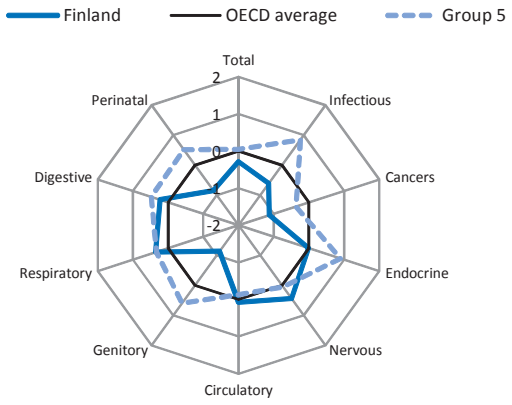
Finland: health care indicators

Group 5: Denmark, Finland, Mexico, Portugal, Spain

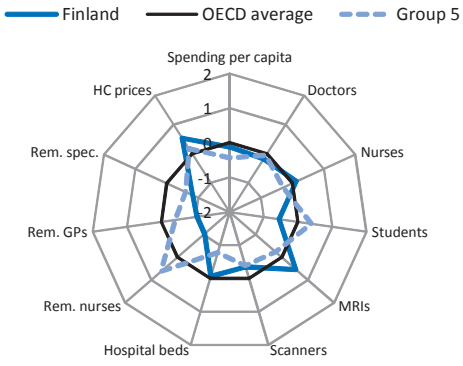
A. Efficiency and quality



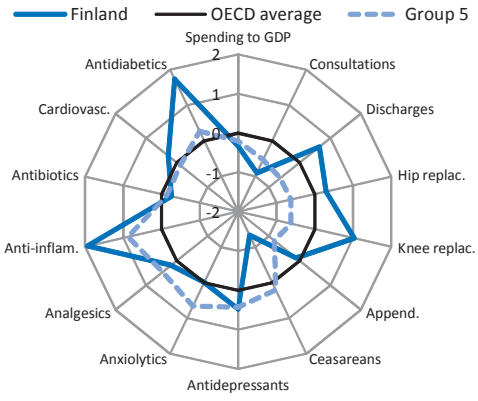
B. Amenable mortality by group of causes



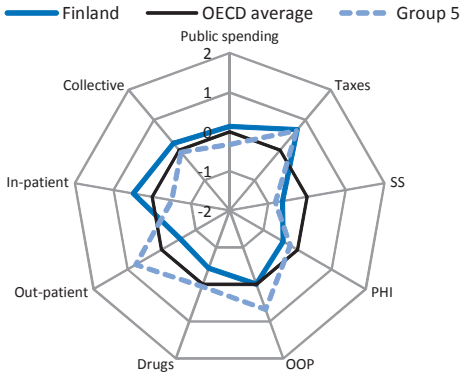
C. Prices and physical resources



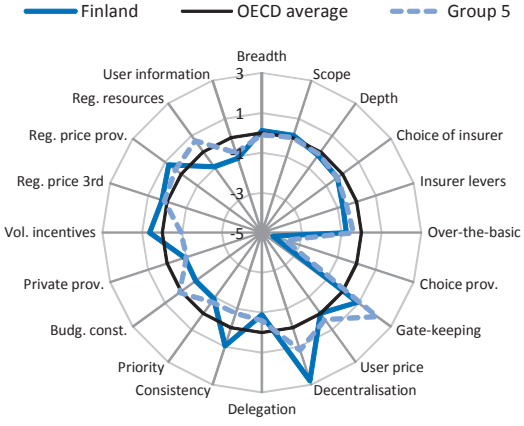
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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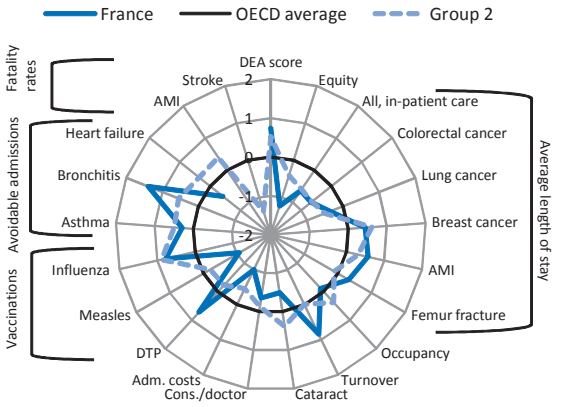
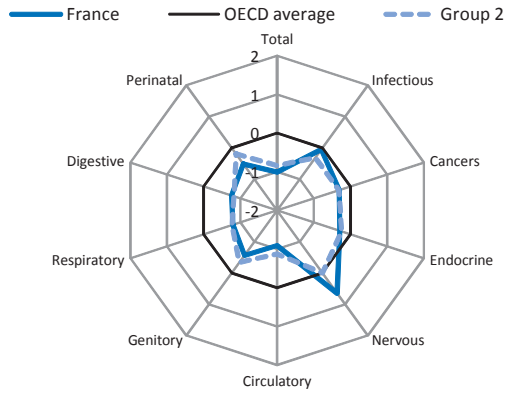
France: health care indicators

Group 2: Australia, Belgium, Canada, France

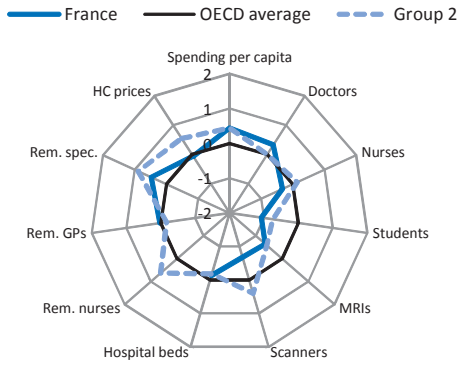
A. Efficiency and quality



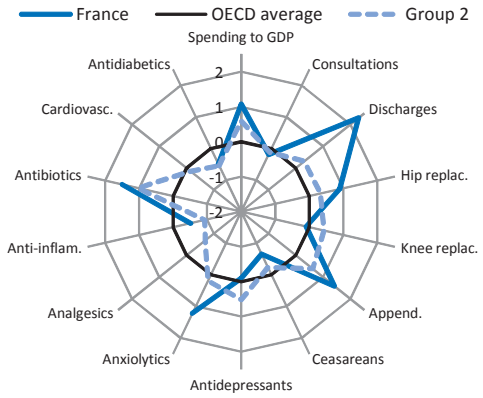
B. Amenable mortality by group of causes



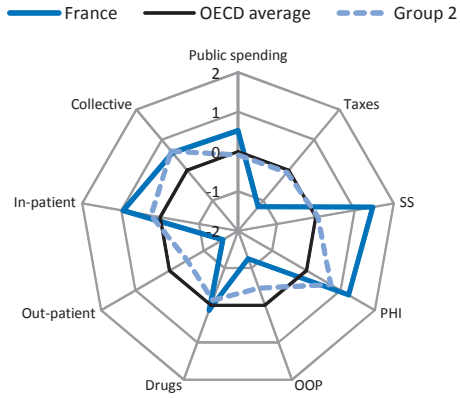
C. Prices and physical resources



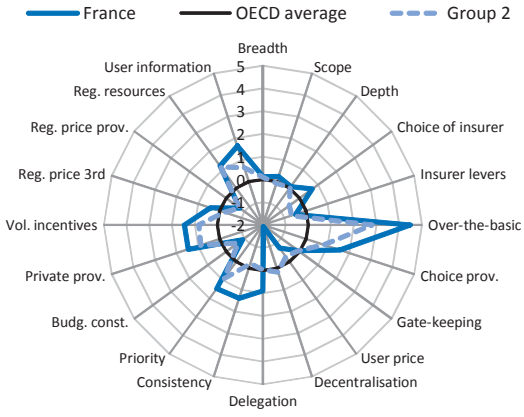
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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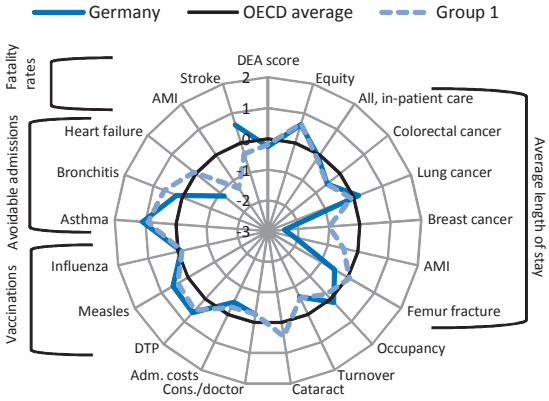
Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

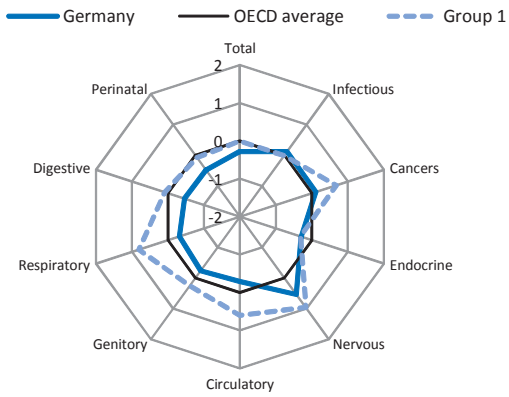
Germany: health care indicators

Group 1: Germany, Netherlands, Slovak Republic, Switzerland

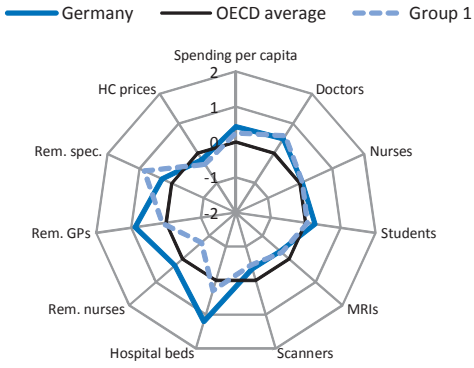
A. Efficiency and quality



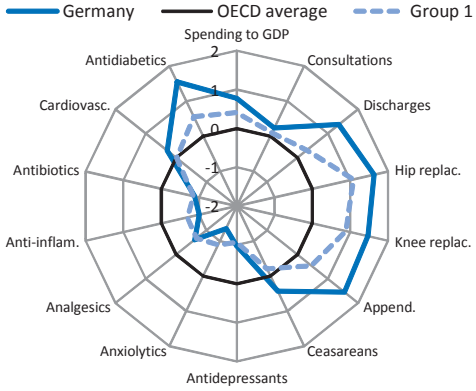
B. Amenable mortality by group of causes



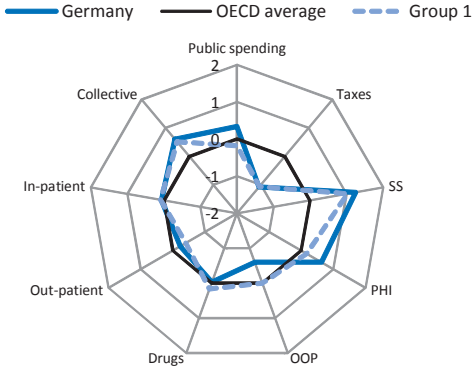
C. Prices and physical resources



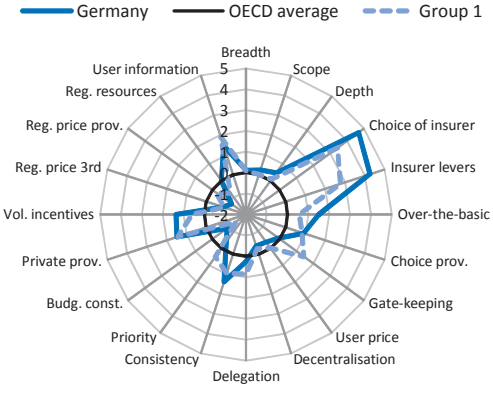
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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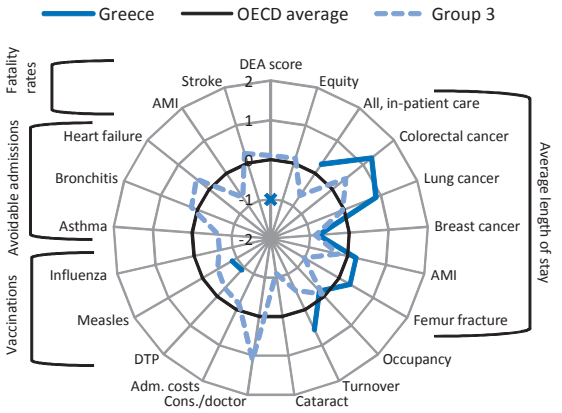
Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

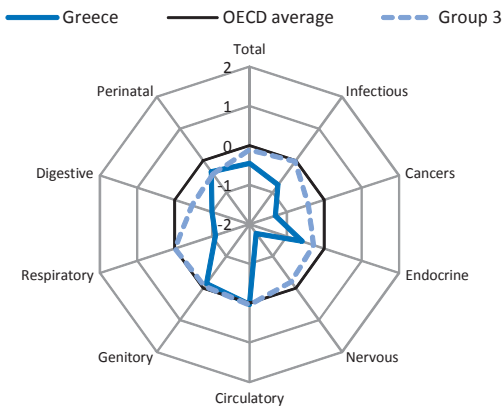
Greece: health care indicators

Group 3: Austria, Czech Republic, Greece, Japan, Korea, Luxembourg

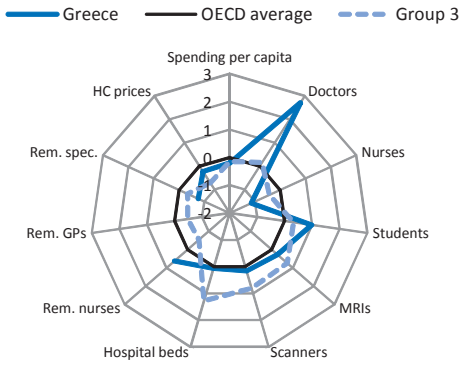
A. Efficiency and quality



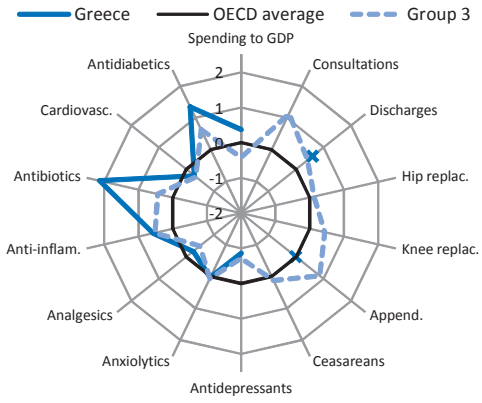
B. Amenable mortality by group of causes



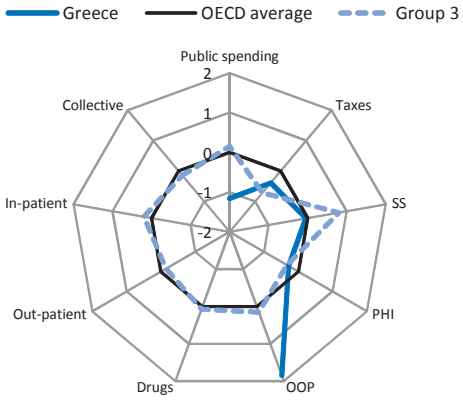
C. Prices and physical resources



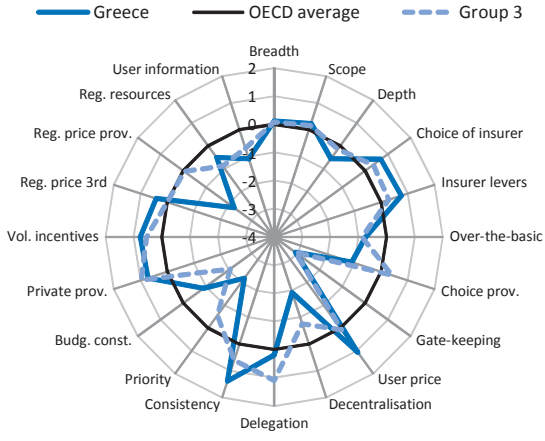
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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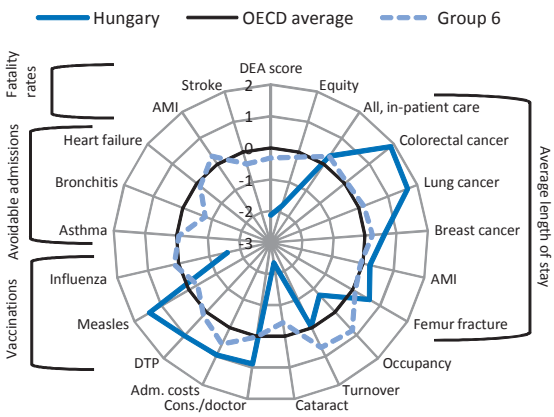
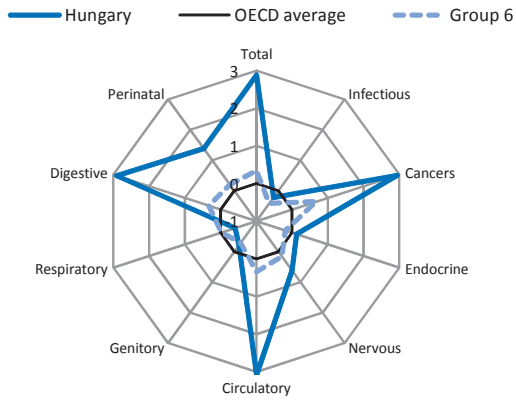
Hungary: health care indicators

Group 6: Hungary, Ireland, Italy, New Zealand, Norway, Poland, United Kingdom

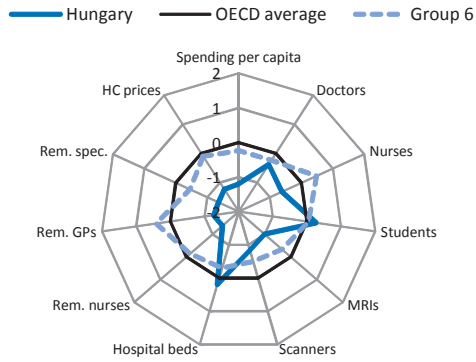
A. Efficiency and quality



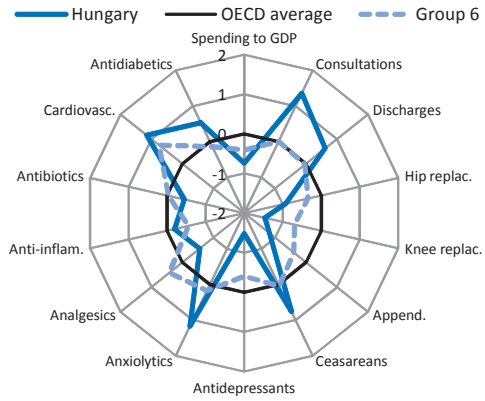
B. Amenable mortality by group of causes



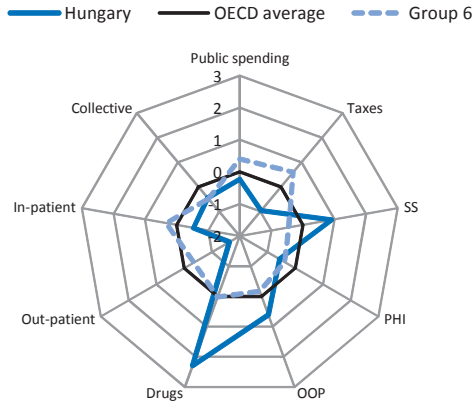
C. Prices and physical resources



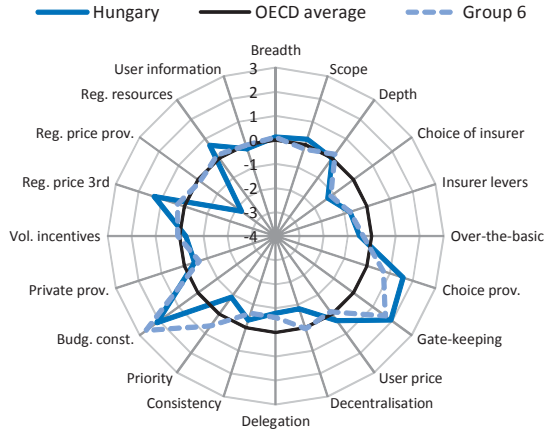
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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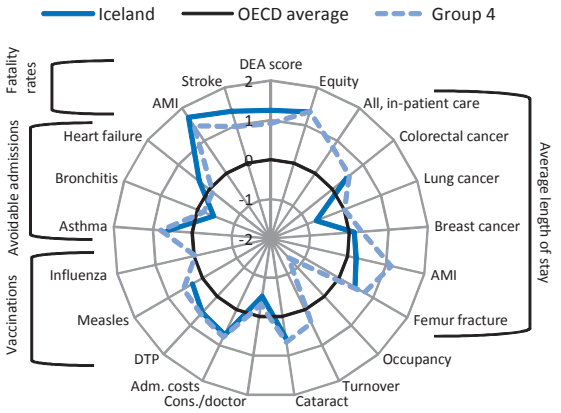
Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

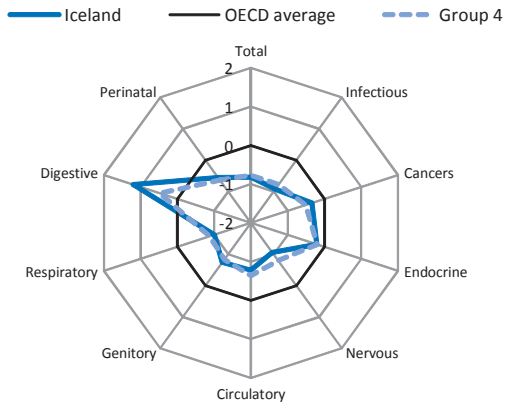
Iceland: health care indicators

Group 4: Iceland, Sweden, Turkey

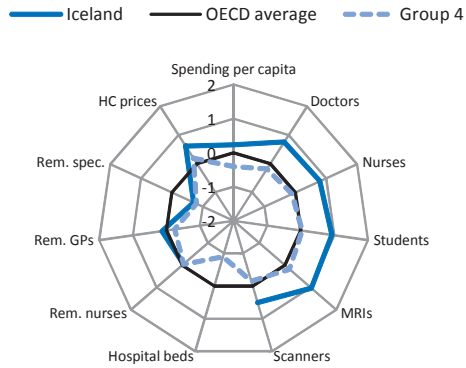
A. Efficiency and quality



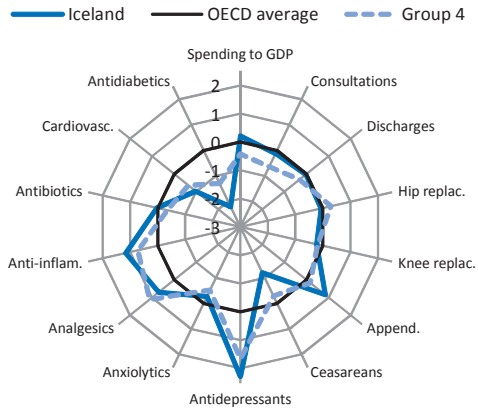
B. Amenable mortality by group of causes



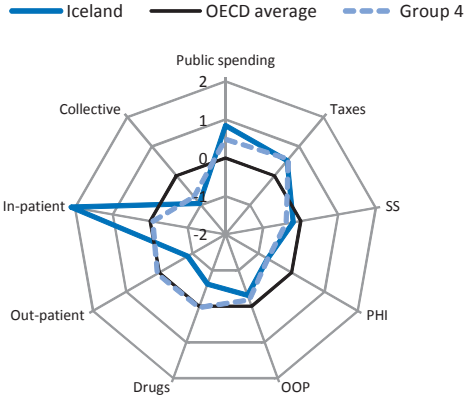
C. Prices and physical resources



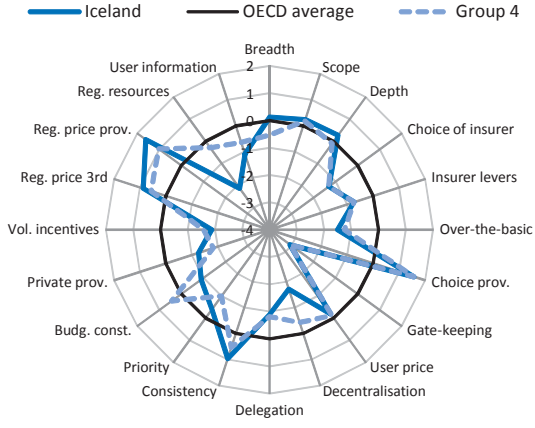
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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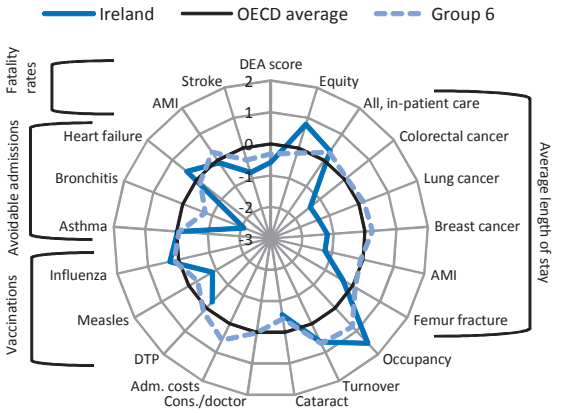
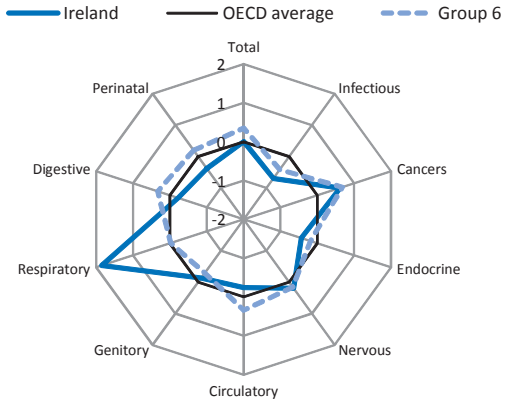
Ireland: health care indicators

Group 6: Hungary, Ireland, Italy, New Zealand, Norway, Poland, United Kingdom

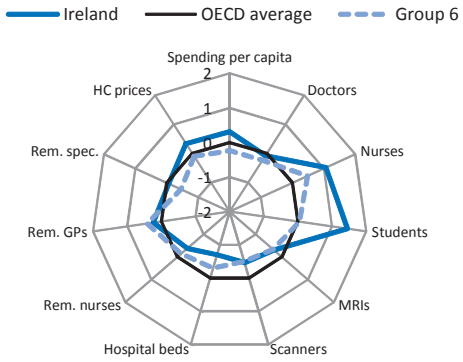
A. Efficiency and quality



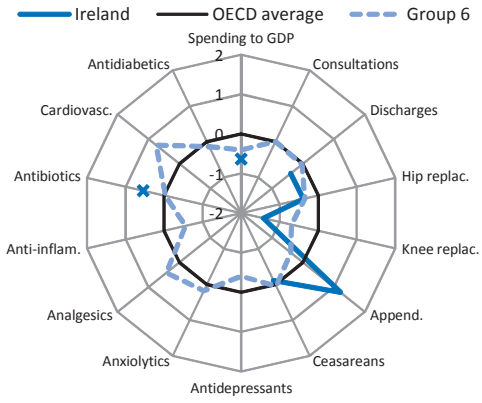
B. Amenable mortality by group of causes



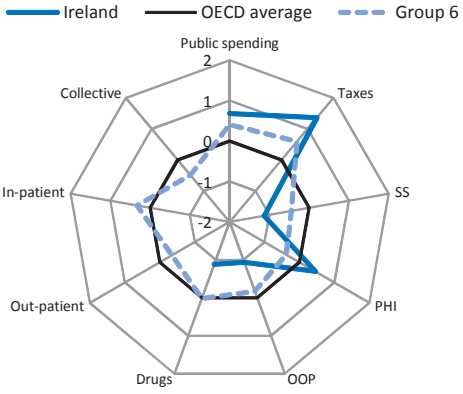
C. Prices and physical resources



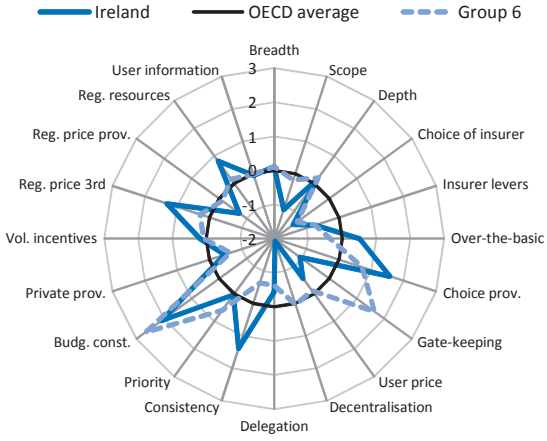
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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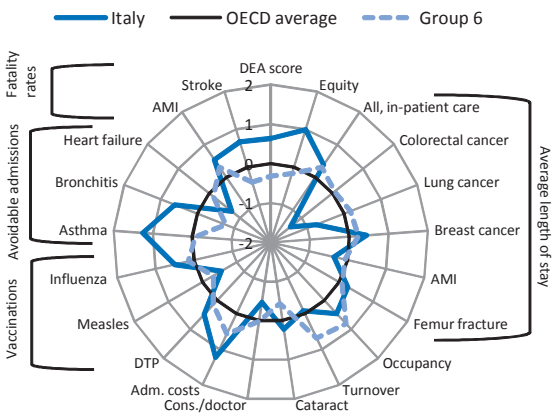
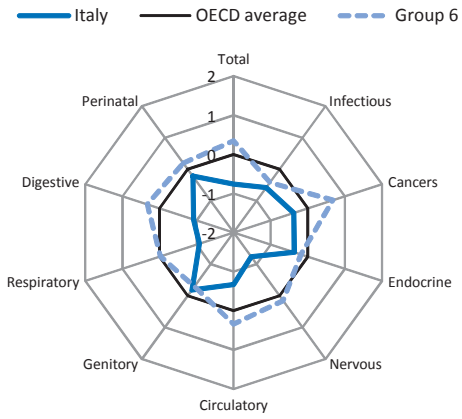
Italy: health care indicators

Group 6: Hungary, Ireland, Italy, New Zealand, Norway, Poland, United Kingdom

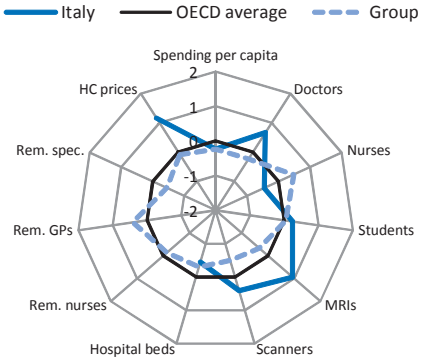
A. Efficiency and quality



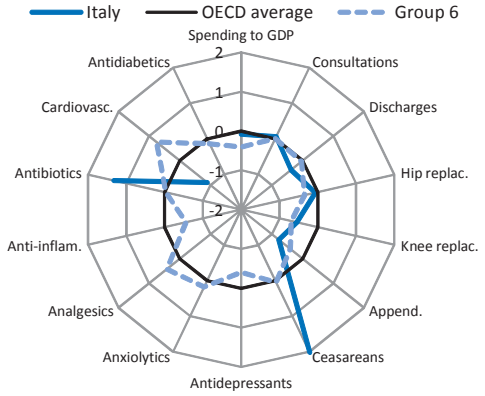
B. Amenable mortality by group of causes



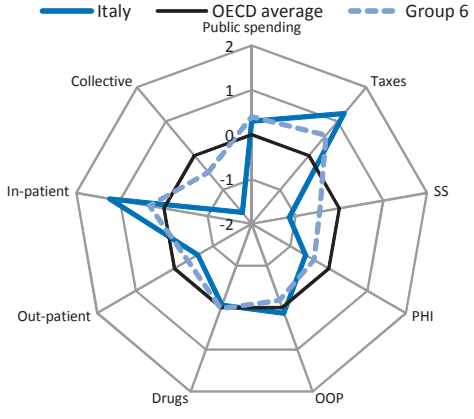
C. Prices and physical resources



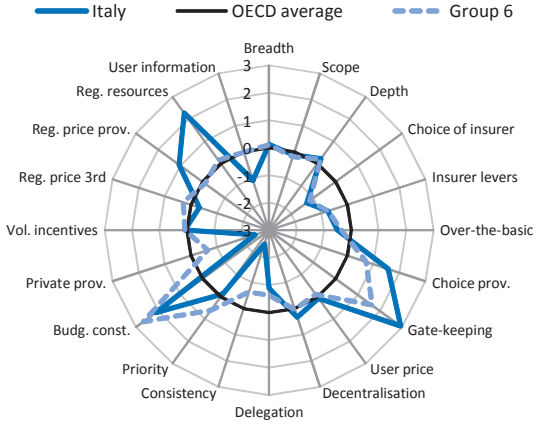
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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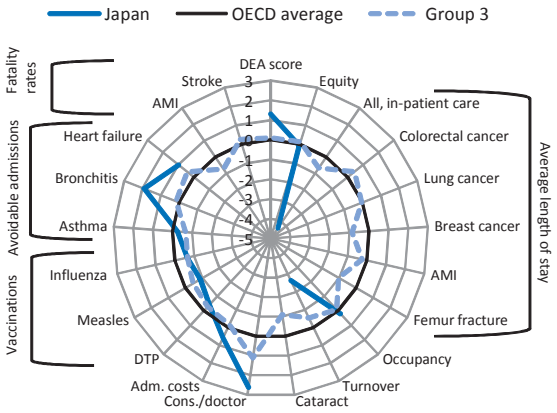
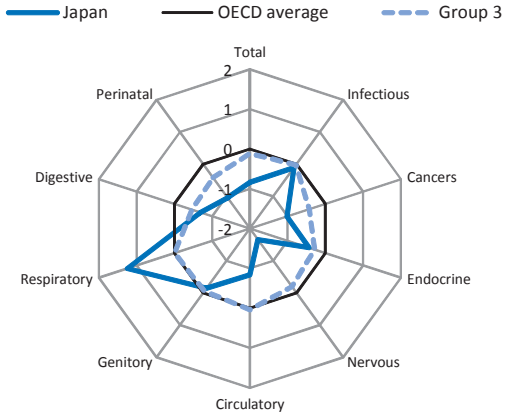
Japan: health care indicators

Group 3: Austria, Czech Republic, Greece, Japan, Korea, Luxembourg

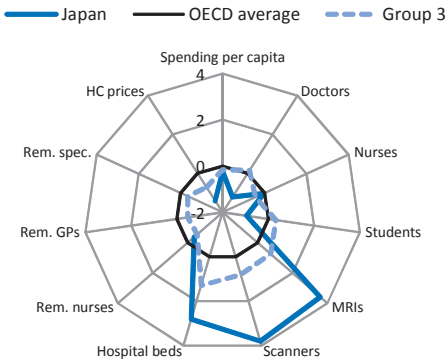
A. Efficiency and quality



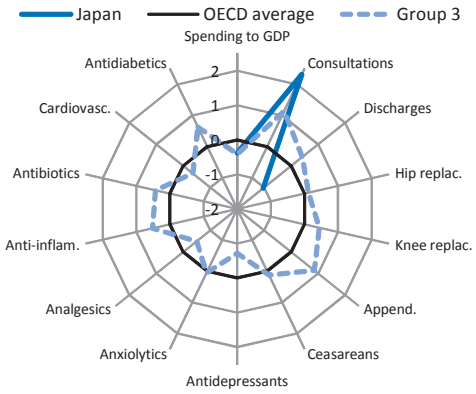
B. Amenable mortality by group of causes



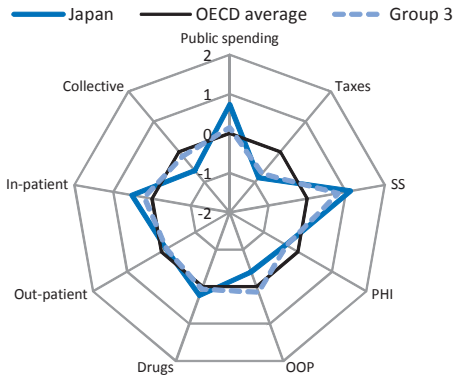
C. Prices and physical resources



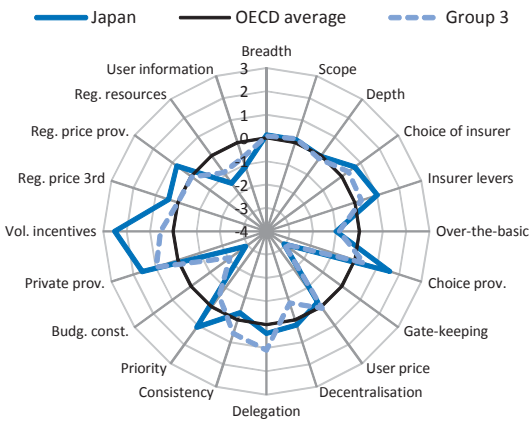
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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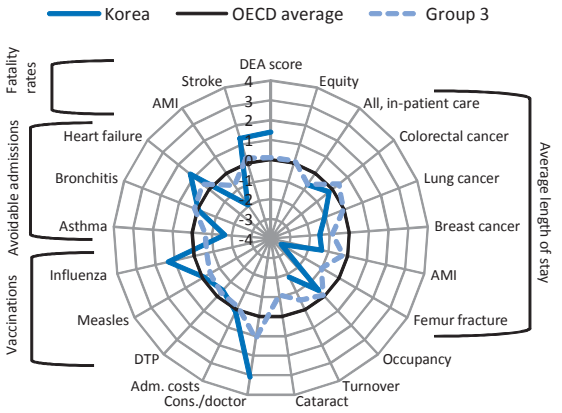
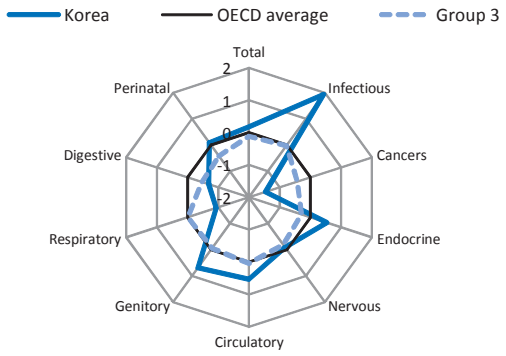
Korea: health care indicators

Group 3: Austria, Czech Republic, Greece, Japan, Korea, Luxembourg

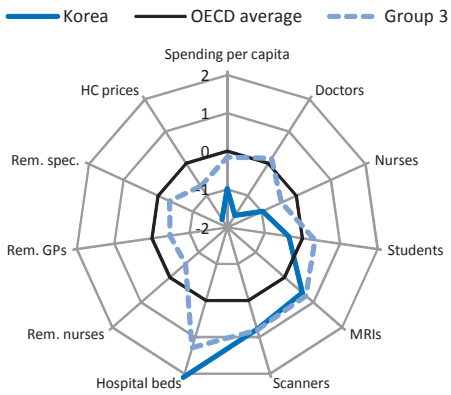
A. Efficiency and quality



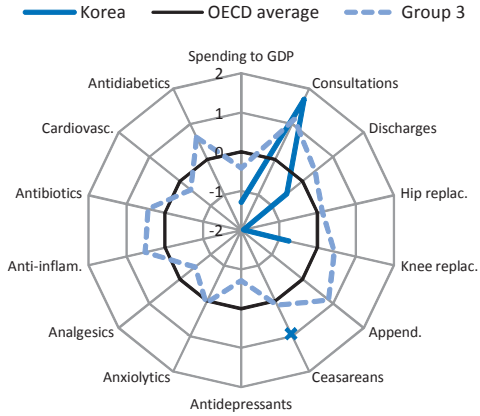
B. Amenable mortality by group of causes



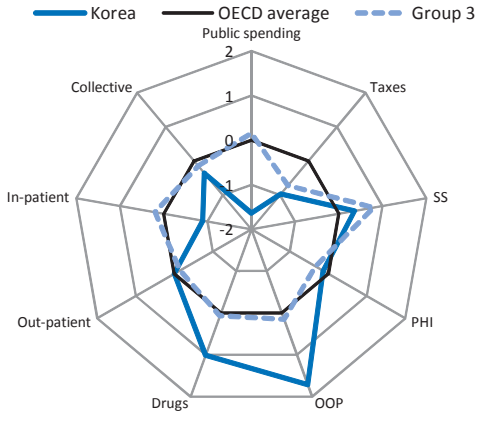
C. Prices and physical resources



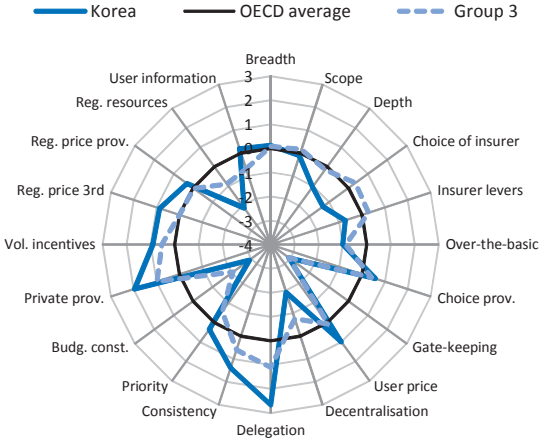
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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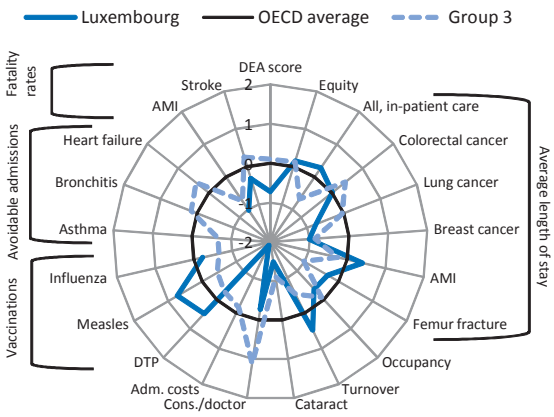
In Panel F, data shown are simple deviations from the OECD average.

Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

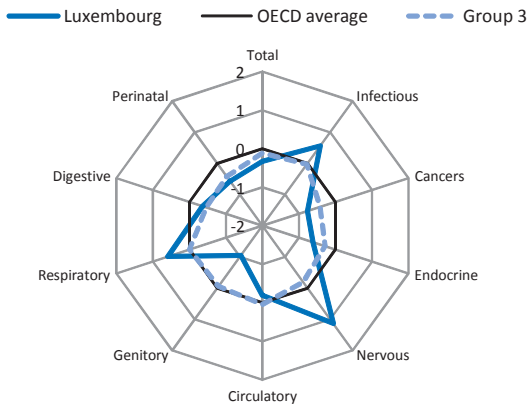
Luxembourg: health care indicators

Group 3: Austria, Czech Republic, Greece, Japan, Korea, Luxembourg

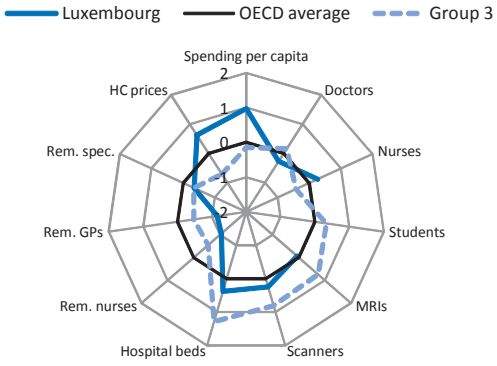
A. Efficiency and quality



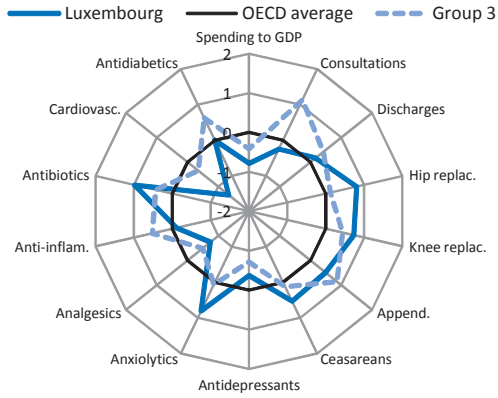
B. Amenable mortality by group of causes



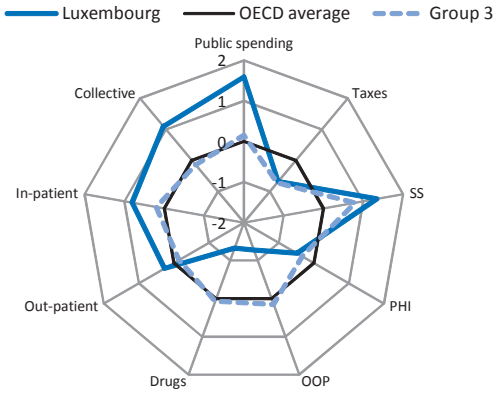
C. Prices and physical resources



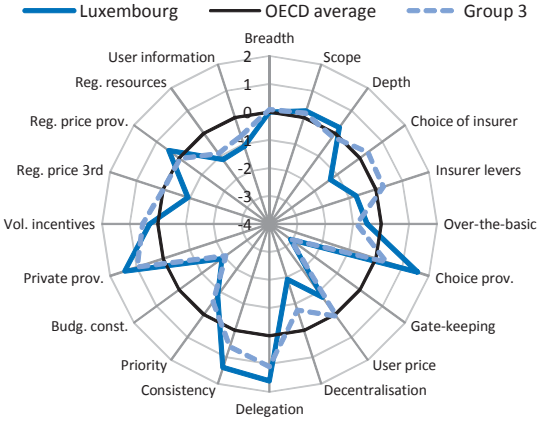
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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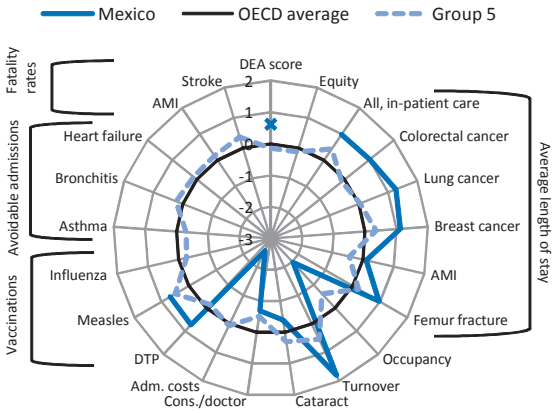
Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

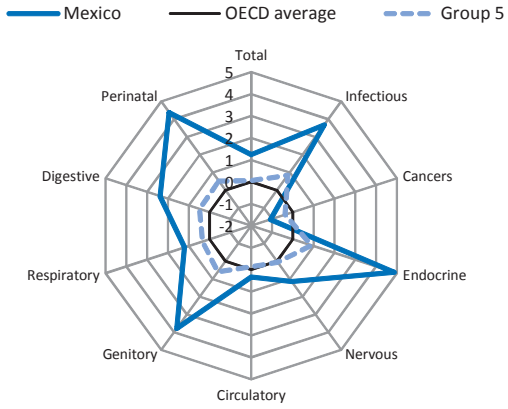
Mexico: health care indicators

Group 5: Denmark, Finland, Mexico, Portugal, Spain

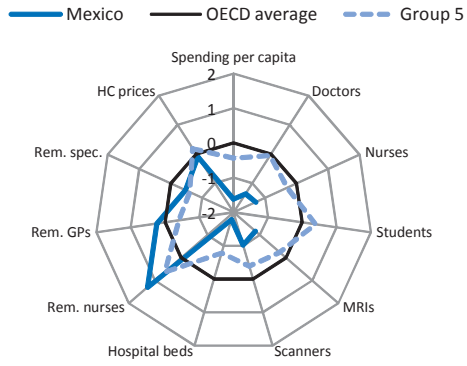
A. Efficiency and quality



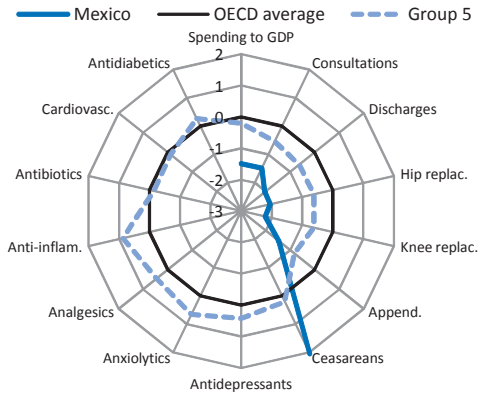
B. Amenable mortality by group of causes



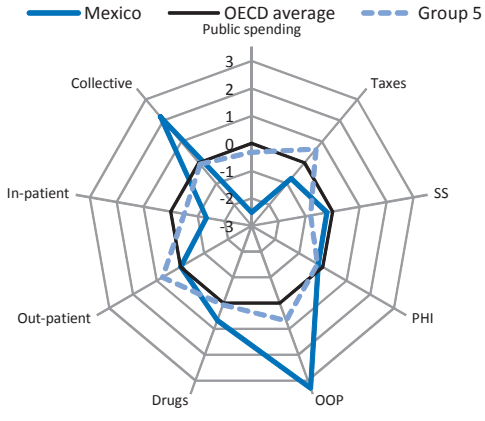
C. Prices and physical resources



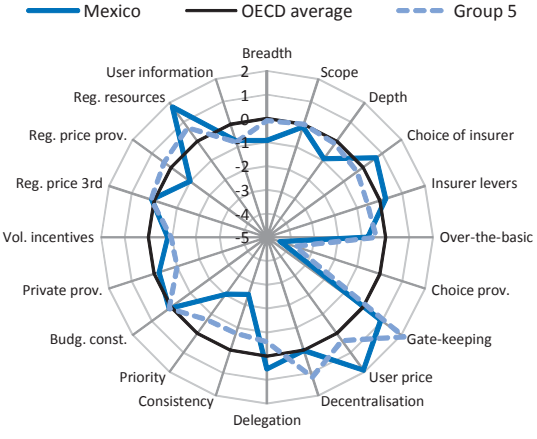
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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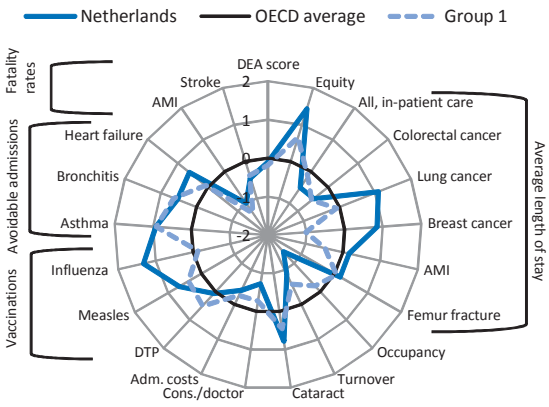
In Panel F, data shown are simple deviations from the OECD average.

Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

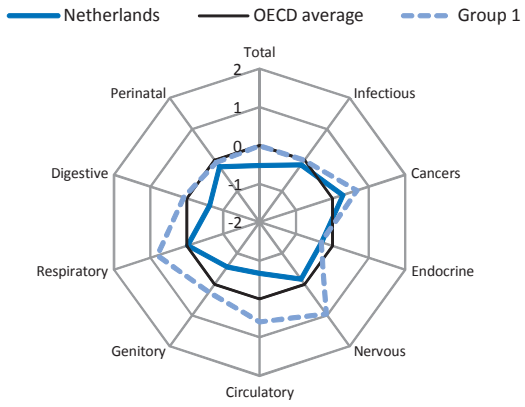
Netherlands: health care indicators

Group 1: Germany, Netherlands, Slovak Republic, Switzerland

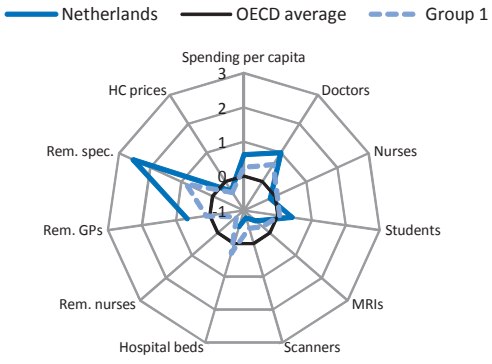
A. Efficiency and quality



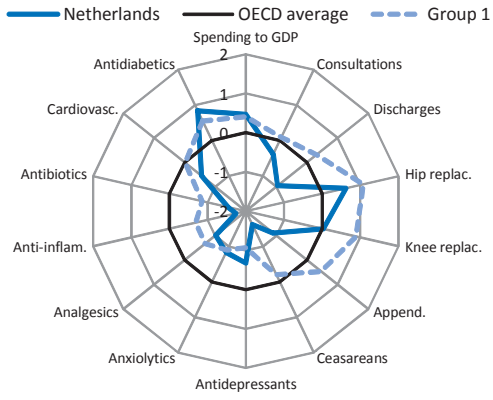
B. Amenable mortality by group of causes



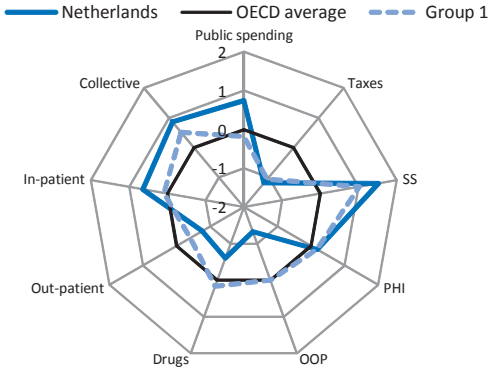
C. Prices and physical resources



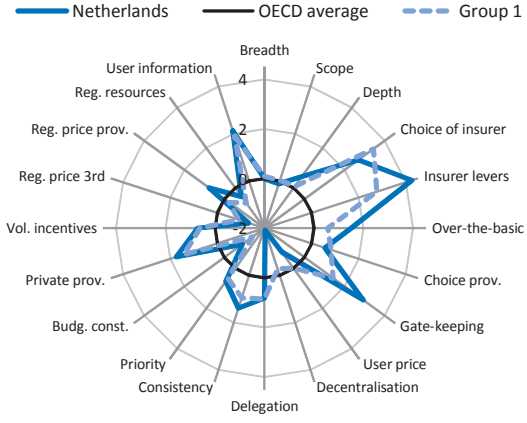
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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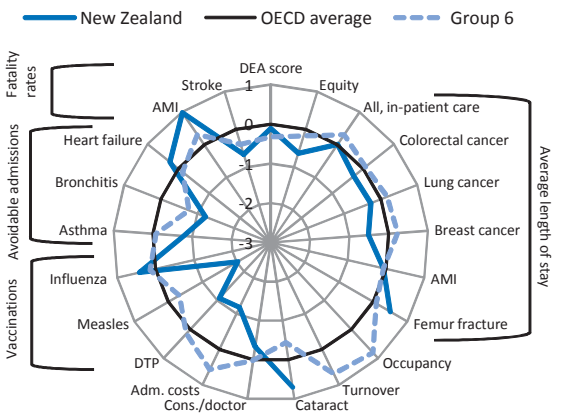
In Panel F, data shown are simple deviations from the OECD average.

Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

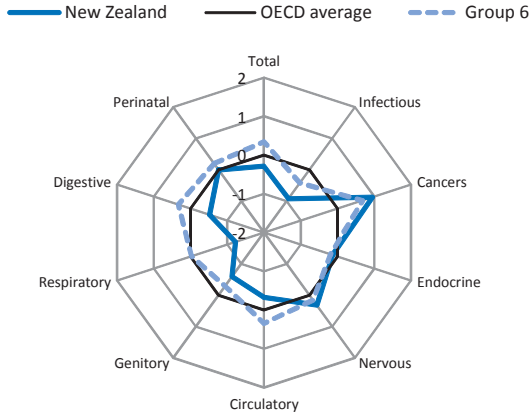
New Zealand: health care indicators

Group 6: Hungary, Ireland, Italy, New Zealand, Norway, Poland, United Kingdom

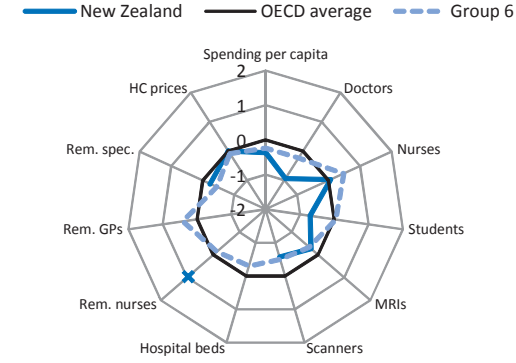
A. Efficiency and quality



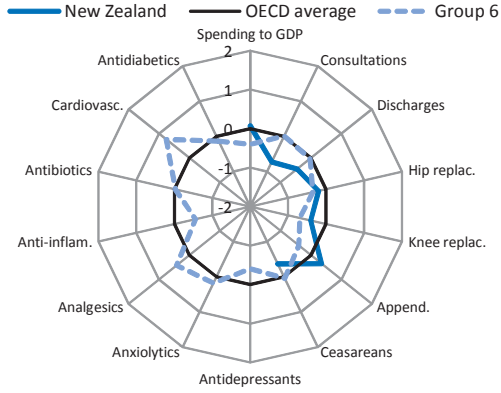
B. Amenable mortality by group of causes



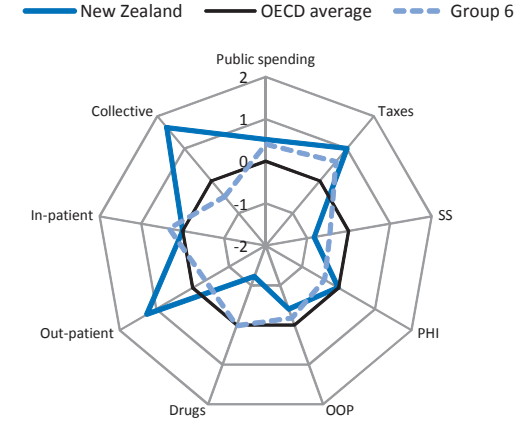
C. Prices and physical resources



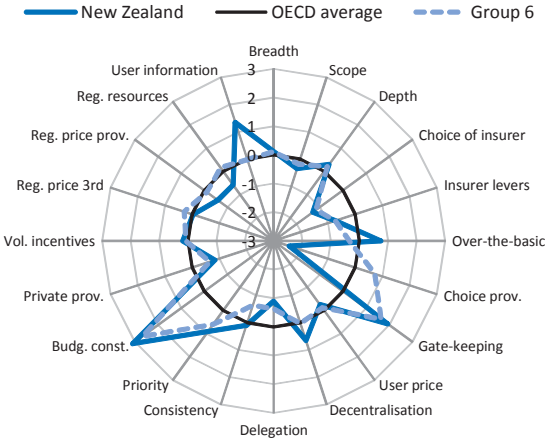
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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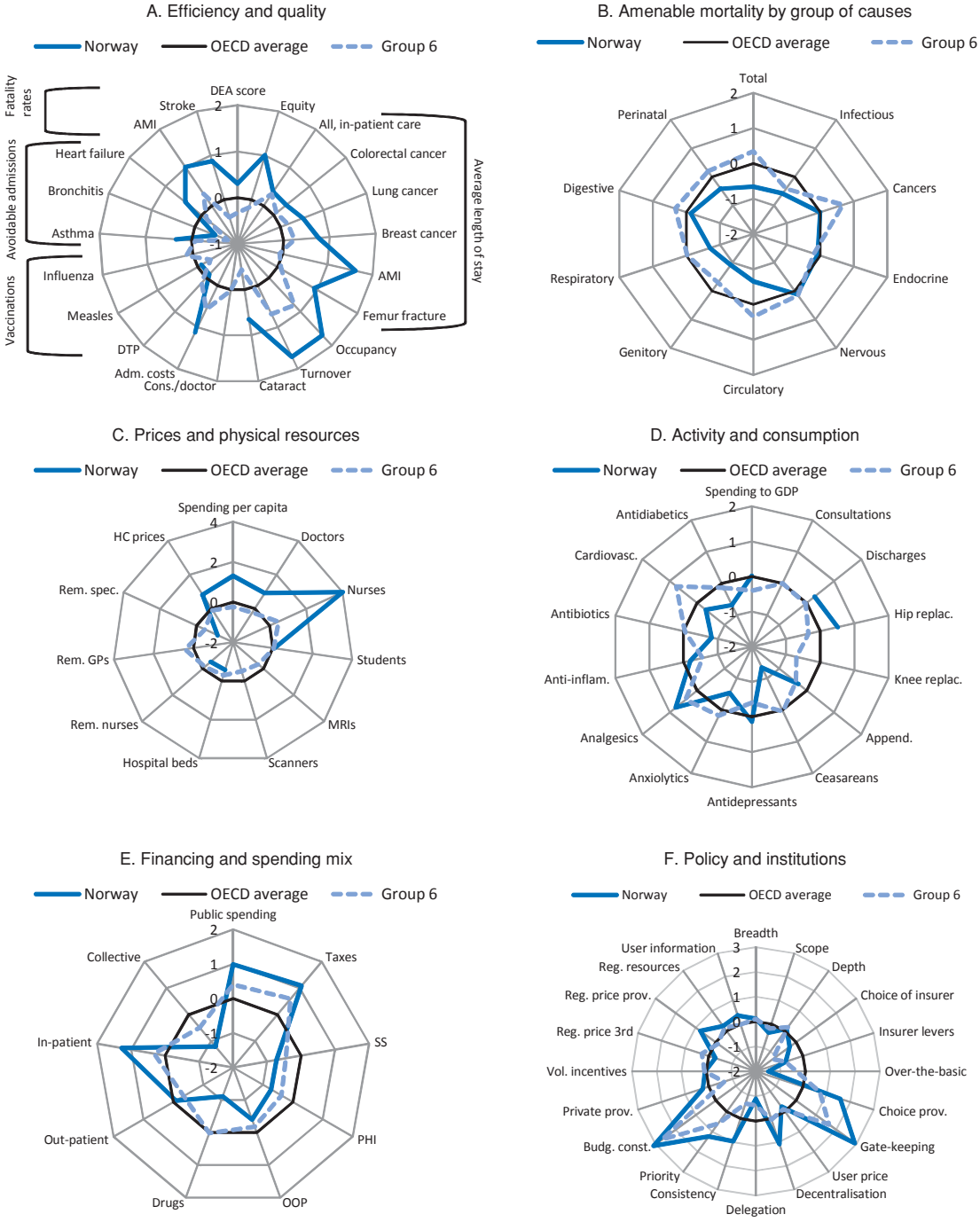
In Panel F, data shown are simple deviations from the OECD average.

Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

Norway: health care indicators

Group 6: Hungary, Ireland, Italy, New Zealand, Norway, Poland, United Kingdom



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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In Panel F, data shown are simple deviations from the OECD average.

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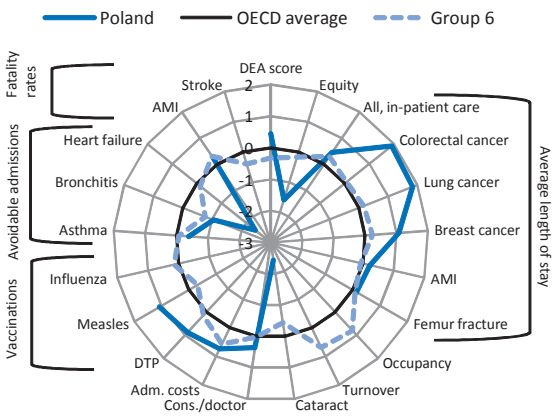
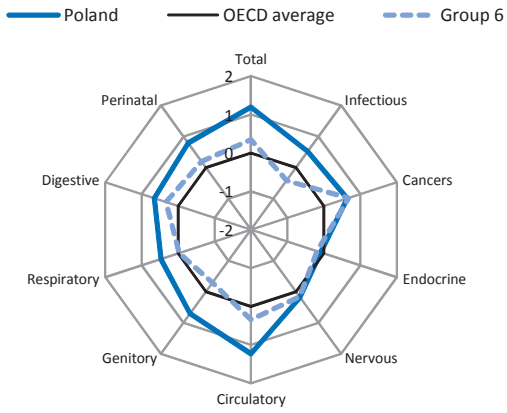
Poland: health care indicators

Group 6: Hungary, Ireland, Italy, New Zealand, Norway, Poland, United Kingdom

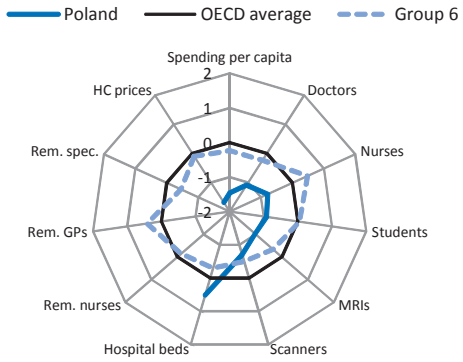
A. Efficiency and quality



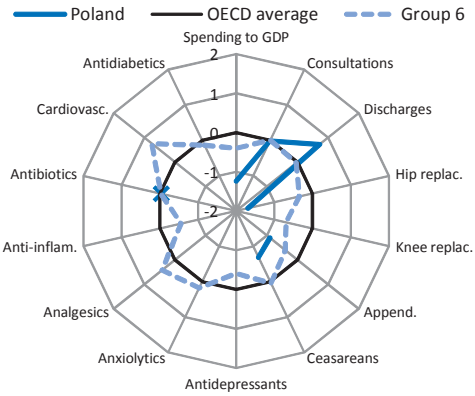
B. Amenable mortality by group of causes



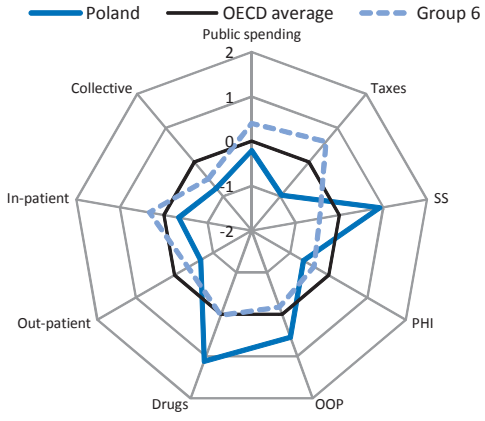
C. Prices and physical resources



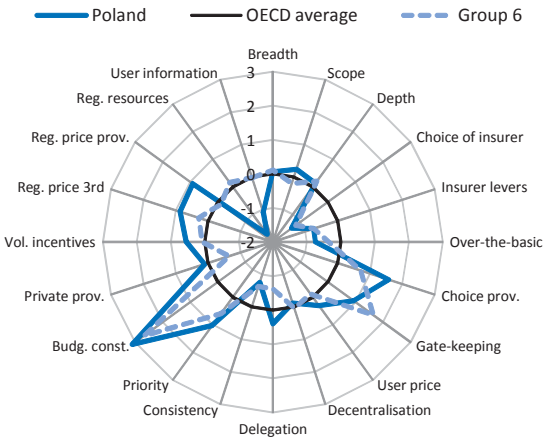
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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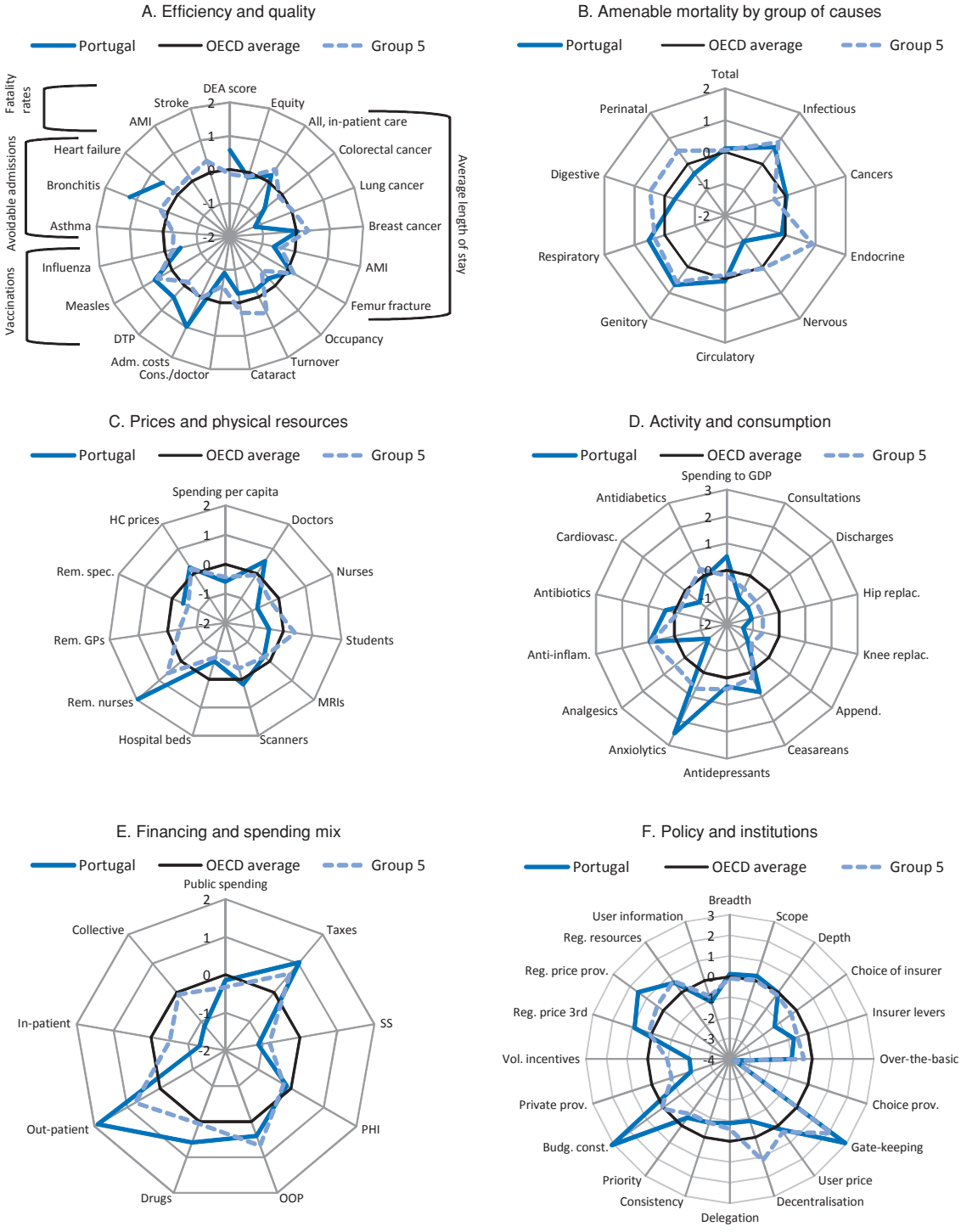
Portugal: health care indicators

Group 5: Denmark, Finland, Mexico, Portugal, Spain



Note: Country groups have been determined by a cluster analysis performed on policy and institutional indicators. In all panels except Panel A, data points outside the average circle indicate that the level of the variable for the group or the country under scrutiny is higher than for the average OECD country (e.g. Australia has more scanners than the OECD average country).
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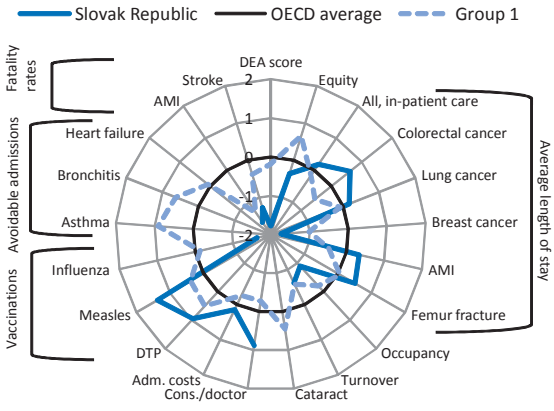
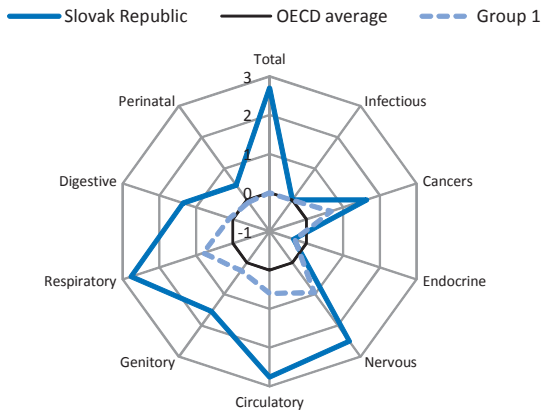
Slovak Republic: health care indicators

Group 1: Germany, Netherlands, Slovak Republic, Switzerland

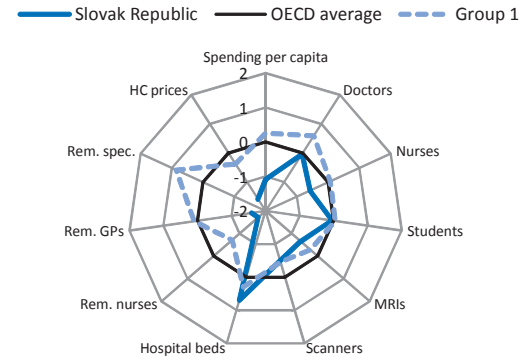
A. Efficiency and quality



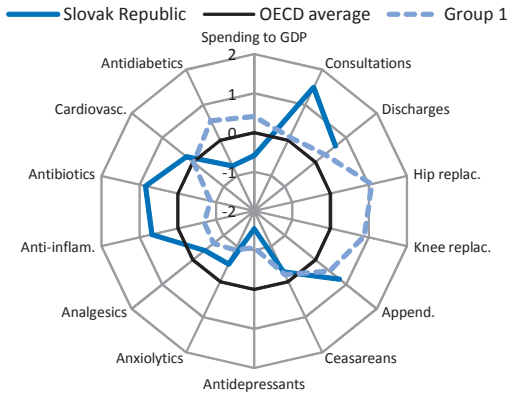
B. Amenable mortality by group of causes



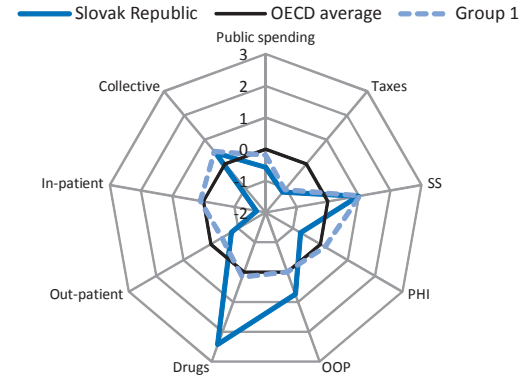
C. Prices and physical resources



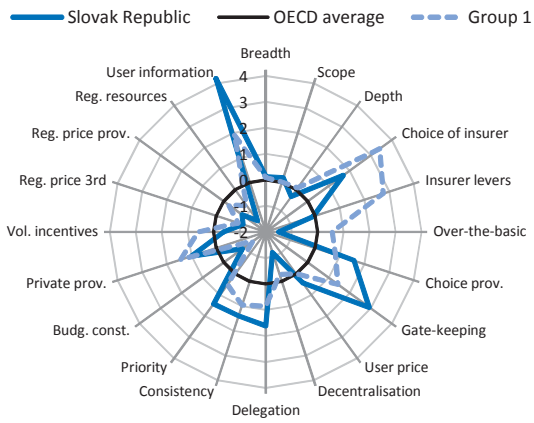
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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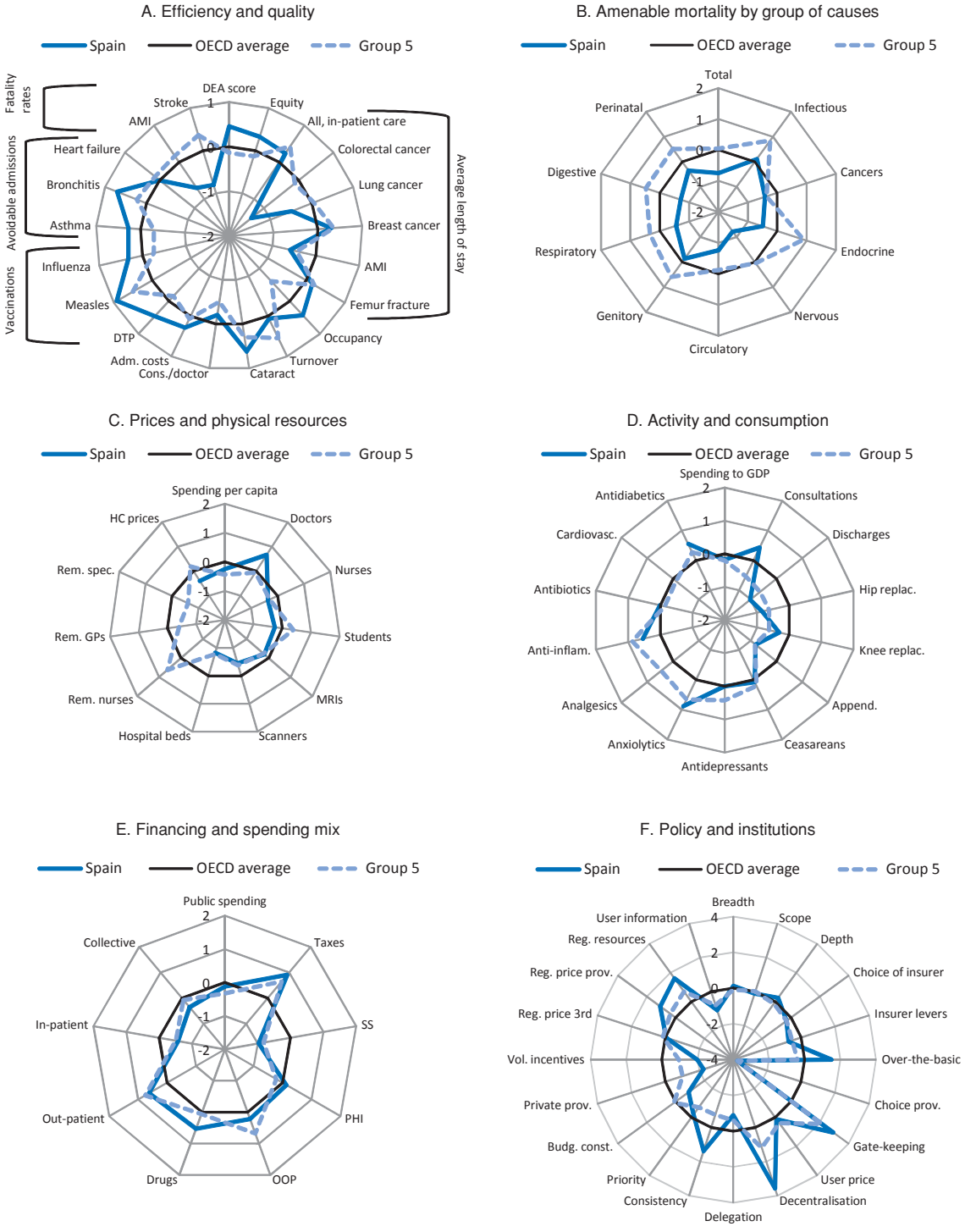
Spain: health care indicators

Group 5: Denmark, Finland, Mexico, Portugal, Spain



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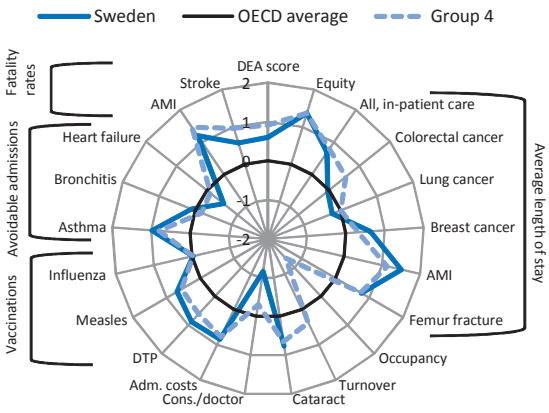
In Panel F, data shown are simple deviations from the OECD average.

Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

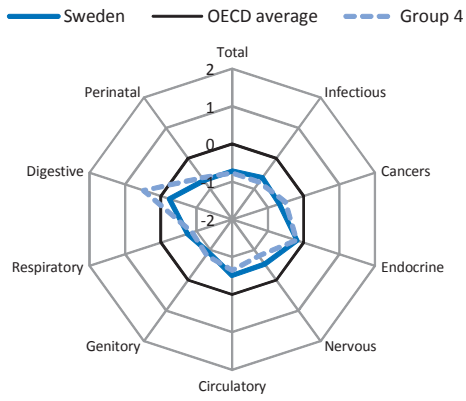
Sweden: health care indicators

Group 4: Iceland, Sweden, Turkey

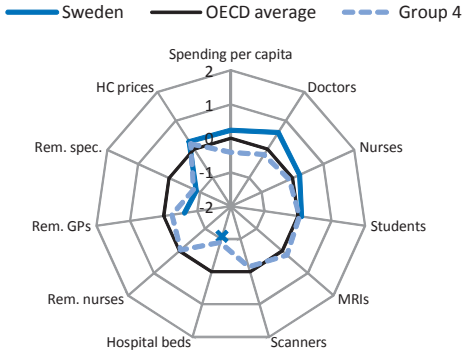
A. Efficiency and quality



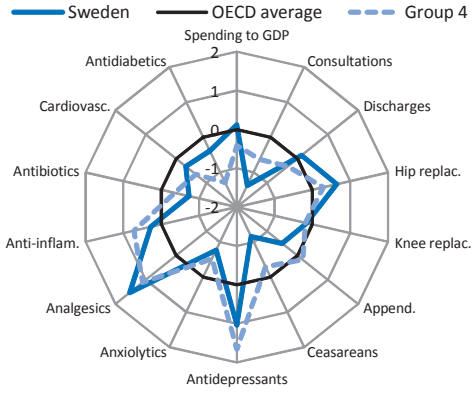
B. Amenable mortality by group of causes



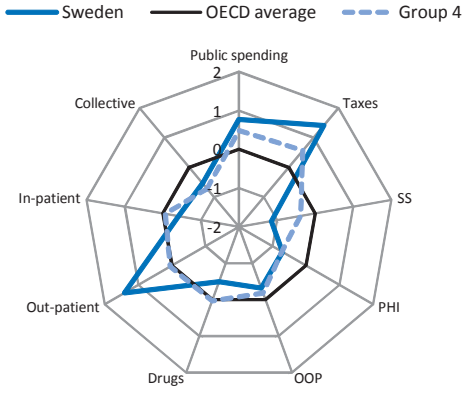
C. Prices and physical resources



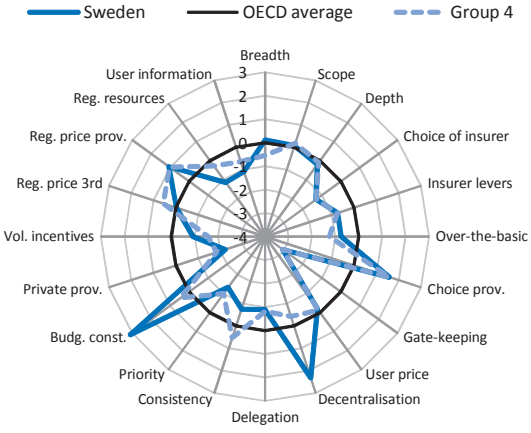
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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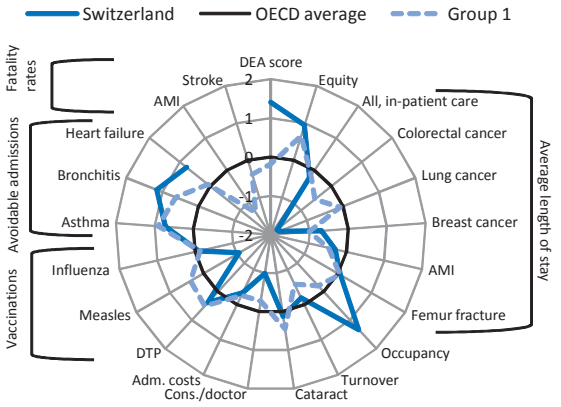
Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

Switzerland: health care indicators

Group 1: Germany, Netherlands, Slovak Republic, Switzerland

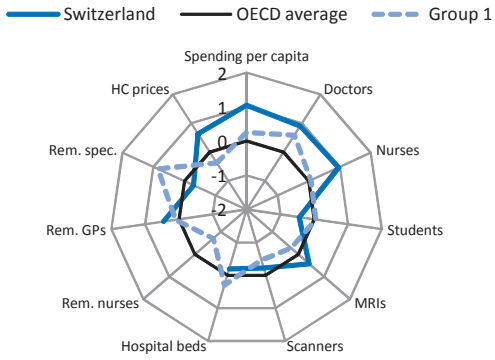
A. Efficiency and quality



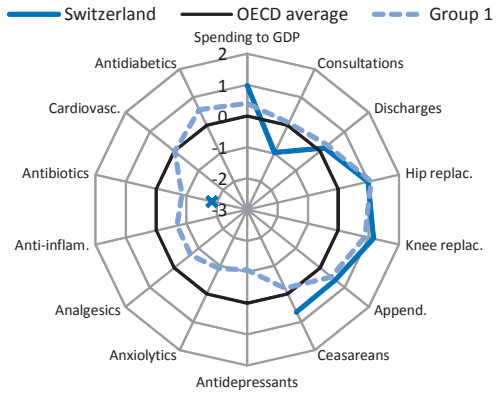
B. Amenable mortality by group of causes

Data not available

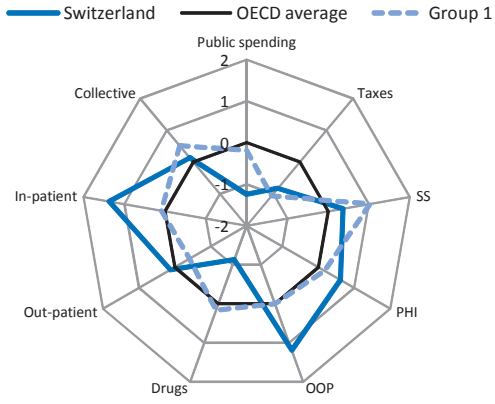
C. Prices and physical resources



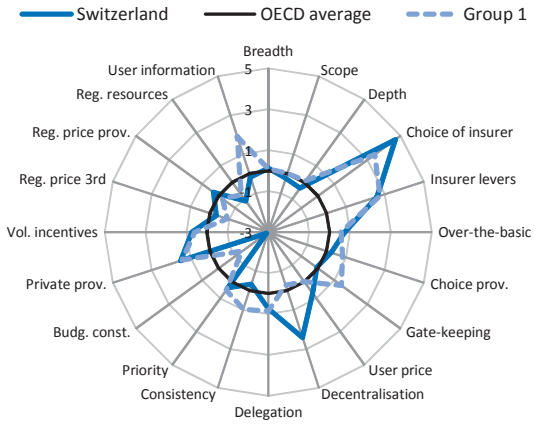
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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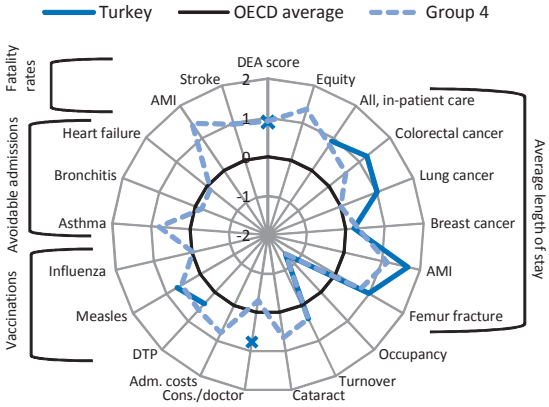
In Panel F, data shown are simple deviations from the OECD average.

Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

Turkey: health care indicators

Group 4: Iceland, Sweden, Turkey

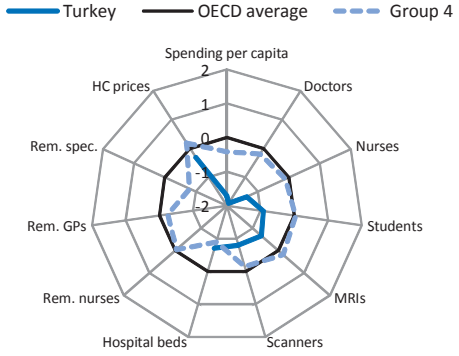
A. Efficiency and quality



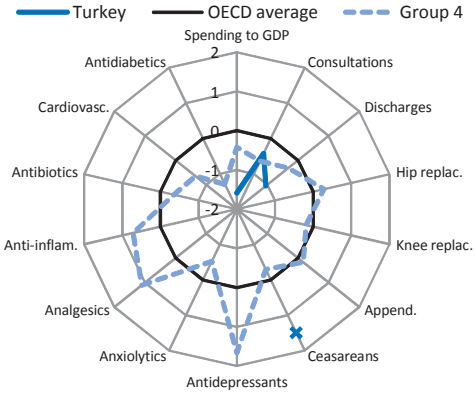
B. Amenable mortality by group of causes

Data not available

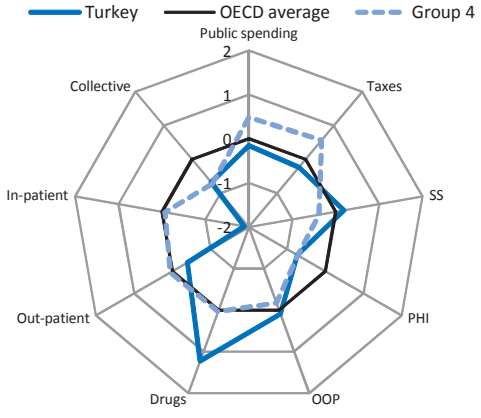
C. Prices and physical resources



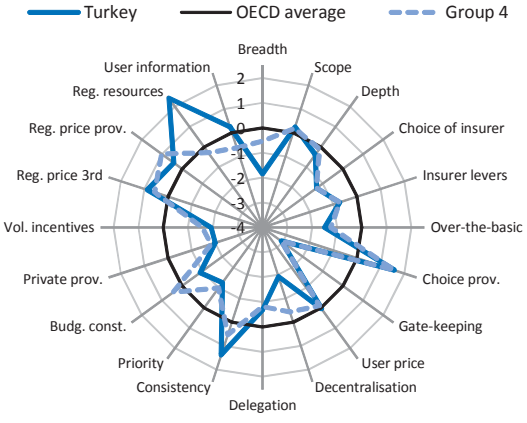
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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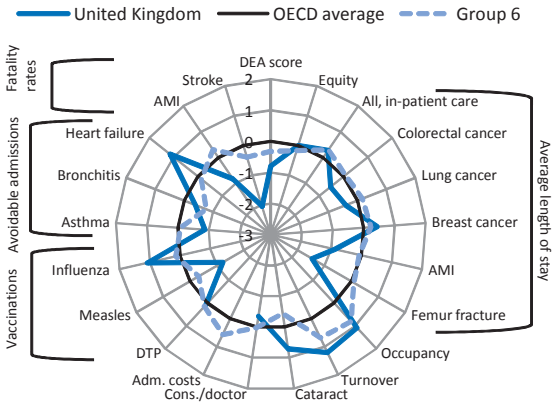
Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

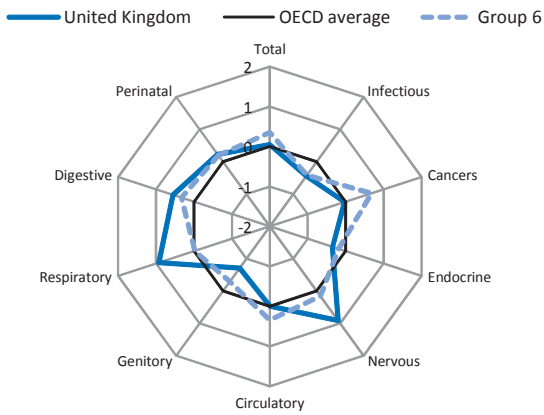
United Kingdom: health care indicators

Group 6: Hungary, Ireland, Italy, New Zealand, Norway, Poland, United Kingdom

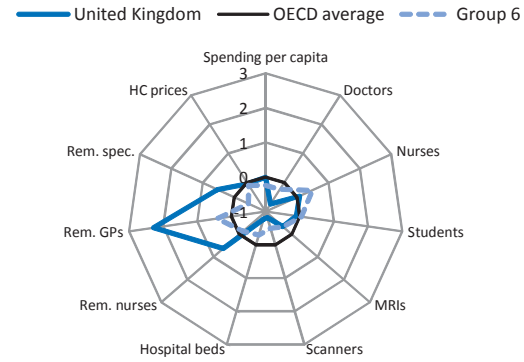
A. Efficiency and quality



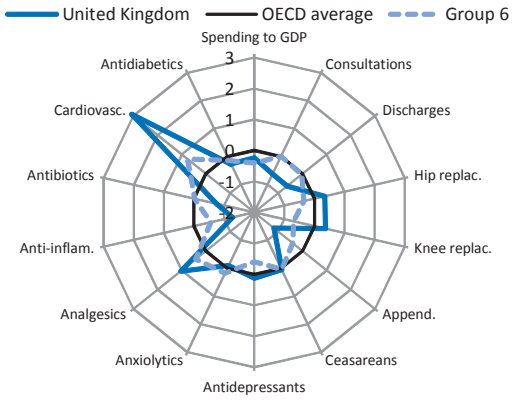
B. Amenable mortality by group of causes



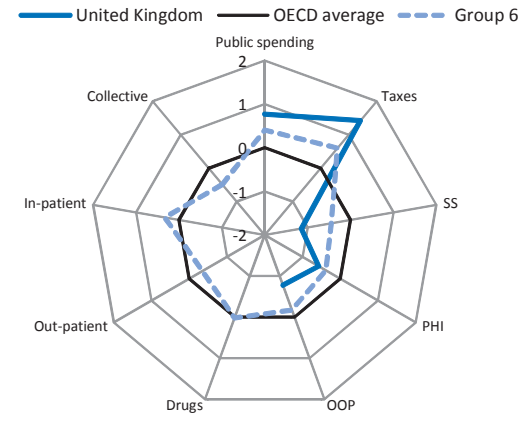
C. Prices and physical resources



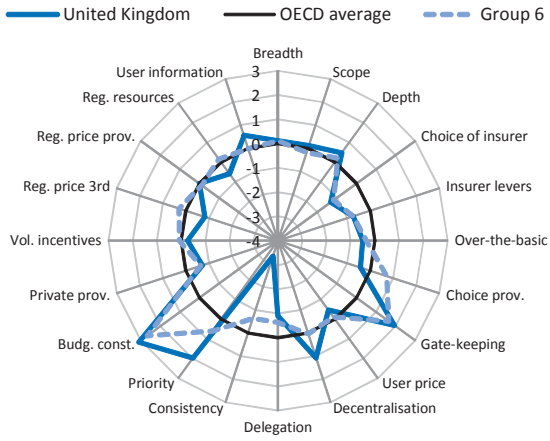
D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions



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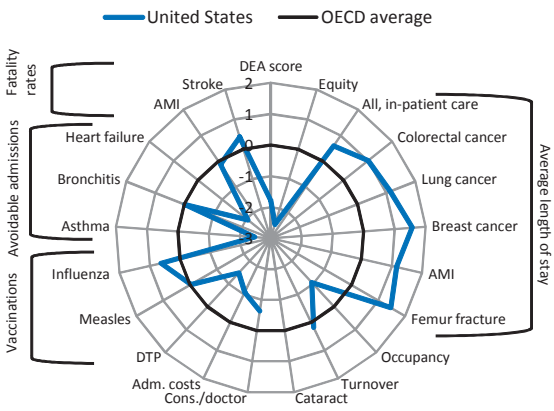
In Panel F, data shown are simple deviations from the OECD average.

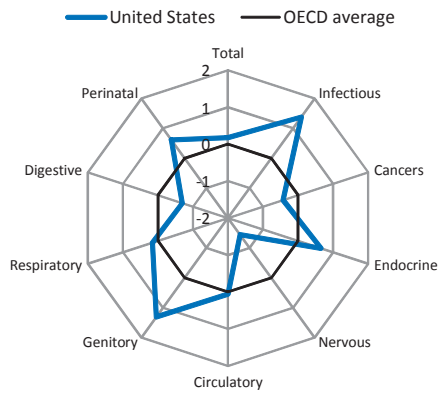
Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

United States: health care indicators

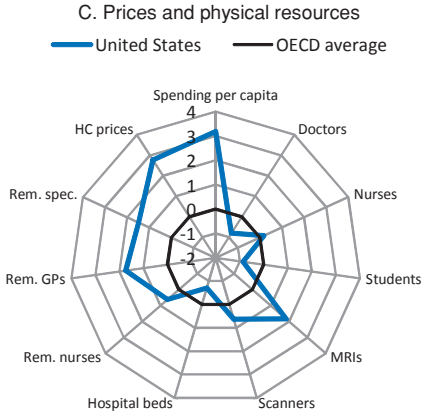
A. Efficiency and quality



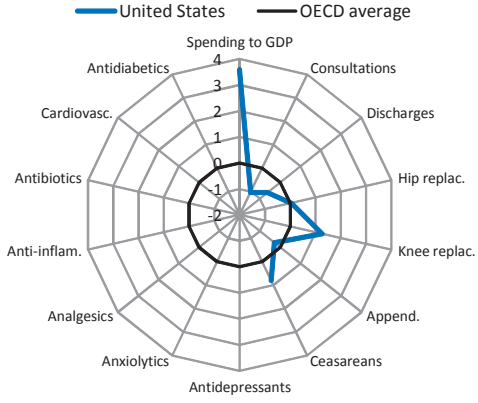
B. Amenable mortality by group of causes



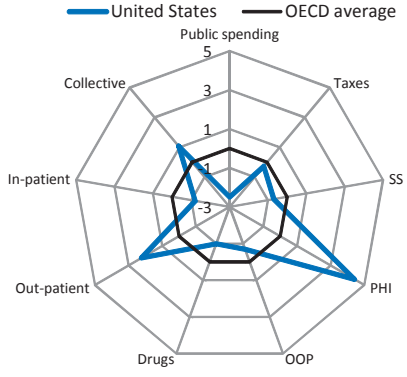
C. Prices and physical resources



D. Activity and consumption



E. Financing and spending mix



F. Policy and institutions

Data not available

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Source: OECD Health Data 2009; OECD Survey on Health Systems Characteristics 2008-2009; OECD estimates based on Nolte and Mc Kee (2008).

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