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value for money in health
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WHICH POLICIES INCREASE VALUE FOR MONEY IN HEALTH CARE?

Luca Lorenzoni*, Fabrice Murtin, Laura-Sofia Springare**, Ane Auraen* and Frederic Daniel***

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Abstract

The incentive structures produced by different institutional arrangements in health systems are important determinants of their performance, and can explain some of the differences in cross-country performance patterns.

This paper proposes an approach and quantitative method to investigate how different policies and institutions helped achieving better value for money across 26 OECD countries for the period of 2000-2015. To this aim, it uses a panel of health system characteristics indicators - derived from questionnaires sent to countries by OECD in 2008, 2012 and 2016 - that describes primarily health financing and coverage arrangements, health care delivery systems, and governance and resource allocation.

The model for analysis measures value for money by estimating the effect of policies and institutional arrangements on life expectancy and health spending at the same time. In this framework, policies and institutions are assumed to have a multiplicative effect on core demographic and non-demographic determinants of life expectancy and spending on health care and can therefore magnify or taper the effects of core determinants.

The results of the analysis show that policies aimed at increasing the scope of goods and services covered by basic (primary) health care coverage help achieving better value for money by increasing life expectancy and moderating health spending growth. The results show also that the use of health technology assessment to provide evidence related to new technologies as well as policies aimed at offering a higher degree of user choice for basic coverage are likely to magnify life expectancy gains and spending on health care growth at the same time. None of the policies in study has the likely effect of decreasing value for money in health care.

Overall the model provides plausible results. However, occasional "odd" results are inevitable given the short time series of data on policies available; the degree of imprecision in the construction of policy indicators; and the reverse causality affecting the relationship between spending on health care and life expectancy.

Résumé

Les mesures incitatives issues de différents accords institutionnels du secteur de santé sont des déterminants importants de la performance, et peuvent expliquer certaines différences dans les modèles de performance entre pays.

Ce document propose une méthode et un modèle d'analyse quantitatif pour examiner comment différentes politiques et institutions ont aidé à obtenir un meilleur rapport qualité-prix pour 26 pays de l'OCDE pour la période 2000-2015. À cet égard, il utilise une vision des caractéristiques des systèmes de santé - tirée des questionnaires envoyés aux pays par l'OCDE en 2008, 2012 et 2016 - décrivant principalement les dispositifs de financement et de couverture santé et les systèmes d'allocation de ressources.

Le modèle d'analyse mesure l'optimisation des ressources en examinant l'effet des politiques et des institutions de santé sur en même temps les gains d'espérance de vie et les dépenses de santé. Dans ce cadre, les politiques et les institutions de santé ont un effet multiplicatif sur les principaux déterminants démographiques et non démographiques de l'espérance de vie et des dépenses de santé et peuvent amplifier ou, au contraire, réduire les effets des principaux déterminants.

Les résultats de l'analyse montrent que les politiques visant à accroître l'éventail des biens et services couverts par les soins de santé primaires aident à obtenir un meilleur rapport qualité-prix en augmentant l'espérance de vie et en modérant la croissance des dépenses de santé. Les résultats montrent également que l'utilisation des méthodes d'évaluation des technologies de la santé afin d'apporter des preuves liées aux nouvelles technologies ainsi que les politiques visant à offrir un plus grand choix aux utilisateurs pour une couverture de base amplifient à la fois les gains d'espérance de vie et la croissance des dépenses de santé. Aucune des politiques étudiées ne réduit l'efficacité du secteur de la santé.

Dans l'ensemble, le modèle fournit des résultats plausibles. Cependant, certains résultats «étranges» occasionnels sont inévitables étant donné le trop petit nombre de séries chronologiques sur les politiques disponibles; le degré de précision dans la construction des indicateurs de politique; et la causalité inverse qui affecte la relation entre les dépenses consacrées aux soins de santé et l'espérance de vie.

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1. Introduction

1. OECD countries have seen sustained improvements in the health status of their population, but the need to ensure value for money from health spending remains high in the face of continued growth of health spending. With population ageing and increased cost pressures arising also from technological change, providing incentives to increase of value for money (VFM)¹ in health care becomes therefore a priority to promote the long-term financial sustainability of health systems.
2. The incentive structures produced by different institutional arrangements are key determinants of the performance of health systems and can help understand variations in cross-country performance patterns (Oxley and MacFarlan, 1994; Dormont *et al.* 2006; Chernew and May 2011; Charlesworth *et al.* 2016; Wenzl *et al.* 2017). Thus health system characteristics - which help to understand and describe those incentive structures - can be used for assessing the effect of health policies and institutions on achieving the common goals of increasing VFM in health care (OECD 2009; OECD 2010).
3. This paper seeks to identify which health system characteristics are likely to increase VFM in health care by using panel data from 2000-2015. It describes an original comprehensive empirical approach to measuring VFM and understanding its policy determinants. This analysis extends previous work by de la Maisonneuve *et al.* (2016; 2017) - who focused on the policy determinants of health care spending - by looking at life expectancy gains and at public spending on health care trends at the same time. This approach adds a new bit of evidence on VFM by also evaluating several policies at a time.
4. The analysis is based on a new panel dataset that describes changes in health system characteristics. This nine year view of key characteristics of health systems also fills an important gap in existing panel data for policy-oriented studies of health systems making use of international comparisons.
5. This paper is structured as follows. First, the framework for analysing VFM, the data and empirical strategy for analysis are described, and then results of the analysis are reported. Finally, a discussion distils the main policy implications emerging from this analysis and identifies a possible way forward.

¹ This term is equivalent to "value" or "economic efficiency".

2. The framework for evaluation of policies

2.1. Defining the framework for measuring VFM

6. To better understand the relationship between health spending, longevity, policies and VFM, a stylized model of utility maximisation by a social planner subject to a budget constraint and a health production function was developed (described in Annex A). This model helps explore the overall effect of policies and institutions on life expectancy gains on the one hand, and on spending on health care trends on the other.

7. On the basis of a conceptual framework developed to assess the effects of policies on efficiency and equity (Wenzl *et al.* 2017), we have quantified and visualised the likely effects of changes of policy indicators on VFM.

8. Two quantities are of interest for analysing VFM: an index of policies associated with core determinants of life expectancy—labelled as *Outcome improvement*; and an index of policies associated with core determinants of public spending on health care—labelled as *Spending pressure*, or its inverse, namely *Spending moderation*.

9. We have also borrowed from a framework (McGuire and Drummond 2001) that allows for the visualisation of the effects of policies on spending on health care and life expectancy (Figure 1). The position of policies on the plane relative to each other is determined on the basis of the regression results. For example, a policy in the top-right quadrant is likely to increase VFM by magnifying the effect of core determinants on life expectancy and reducing the effect of core determinants on public spending on health care, whereas a policy on the bottom-left quadrant is likely to decrease VFM by reducing the effect of core determinants on life expectancy and magnifying the effect of core determinants on public spending on health care.

10. Policies in the remaining two quadrants, which are likely to increase or decrease both spending and outcome at the same time, may increase VFM, decrease VFM or be VFM-neutral depending on the value of the regression coefficients and on an externally set threshold against which the ratio of the effects of policies on outcome and spending can be compared.

Figure 1. The value for money plane – a graphical framework to visualise the effects of policies on spending on health care and life expectancy

2.2. Data

2.2.1. The surveys

11. To distinguish health systems in ways that are meaningful for assessing performance, OECD collected information on health system characteristics through three surveys carried out in 2008, 2012 and 2016². Those surveys were based on a conceptual framework grounded in concrete structural or organisational characteristics of health systems (OECD 2008). This framework comprises three domains:

- health financing and coverage arrangements
- health care delivery systems
- governance and resource allocation

12. The 2008 survey included 81 questions, often with multiple items and sub-questions for further details. The 2012 and 2016 surveys comprised 91 and 78 questions, respectively. Changes to questions and multiple-choice responses from one survey to the next were suggested by OECD as appropriate. A copy of the surveys is available on request.

13. The survey was filled in by 29 OECD member states in 2008. For the 2012 round, the four new OECD member countries – Chile, Estonia, Israel and Slovenia – filled in the survey too, for a total of 33 countries, whereas 28 OECD member countries filled in the

² No data on its policies and institutions were available from the questionnaires for the United States, reflecting the complexity and variety of the US system.

survey in 2016. Of note that Costa Rica and South Africa provided responses to the questionnaire for the first time in 2016³.

14. Responses to surveys yielded a vast amount of information. The main characteristics of health systems of OECD countries and key partners and accession countries are available in one dataset on a dedicated OECD webpage (<http://www.oecd.org/els/health-systems/characteristics.htm>). The dataset consists of results for the 2016 round as well as results for the 2012 round of the survey and it can be searched according to the following criteria: country; version of the survey; question. The data can be displayed online or downloaded in an excel format file.

2.2.2. Indicators and their validation process

15. The raw responses are of interest for certain issues, but for the purpose of providing input to performance analyses, a more manageable set of indicators is necessary.

16. OECD has developed a set of health system characteristics indicators that can be useful in investigating cross-country differences in health system performance. Key institutional features of health systems are defined as a set of formal constraints defined within countries by rules, law or institutions intended to shape health insurance and health care markets (Paris *et al.* 2010).

17. To describe the key health system characteristics in a meaningful and useful way, this study selected a core set of 17 policy oriented indicators on the basis of their relevance to performance analysis and of the applicability of a standard measuring approach to the 2008, 2012 and 2016 surveys⁴. Table 1 shows the list of indicators by domain. The selected indicators are a subset of those used by the OECD in previous comparative analyses of efficiency and health care spending trends (Joumard *et al.* 2010; de la Maisonnette *et al.* 2016). It is important to emphasise that this work aimed at developing indicators that can be used to describe health systems features over time, rather than to devise measures to rank health systems (e.g. a scoreboard).

³ Costa Rica and South Africa are not included in the panel dataset though.

⁴ A mapping of questions and responses included in the three surveys allowed the identification of comparable questions and responses. As an example, a change in multiple-choice responses concerning "cost sharing by function of care" did not allow the selection of "height of basic coverage" as an indicator for this analysis.

Table 1. List of indicators selected for the analysis by domain

<i>Health financing and coverage arrangements</i>	
	Depth of basic coverage
	Level of financial protection for health care users
	Out-of-pocket payments for curative care
	Degree of user choice for basic coverage
	Levers for the insurance market
	"Over the basic" coverage
	Patient choice among providers
	Role of primary care in the health system (gate-keeping)
<i>Health care delivery systems</i>	
	Incentives for volume increase in physicians' payment methods
	Incentives for volume increase in hospitals' payment methods
	Degree of private provision – physicians
	Regulation of medical staff in hospitals
	Incentives for health care quality
<i>Governance and resource allocation</i>	
	Definition of the health benefit basket
	Use of Health Technology Assessment
	Regulation of prices/fees for primary care physicians' services paid by third-party payers
	Regulation of prices/fees for hospitals' services paid by third-party payers

18. Qualitative responses provided to the questionnaire were transformed into quantitative indicators using the same scoring system for the three rounds of the survey. Scores were assigned to reflect the country variance rather than distributing countries evenly across categories. The final output is a score ranging from 0 – 6, and points are assigned to each indicator as described in Annex B.

19. Boundaries between different groups of health policies and institutions are rarely clear-cut, with no obvious best model. Thus this panel dataset provides as complete a picture as possible of the contextual variation across OECD health systems over time, given data availability.

20. Additional data sources, such as the System of Health Accounts (SHA), were used to complement responses as appropriate, with the implicit assumption that these captured well a policy dimension.

21. Using this scoring system, a panel of survey responses was created. High and low bounds were computed for each indicator on the basis of the standard deviation from the mean. Scores were then highlighted if the variation of scores for a country and an indicator over time was higher than one or two standard deviations from the mean across all countries and years.

22. To ensure the validity of this panel dataset, OECD asked countries to review responses to questions that were used to calculate scores for the indicators highlighted. Furthermore, countries were asked to provide responses to questions with missing values.

23. Between mid-June 2017 and mid-September 2017, sixteen countries reviewed responses and helped OECD with interpreting significant changes to indicators' scores over time.

2.2.3. Missing data

24. The panel dataset contains 1683 observations (17 indicators x 3 surveys x 33 countries). After the validation process, 182 values remained missing. For the empirical analysis, we used the following methods to fill in missing data:

- using interpolation when the 2012 value was missing; computing the simple mean of the 2008 and 2016 values;
- imputing scores with previous survey's values, under the assumption that the response did not change;
- imputing scores with the following survey's scores, under the assumption that the response did not change;
- predicting missing scores, by country, using the other indicators as predictors; the method is used when the values are missing in 2008, 2012 and 2016. The model used: $I_i = \beta_0 + \beta_1 X_{ic} + \beta_2 X_c + \varepsilon$, where I_i is the missing indicator, X_i includes the rest of the indicators of panel dataset, X_c is the country-level control variable and ε is the error term.

2.2.4. Results of the surveys

25. Annex C reports results. For each indicator, a bar chart shows scores by round by country, whereas Table 20 offers an overview of the panel dataset.

26. Indicators that refer to *health financing and coverage arrangements* showed little variation over time. Significant changes were primarily reported for the insurance market characteristics, in particular with regards to levers for the insurance market (Belgium, Germany, Mexico, the Netherlands and Switzerland) and "over the basic" coverage (Chile, Mexico and Portugal). An increase in the degree of user choice for basic coverage over time was reported for Belgium, whereas a decrease in patient choice among providers from 2008 to 2012 was reported for Canada, France, Hungary and Switzerland.

27. Changes in *health care delivery systems* over time were more pronounced. In particular, countries reported a shift towards activity-based payment systems for hospitals (Australia, Greece, the Netherlands and Turkey), a greater use of incentives for health care quality (France, Portugal and Spain), and changes in the degree of autonomy of hospital managers to recruit medical staff and set their remuneration (less autonomy in Portugal and more autonomy in the United Kingdom).

28. *Governance and resource allocation* indicators also showed significant changes over the time period in study. Countries have put in place and expanded structures and capacity for undertaking health technology assessment and using results from evaluation processes (Greece, Germany, Ireland, Italy, Luxembourg, Norway and Turkey), and regulated more strictly prices/fees paid to providers by third party payers (Austria, Australia, Czech Republic and Finland).

2.2.5. Data used for this study

29. For this analysis, scores for policy and institutions were averaged over the period in study. Indeed, using the change in policy over time to assess the magnitude of a policy

effect would imply making the assumption that a policy reform has an instantaneous impact on the change in longevity or the change in public health expenditures, which is too strong an assumption. There is an additional econometric argument that changes in policy are statistically noisy and using them introduces significant measurement errors that drive policy coefficients to zero.

30. Preliminary results showed that Estonia, Slovenia and Turkey were outliers in the life expectancy gains pattern, whereas Portugal, Greece and Chile were outliers in the health spending trends pattern, and Luxembourg in the GDP growth pattern. Thus those countries were not included in the econometric analysis, and results presented in the following section cover 26 OECD countries⁵.

31. The indicator *levers for the insurance market* was not included in the econometric analysis as a score was assigned only to a sub-set of countries featuring multiple insurers/funds. Therefore results presented in the following section cover 16 indicators.

32. Life expectancy at birth data were extracted from the OECD database (OECD.stat). The analysis also uses expenditure data from the OECD's System of Health Accounts (SHA) (OECD, Eurostat and WHO, 2011) database. This database provides a systematic account of overall financial flows through national health systems, including information on where money comes from, who manages it, and how it is used. The 2016 release of SHA used in this study includes national expenditure estimates through 2015.

2.3. Model specification

2.3.1. Life expectancy at birth

33. The production of life expectancy at birth (*LE*) for country *i* in year *t* is assumed to follow a Cobb-Douglas function taking health expenditures as well as observed and unobserved risk or technological factors as input (*k*):

$$LE_{i,t} = \prod_k (X_{i,t}^k)^{b_{i,k}}$$

34. In turn, the elasticities of these factors (*b*) are country-specific as they are determined by health policies and institutions (*m*):

$$b_{i,k} = \alpha_k \times e^{\sum_m \pi_m Z_i^m}$$

where Z_i^m is a normalized index of health policies (with zero-mean and unity standard deviation), α_k the average return of the factor *k*, and π_m a coefficient capturing the effect of policies on life expectancy. After log-linearising and accounting for unobserved country effects c_i , the model becomes:

$$\log LE_{i,t} = e^{\sum_m \pi_m Z_i^m} \times \left[\alpha \log H_{i,t-5} + \sum_k \lambda_k \log X_{i,t-5}^k + c_i \right] + \varepsilon_{i,t} \quad (1)$$

⁵ Latvia filled in the 2016 survey only after becoming a member of the OECD. Therefore this country could not be included in this empirical work.

where $H_{i,t-5}$ is the total health spending expressed in per capita constant USD PPP⁶, and $X_{i,t-5}^k$ is a set of other observed factors, which includes income as measured by GDP per capita at constant USD PPP net of total health expenditure, the stock of upper secondary and higher education, prevalence of daily smokers and alcohol consumption in litres per capita.⁷ Lags of five years were chosen to account for delayed effects on health status.

2.3.2. Public spending on health care

35. The public spending on health care⁸ equation is linked to the life expectancy equation described above. As reported in Annex A, the health spending production function that derives from the agent's maximization process is:

$$\log H_{i,t}^{Public} = e^{\sum \phi_m \cdot Z_i^m} \times \left[\beta \log GDP_{i,t-5} + \gamma \log D_{i,t-5} + e_i + f_t \right] + \eta_{i,t} \quad (2)$$

where $GDP_{i,t-5}$ is the GDP per capita at constant USD PPP net of total health expenditure, and $D_{i,t-5}$ is the share of the elderly (age of 65+ years) in the population⁹.

36. As for the life expectancy equation, a lag of 5 years is used in order to capture the long-term relationship between income and health spending, rather than short-term variations due to the business cycle. From that perspective, using 5-year lags also reduces the endogeneity of income in the public spending on health care equation.

2.3.3. The role of policies and institutions on value for money

37. An index of policies associated with core determinants of life expectancy (outcome improvement, see equation (1) above) and an index of policies associated with core determinants of public spending on health care (spending pressure or its inverse spending moderation, see equation (2) above) are defined as follows:

$$\text{Outcome improvement} = e^{\sum \pi_m \cdot Z_i^m}$$

$$\text{Spending pressure} = e^{\sum \phi_m \cdot Z_i^m}$$

$$\text{Spending moderation} = 1 / \text{Spending pressure}$$

⁶ Purchasing Power Parities (PPPs) are conversion factors that show the ratio of the prices in national currencies of the same basket of goods and services in different countries. Thus they can be used as both currency converter and price deflators. When PPPs are used to convert expenditure to a common unit, the results are valued at a uniform price level and should reflect only differences in volumes of goods and services consumed in countries (Eurostat and OECD 2012).

⁷ This model follows James *et al.* (2017). Environmental factors, unemployment rate and healthy diet were excluded from the model as the association between life expectancy and those variables was not significant in their analysis.

⁸ Because policies and institutions considered in our analysis pertain to the public sector - which accounts for a large part of spending on health care across OECD countries -, we concentrate here on public spending on health care. Estimates for total spending on health care are qualitatively similar for several important policies and are presented in Annex D. Future work may also look at interactions between public and private spending on health care.

⁹ Future work could also assess the role of health prices on explaining trends.

38. In this framework, the effect of core determinants on public spending on health care and on life expectancy can be magnified or reduced by policies and institutions. For that reason, policies and institutions intervene in a multiplicative way in the model and affect all fundamental factors in a similar way: they increase VFM if they reduce the growth of public spending on health care associated with policies (as measured by the *Spending moderation* index) and increase the growth of life expectancy associated with policy (as measured by the *Outcome improvement* index). Achieving one of the two could be enough, e.g. if there is no effect on the other dimension or, depending on the external threshold, the increase in one of the two dimensions is considered to outweigh the increase in the other.

39. The system of equations (1) - (2) is estimated in two steps with non-linear least-squares and it treats the endogeneity of health spending in the life expectancy production function. Institutions and policy may remain endogenous and could be affected by reverse causality as low value for money could prompt health reforms. Modelling the endogeneity of policies and institutions goes beyond the scope of this paper.

3. Results

40. Figure 2 shows the effect of policies and institutions on VFM in health care. In line with previous literature (see the review by Wranik 2012), policies aimed at increasing the depth of basic coverage and the level of financial protection for health care users help achieving higher VFM. Policies aimed at increasing the use of health technology assessment to inform the decision-making process as well as policies that increase the degree of user choice for basic coverage have the likely effect to magnify life expectancy gains and public spending on health care growth at the same time, while increasing regulation of prices/fees has the likely effect of reducing public spending on health care. In line with the expectations of a possible substitution effect, the higher the share of OOP spending the lower the growth in public spending on health care, and the more important the role played by health insurance as a secondary source of coverage the lower the growth in public spending. Policies in this study are not likely to have negative effects on life expectancy.

Figure 2. Effect of policies and institutions on life expectancy and public spending on health care determinants

Note1: Only policies with at least one statistically significant coefficient for life expectancy or public spending on health care are shown.

Note2: If one of the two coefficients of a policy is not statistically significant, then the non-significant effect on core determinants is set = 1.

41. Table 2 reports regression results¹⁰. We start by examining the core determinants of public spending on health care. Column (1) shows that the coefficient for the share of old-age population is positive and statistically significant. Holding all other independent variables constant, an increase of one percentage point in the share of old-age population is associated with a 0.2% increase in public spending on health care. The positive value of this coefficient reflects the effects of the interaction between population ageing and health status, functional impairment and disability, use of technology and proximity to death¹¹. Results show also that a one percent increase in GDP per capita is associated with a 0.81% increase in health spending. This partial income elasticity is in line with previous studies and meta-analyses¹².

¹⁰ It should be noted that all variables are not simultaneously estimated.

¹¹ Mortality rates are higher for old-age cohorts, so a higher proportion of old-age people will be subject to much higher health expenditure associated with the final months of life (Seshamani and Gray 2004).

¹² For example Acemoglu *et al.* (2013) derive a central estimate for the income elasticity of health spending around 0.72. For a literature review of the income elasticity of health spending, see de la Maisonneuve and Oliveira Martins (2013).

42. Focusing on the core determinants of longevity (column (2)), all variables display significant coefficients, except – surprisingly – the stock of upper secondary and higher education. A one percentage point increase in health spending per capita is associated with a 0.041% increase in life expectancy, and a one percentage point increase in GDP per capita is associated with a 0.045% increase in life expectancy. In line with expectations on unhealthy lifestyles, a one percentage point increase in smoking is associated with a 0.023% decrease in life expectancy, and a one percentage point increase in alcohol consumption is associated with a 0.017% decrease in life expectancy.

43. Results pertaining to health policies and institutions are discussed below by indicators' domain.

3.1. Health financing and coverage arrangements

44. The variable *depth of basic coverage* is negatively associated with health spending and positively associated with longevity, which is consistent with the view that coverage expansion significantly increases patients' access to care and use of preventive care (Sommers *et al.* 2017), whereas less generous insurance coverage and an increased amount of cost-sharing can lead to not seeking health care especially among low-income and high-risk populations, with adverse consequences for health status and potentially higher spending in the future (Manning *et al.* 1987; Gruber 2006; Haviland *et al.* 2011; Rubin and Mendelson 1996; Lundberg *et al.* 1998; Robinson 2002; Jemai *et al.* 2004; Kim *et al.* 2005). The same line of reasoning prevails for *level of financial protection for health care users* and *out-of-pocket payments for curative care* that show expected signs on coefficients, although the latter is not statistically significant on life expectancy.

45. In the absence of any government intervention, competition between health insurers may push insurers to price premia according to the expected costs of insured individuals (Barr 2012). Thus a higher degree of *user choice for basic insurance* may be associated with higher public spending on health care to also reflect the need to regulate, administer and supervise the insurance market on the part of the government. At the same time, insurers would – in principle – have incentives to deliver high quality services to attract customers, which in turn may translate into longevity gains (see the coefficient in column 2)¹³. A higher degree of autonomy and market power dwells on the ability of defining benefits and premiums of insurers for complementary health insurance ("*over the basic*" coverage). A larger role played by a highly competitive secondary insurance market is associated with lower public spending on health care, while competition may reinforce adverse selection and hence have negative effects on health status, as suggested by the negative coefficient.

46. A larger *patient choice among providers* may – in principle – encourage providers to seek efficiency gains and maintain quality of care if payment takes the form of a fixed activity-based price (Volpp *et al.* 2003; Gaynor *et al.* 2013). However, if prices are not fixed or there is no cap to total payment to providers (de Lagasnerie *et al.* 2015), individual choice can also raise spending and have mixed effects on quality of care¹⁴. In

¹³ However, note that an excess degree of competition may induce switching between insurance schemes as in the United States, and may lower incentives for insurers to increase quality of care for high-costs individuals.

¹⁴ Previous studies report mixed results. In the UK, Propper *et al.* (2006) show that competition reduced quality (i.e. increased death rates), although waiting time has been reduced too (Propper *et al.* 2008). The « choose and book » reform (improved user choice coupled with DRGs implying that money follows the

general, for the incentives of providers competition on quality to be effective, individuals must face real choice of providers, there should be a sufficient supply of hospital services, providers should have sufficient autonomy to respond to competition, and competition law should be effectively enforced (Le Grand 2007).

47. Gate-keeping arrangements are expected to help control costs by requiring primary care physicians to pre-authorise service use by patients, screening out unnecessary services (Docteur and Oxley 2003), but the evidence on the system-wide cost impacts of gate-keeping implementation in individual countries is still limited (Forrest 2003; Moreno-Serra 2014). Therefore it is plausible that the coefficients on this variable are not statistically significant in the regressions. The results fall in line with most previous literature: gate-keeping arrangements have no statistically significant impact on premature mortality or infant mortality (Or 2001; Or *et al.* 2005), health expenditure growth rates (Barros 1998) or efficiency (Bhat, 2005).

48. In theory, gate-keeping arrangements work best when coupled with appropriate and effective physician incentives (Garcia Marinoso and Jelovac 2003; Gonzales 2009). Thus future work may also assess the usefulness and soundness of creating variables that combine policies so as to also evaluate the effect of interactions among policies.

3.2. Health care delivery systems

49. Incentives embedded in hospitals' activity-based payment methods have been conducive to higher volume of care (Louis *et al.* 1999; Gerdtham *et al.* 1999; Dismuke and Guimaraes 2002; Kwon 2003; Moreno-Serra and Wagstaff 2010), which is consistent with the positive and significant coefficient found on the health spending equation.

50. A higher *degree of private provision of physicians' services* is associated with larger health expenditures, often linked to the use of new and expensive technologies (Chandra *et al.* 2011). The experience of OECD countries demonstrates that price schedules can be used by the public sector to better link payments or budgets with activity, they can create a basis on which the public sector can draw on private services, and they can be used by private insurers to scale prices to reflect their commercial objectives (Kumar *et al.* 2014). Thus an effective use of prices/fees on the part of the government can provide stronger incentives to private provision of primary care and outpatient specialist services too.

51. Hospital autonomy can spur innovation and increase productivity. The extent to which hospital managers have autonomy to hire and fire staff, and to influence the pay of doctors (*regulation of medical staff in hospitals*) is a key supply side factor in influencing the capacity for hospitals to compete on efficiency and quality (OECD 2012). Bloom *et al.* (2010), for example, found that better managed hospitals are not only more cost-effective but also provide better outcomes for patients.

52. *Incentives for quality* (e.g. bonuses to general practitioners, specialists and hospitals for prevention or patient satisfaction) increase health spending, which is consistently reflected by a positive and statistically significant coefficient in the health

patient) is shown to improve health care quality (Gaynor *et al.* 2012, 2013). On the contrary, Cooper *et al.* (2010) show that increased competition between private and public hospitals decreased productivity among the public sector (as more complicated cases were selected there) while it increased in the private sector, and the same observation has been made in Australia.

spending equation¹⁵. Surprisingly, no statistically significant effect on longevity could be detected in our regression analyses.

53. Fee-for-service payments for physicians services are found to be positively related to premature mortality (Or 2001) and to higher health expenditures (Gerdtham *et al.* 1998). Coefficients in our regression have a plausible sign, even if they are not statistically significant.

3.3. Governance and resource allocation

54. Health technology assessment (HTA) can complement the use of evidence-based clinical guidelines by providing evidence related to new medical technologies during assessment, appraisal and decision-making processes (Auraaen *et al.* 2016; OECD 2010; Mossialos and Le Grand 1999). Criteria for investment and disinvestment decision-making sit within the broader context of activities aimed at encouraging best practices in health care, and may include results from HTA examining the clinical and economic evaluation of new technologies. However, the use of HTA also leads to expenditure increases mainly related to the additional use of effective services, as well as cost increases related to the up-front investment to create, expand and operate health technology assessment agencies. As an example, empirical estimates show that NICE's recommendations for the adoption of new technologies have cost the NHS an additional GBP 1.65 billion per year (Chalkidou *et al.* 2009). Thus it seems plausible that higher scores in *use of Health Technology Assessments* – which reveal the existence of institutional structures and capacity for technology assessment and encourage the additional use of effective services – are associated with higher public expenditures and higher care quality as suggested by the positive and significant coefficients.

55. The notion of 'pricing' sits at the heart of payments for specialist and hospital services across most OECD countries (Kumar *et al.* 2014). There is a long and established literature arguing that health care is far from being a classic market for goods and services as it is characterised by patients that have imperfect information, which provides providers (and insurers) with a disproportional influence on the demand for health care goods and services (Blomqvist 1991) likely driven by providers and insurers' interests. This combination of information asymmetry and diverging motivations have often justified a greater degree of price regulation in health as governments seek to ensure socially optimal levels of service delivery, and promote efficiency in production (Ellis and McGuire, 1993). In line with the literature, a stronger *regulation of prices/fees* is associated with lower public expenditure on health.

¹⁵ It should be noted that not all incentives for quality are add-on payments. Introducing a value dimension into payments can support a greater focus on quality, outcome and patient experiences while simultaneously reducing health spending. Incentive payments of this kind provide one of the few mechanisms to reward high-performing clinicians for more effective care, and conversely provide less funding to poor performing providers.

Table 2. Results for the effects of policies and institutions on health spending and life expectancy

Dependent variable:		LOG HEALTH SPENDING	LOG LIFE EXPECTANCY
		(1)	(2)
CORE DETERMINANTS			
	Log of share of old-age population	0.205**	
		(0.09)	
	Log of health spending per capita		0.041***
			(0.35)
	Log of GDP per capita	0.813***	0.045***
		(0.08)	(0.54)
	Log higher education		-0.0095
			(0.58)
	Log smoking		-0.023***
			(0.34)
	Log alcohol consumption		-0.017***
			(0.30)
POLICIES AND INSTITUTIONS			
Health financing and coverage arrangements	Depth of basic coverage	-0.143***	0.112***
		(0.04)	(0.03)
	Level of financial protection for health care users	-0.243***	0.197***
		(0.09)	(0.06)
	Out-of-pocket payments for curative care	-0.201**	0.097
		(0.08)	(0.05)
	Degree of user choice for basic coverage	0.121***	0.093***
		(0.04)	(0.03)
	"Over the basic" coverage	-0.147***	0.005
		(0.04)	(0.02)
	Patient choice among providers	0.128***	-0.018
		(0.05)	(0.03)
	Role of primary care (gate-keeping)	0.077	-0.030
		(0.05)	(0.03)
Health care delivery systems	Incentives for volume increase in physicians' payment methods	0.043	-0.059
		(0.07)	(0.04)
	Incentives for volume increase in hospitals' payment methods	0.145***	0.039
		(0.05)	(0.03)
	Degree of private provision of physicians services	0.087**	-0.036
		(0.04)	(0.03)

	Regulation of medical staff in hospitals		0.078	0.188***
			(0.05)	(0.04)
	Incentives for health care quality		0.198***	-0.027
			(0.04)	(0.02)
Governance and resource allocation	Definition of health benefits basket		-0.060	0.078***
			(0.04)	(0.03)
	Use of HTA		0.177***	0.082***
			(0.04)	(0.03)
	Regulation of prices/fees for primary care physicians' services paid by third-party payers		-0.139***	-0.048
			(0.05)	(0.03)
	Regulation of prices/fees for hospitals' services paid by third-party payers		-0.136**	-0.054
			(0.05)	(0.03)
	Country dummies		Yes	Yes
	Time dummies		Yes	No
	N		410	410

Note: robust standard errors in parentheses.

***Indicates statistical significance at the 1% level.

**Indicates statistical significance at the 5% level.

*Indicates statistical significance at the 10% level.

4. Discussion

56. The new nine year view of key health system characteristics developed and used for the first time by OECD for this empirical analysis fills an important gap in existing panel data for policy-oriented studies of health systems making use of international comparisons.

57. Another key contribution of this work is to explore and quantify the likely influence of policies and institutions on key determinants of life expectancy gains and health spending growth using panel data. Overall, the model provides plausible results. Policies aimed at increasing the depth of basic coverage and the level of financial protection for health care users help achieving higher value for money by improving outcome and moderating health spending at the same time, while policies associated to increasing capacity and use of health technology assessments and fostering a higher degree of user choice of basic insurance improve life expectancy and health spending at the same time. An increase in price regulation is likely to be associated with lower public spending on health care. None of the policies in study is likely to decrease value for money in health care.

58. In few cases, the estimated effects on life expectancy and health spending of policy indicators have differed from expectations. It is important to recognise that this

may be also due to reverse (two-way) causality affecting the relationship between public spending on health care and life expectancy. As previously acknowledged, reverse causality is not accounted for in this empirical work. Furthermore, we have too short time series for a robust panel analysis, which is why occasional ‘odd’ results are inevitable. Results are also subject to the unavoidable limitation that the policy indicators used in this study exhibit a lower degree of precision in their construction than variables such as health spending per capita.

59. Future work should assess the robustness of results across different model specifications, countries and indicators panels.

Annex A. The theoretical framework

60. Let us consider a representative agent who maximises utility derived from individual consumption c expressed in real terms and health status denoted as x . For the sake of simplicity, we abstract from the heterogeneity associated with age and consider a unique life period.¹⁶ Utility is given by the following constant elasticity of substitution function:

$$U(c, x) = \left(\lambda \times x^\rho + (1 - \lambda) \times c^\rho \right)^{1/\rho}, \quad \rho \leq 1 \quad (1)$$

61. As a particular case, a Cobb-Douglas utility function is obtained for $\rho = 0$. In the above function, health status x is an unobserved, latent, health compound that includes both mortality risks (and life expectancy) and morbidity status. The representative agent maximises utility under the budget constraint:

$$c + H = y \quad (2)$$

where H is real health spending per capita and y real individual income proxied by real GDP per capita. There is no physical capital, no savings and no international trade in the economy, and real health prices relative to consumption are excluded from the analysis.

62. An individual's health state x is determined by a health production function that uses individual health spending with decreasing returns to scale and is augmented by an exogenous variable Q that captures a number of risk factors:

$$x = (Q \times H)^\beta, \text{ with } 0 \leq \beta \leq 1 \quad (3)$$

63. A social planner will maximise aggregate utility over consumption and health spending subject to the resource constraint and the production function of health. Denoting $h = H/y$ as the share of real health spending in real income, the optimal allocation solves:

$$\max_{c, h} \left[\lambda \times (Qh \times y)^{\beta\rho} + (1 - \lambda) \times c^\rho \right]^{1/\rho} \quad s.t. \quad c = (1 - h) \times y \quad (4)$$

64. The optimal allocation of health spending and consumption satisfies the following first-order condition:

$$h^* = \left(\frac{\beta\lambda}{1 - \lambda} \right)^{1/(1 - \rho\beta)} \times Q^{\beta\rho/(1 - \rho\beta)} \times (1 - h^*)^{(1 - \rho)/(1 - \rho\beta)} \times y^{\frac{1 - \rho}{1 - \rho\beta} - 1} \quad (5)$$

¹⁶ For a dynamic system of health investments throughout life allowing for age-specific mortality rates see Hall and Jones (2007).

65. The equation above links the optimal health spending share to the technological variable, relative health prices and real income. The optimal share h^* appears on both sides of the equation. However, equation (5) can be further simplified. The average health spending share h^* is around 8% of the GDP in a sample of high-income OECD countries. The expression $(1-\rho)/(1-\rho\beta)$ is the income elasticity of health spending H , which is likely to be smaller but close to one.¹⁷ This yields the following approximation: $(1-h^*)^{(1-\rho)/(1-\rho\beta)} \approx 1$.¹⁸ Then, the optimal health spending share in real income can in turn be conveniently approximated as:

$$h^* \approx \left(\frac{\beta\lambda}{1-\lambda} \right)^{1/(1-\rho\beta)} \times Q^{\beta\rho/(1-\rho\beta)} \times y^{\frac{1-\rho}{1-\rho\beta}-1} \quad (6)$$

66. And the optimal health spending per capita then is:

$$H^* = h^* y \approx \left(\frac{\beta\lambda}{1-\lambda} \right)^{1/(1-\rho\beta)} \times Q^{\beta\rho/(1-\rho\beta)} \times y^{\frac{1-\rho}{1-\rho\beta}} \quad (7)$$

67. Health policies and institutions enter the formulation above as factors that influence the degree of return of health expenditures. In practice, policies and institutional factors X determine the magnitude of the parameter β in the health production function, with high-return policies raising parameter β and therefore the health level for a given amount of health spending. It is interesting to note that the impact of institutions on health spending per capita H^* depends on the value of the elasticity of substitution $\sigma = 1/(1-\rho)$ in the utility function (1).

68. The specification of our econometric model follows naturally from equations (3) and (7). Taking logs on both sides of the equation yields the following expression:

$$\log H^* = \frac{1}{1-\rho\beta} \times \left[\log(\beta) + \log\left(\frac{\lambda}{1-\lambda}\right) + \rho\beta \log(Q) + (1-\rho) \log(y) \right]. \quad (8)$$

69. While this equation is not directly estimable, it suggests a log-linear reduced form where health spending is explained by policy and institutions (P), through the elasticity of the health production function β , the preferences towards health λ , health care quality, and real income.

70. We further assume that the share of health spending in the utility term λ is affected by demographic factors proxied by the share of the population older than 65 years (Marino *et al.* 2017) D ¹⁹ as well as by some unobserved time-varying factors:

¹⁷ For example Acemoglu *et al.* (2013) derive a central estimate for the income elasticity of health spending around 0.72. For a literature review of the income elasticity of health spending, see de la Maisonneuve and Oliveira Martins (2013).

$$(1-h^*)^{(1-\rho)/(1-\rho\beta)} = 0.92^{0.72} = 0.94 \approx 1$$

¹⁸ Using the figures mentioned above yields

¹⁹ Note that it is not possible to identify the effect of time-constant policies passing through $\log \beta$ as other time-constant factors may be channelled through λ .

$$\log \frac{\lambda}{1-\lambda} = \phi D_{i,t} + f_t \quad \text{with } \phi \geq 0 \quad (9)$$

71. The returns to policies in the health production and health spending functions are assumed to be an index of policies, and the exogenous quality variable an index of risk factors plus country effects:

$$\begin{aligned} \beta &= e^{\sum_m \pi_m \cdot Z_i^m} \\ \frac{1}{1-\rho\beta} &= e^{\sum_m \phi_m \cdot Z_i^m} \\ Q &= \sum_k \alpha_k \times \log X_{i,t}^k + c_i \end{aligned} \quad (10)$$

72. The production function of life expectancy given by equation (3) then becomes:

$$\log x = \log LE_{i,t} = e^{\sum_m \pi_m \cdot Z_i^m} \times \left[\alpha \log H_{i,t} + \sum_k \alpha_k \log X_{i,t}^k + c_i \right] + \varepsilon_{i,t} \quad (11)$$

73. After noting that country-specific health return β and country time effects c_i jointly form new country effects e_i , and considering the average coefficient $\rho\bar{\beta}$ in front of economic and risk factors Q , the implied equation for health spending (8) becomes:

$$\log H_{i,t} = e^{\sum_m \phi_m \cdot Z_i^m} \times \left[(1-\rho) \log(y) + \gamma \log D_{i,t}^k + \sum_k \beta_k \log X_{i,t}^k + e_i + f_t \right] + \eta_{i,t} \quad (12)$$

In the empirical analysis, there are multicollinearity problems between time effects f_t and the considered risk factors $X_{i,t}^k$ (i.e. smoking prevalence and alcohol consumption), which broadly follow a common time trend across countries. As a result, these risk factors are excluded from the health spending equation (12), which becomes:

$$\log H_{i,t} = e^{\sum_m \phi_m \cdot Z_i^m} \times \left[(1-\rho) \log(y) + \gamma \log D_{i,t}^k + e_i + f_t \right] + \eta_{i,t} \quad (13)$$

74. As it can be seen in equations (13), the economic intuition underlying the non-linear specification is straightforward. On the one hand, there are fundamental factors driving the core amount of health spending, that is income and demographic factors. On the other hand, the core amount of health spending can be magnified by some health policies and institutions, or on the contrary be reduced by efficient regulations and practices. For that reason, policies and institutions intervene in a multiplicative way in the model and affect all fundamental factors in a similar way. The same reasoning prevails for the health production function (11). Both equations (11) and (13) are estimated via non-linear least-squares.

Annex B. Construction of the health system characteristics indicators

75. The policies and institutions indicators used in this paper were constructed by attributing a score to responses to the OECD questionnaires.

4.1 Health financing and coverage arrangements

4.1.1 Depth of basic coverage

76. The term "basic (primary) health care coverage" refers to the first source of financial protection for health care users. In most OECD countries, residents are entitled to tax-funded health coverage or covered by compulsory social health insurance (Paris *et al.* 2016).

77. In principle, a more generous package of benefits covered by basic health care coverage can be expected to result in higher health spending, although much will depend on the type of services included in the package. For instance, encouraging effective preventive and health promotion services through explicit priority setting in public health may lead to lower hospital admission rates and reduced use of expensive therapies in the longer term (Kenkel and Sindelar 2011). Moreover, wise use of health technology assessment to determine the benefits package – providing incentives for using the most cost-effective treatments for a given condition – could contribute to savings in the health sector without detrimental impacts on quality of care. In the pharmaceutical sector, for instance, the use of formularies or preferred drug lists in the benefit package definition has been found to have led to lower expenditure on pharmaceuticals by the public sector and managed care organisations in the United States and Canada (Elzinga and Mills 1997; Kibicho and Pinkerton 2012; Morgan *et al.*, 2004).

78. This indicator is based on the coverage of eight health care functions by basic primary health insurance. Its score is based on responses to question 13a (2008 survey), 14 (2012) and 12 (2016). The score was computed according to the following formula:

$$\text{Depth of basic coverage} = (\sum_j w_j S_j)$$

where j: health care function

$S_j = 0$ if the service j is not covered; 6 if the service is covered (with or without co-payment)

w_j = share of expenditure associated with health care function j in total health expenditures (for the eight functions under analysis) on average across OECD countries in 2014 (see table 3 below).

Table 3 Share in total health expenditure (for the eight functions under analysis) by health care function

Health care function	Weight (Wj)
Acute inpatient care	0.36
Outpatient - primary care physicians	0.13
Outpatient - specialists	0.13
Clinical laboratory tests	0.02
Diagnostic imaging	0.02
Pharmaceuticals	0.26
Dental care	0.04
Dental prostheses	0.04

79. The higher the score the more depth of coverage reported.

4. 1.2 Level of financial protection for health care users

80. This indicator measures the share of health care spending financed by the public sector, social insurance and private insurance in total health care spending. Data used to construct this indicator are based on the SHA database. The sum of the share of current expenditure on health of the government/compulsory ($E_{\text{compulsory}}$) and voluntary financing schemes ($E_{\text{voluntary}}$) is presented on a 0 to 6 range.

$$\text{Actual level of coverage by health insurance} = 6 \times (E_{\text{compulsory}} + E_{\text{voluntary}})$$

81. A high level of financial protection for health care users indicates a low share of out-of-pocket expenditure in total health expenditure²⁰.

4. 1.3 Out-of-pocket payments for curative care

82. This indicator is based on the share of OOP expenditure for inpatient curative care and outpatient curative care in total health expenditure. Data are based on the SHA dataset. The score is based on the weighted average of these shares, the weights be the OECD average share of each function in total inpatient and outpatient spending. The final score was rescaled on a 1 to 6 range.

$$\text{Out - of - pocket payments for curative care} = 6 \times \sum_j w_j S_j$$

where j: 1, 2 (inpatient, outpatient)

S: share of OOP spending over total

w_j = share of expenditure associated with level of care j in total inpatient and outpatient expenditures on average across OECD countries in 2014 (see table 4).

²⁰ Using total OOP payments as a proxy to assess the level of coverage for health care raises a number of problems (Paris *et al.* 2016). However, only a few OECD countries provide data separately on cost sharing on covered goods and services and on OOP payments for non-covered care as the SHA framework allows for.

Table 4 Weights by level of care by survey year

Level of care	Weight (Wj)		
	2008	2012	2016
Inpatient curative care	0.49	0.48	0.49
Outpatient curative care	0.51	0.52	0.51

83. The higher the score the higher the share of health expenditure paid for out-of-pocket by households.

4.1.4 Degree of user choice for basic coverage

84. The score for this indicator is based on responses to the questions on the source of basic health care coverage (single national scheme, local schemes or multiple insurers), on the ability/freedom to choose an insurer and on the market shares covered by the top three and top five insurers. Scores were computed using responses to questions 2, 22 and 23 in 2008, questions 2, 20 and 21 in 2012, and questions 2, 18 and 19 in 2016 following the criteria specified in Table 5 (below).

Table 5 Scoring system for the degree of user choice for basic coverage

	Can people choose?	How many choices?	Share of the basic primary insurance market by the top 3 insurers?	Share of the basic primary insurance market by the top 5 insurers?	Score
A national health system or common health insurance funds					0
Local health systems or health insurers that serve distinct regions					1
Multiple insurers	No				2
	Yes	<=5			3
		>5	>50%		4
			<=50%	>50%	5
			<=50%	<=50%	6

85. The highest score was assigned when there were multiple insurers and individuals had the possibility to choose among more than five insurers. The lowest score was assigned when basic coverage is provided by a national health system.

4.1.5 Levers for the insurance market ²¹

86. This indicator combines information on the scope for insurers to modulate the content of the coverage (benefits, level of the coverage, premiums), the degree of available information on the benefits and premiums to users and information on the existence of risk equalisation schemes. An additive score is assigned as shown in Table 6 below.

Table 6 Scoring system for levers for the insurance market

Question	Description	Score (additive)
Q3	Insurers allowed to modulate benefit basket (marginally or freely)	1.2
Q3	Insurers allowed to modulate level coverage	1.2
Q4	Insurers allowed to modulate premiums	1.2
Q8	Information published on premium/coverage by individual funds	+0.3
	Information published on premium/coverage by private organization/ public authorities	+0.3
	Information published on performance by funds	+0.3
	Information published on performance by private organization/ public authorities	+0.3
Q5	System of risk-equalisation : yes with more than 2 risk factors	1.2
	System of risk-equalisation : yes with 2 or less risk factors	0.6
	System of risk-equalisation : no	0

87. The final score is divided by two if the affiliation to a specific insurance/fund is not a matter of choice (question 2b). A higher score reflects the availability of more levers for competition.

88. Questions used to assign a score to this indicator apply only to those countries featuring multiple insurers/funds. Thus in the bar-chart that shows results for this indicator below, a score of 0 actually means "not applicable".

4.1.6 “Over the basic” coverage

89. In many OECD countries, basic coverage is complemented by other sources of coverage, most often private health insurance offering complementary, supplementary or duplicative coverage on a voluntary basis (Paris *et al.* 2016). It is therefore important to take into account the role of private health insurance as a secondary source of coverage.

90. This indicator is based on the following OECD health data: share of the population covered by private health insurance as a secondary source of coverage; share

²¹ This indicator is not used in the regression analyses.

of private insurance in current health expenditure. The score is assigned in two steps. In the first step, a score is assigned according the criteria shown in Table 7 below. In the second step, the score is weighted by the degree of competition in the private health insurance market as measured by the market share of the top three insurers (Table 8): 0.5, weak; 0.75, intermediate; 1, high.

91. The higher the score the larger the role that a high competitive secondary insurance market plays.

Table 7 Scoring system for "over the basic" coverage

Share of private insurance spending in THE	% of population covered by Duplicate / Complementary/ Supplementary insurance	
	<50%	>=50%
0	0	0
0-5	1	2
5-10	3	4
>=10	5	6

Table 8 Degree of competition in the private health insurance market by country by survey year

Country	Year		
	2008	2012	2016
Australia	Intermediate	Intermediate	Intermediate
Austria	Weak	Weak	Weak
Belgium	Intermediate	Intermediate	Intermediate
Canada	High	High	High
Czech Republic	Weak	Weak	Weak
Denmark	Weak	Intermediate	Intermediate
Finland	Intermediate	Weak	Weak
France	High	High	High
Germany	High	High	High
Greece	Intermediate	Intermediate	Intermediate
Hungary	High	High	High
Iceland	Weak	Weak	Weak
Ireland	Weak	Weak	Weak
Italy	High	High	High
Japan	Weak	Weak	Weak
Korea	Weak	Weak	Weak
Luxembourg	Weak	Weak	Weak
Mexico	Intermediate	Intermediate	Intermediate
Netherlands	Intermediate	High	High
New Zealand	Intermediate	Intermediate	Intermediate
Norway	Weak	Intermediate	Intermediate
Poland	Intermediate	Intermediate	Intermediate
Portugal	Weak	Intermediate	Intermediate
Slovak Republic	Weak	Weak	Weak
Spain	High	High	Intermediate
Sweden	Intermediate	Intermediate	Weak

Switzerland	Intermediate	High	High
Turkey	Intermediate	Intermediate	Intermediate
United Kingdom	Intermediate	Intermediate	Intermediate

4.1.7 Patient choice among providers

92. Promoting competition between health care providers may in principle encourage providers to seek efficiency gains and thus generate savings in the sector. However, economic theory indicates that much depend on the specific features of the competitive environment, including the extent to which providers can compete for patients. Theoretical predictions suggest that a regulatory framework where patients can choose among hospitals that are allowed to compete only through the quality of their services is more conducive to efficiency, and care quality improvements, than systems where hospitals compete both on service quality and prices (Gaynor *et al.* 2013).

93. This indicator is based on responses to questions asking whether individuals are free to choose any doctor or hospital, face incentives to choose a specific doctor or hospital, or have a limited choice. The highest score was assigned when individuals had the possibility to choose any provider, whereas the lowest score was assigned when individuals didn't have the freedom to choose a provider (see Table 9).

94. This score was assigned using responses to questions 39, 43 and 44 in 2008; questions 42a, 43a and 44a in 2012; and questions 38a, 39a and 40a in 2016.

95. A higher score reflects a system with more choice among providers.

Table 9 Scoring system for patient choice

Question	Response	Score (additive)
Choose a primary care physician	Free	2
	Incentives	1
	Limited	0
Choose a specialist	Free	2
	Incentives	1
	Limited	0
Choose a hospital	Free	2
	Incentives	1.33
	Limited but with exceptions (e.g. waiting time)	0.67
	Limited	0

4.1.8 Role of primary care in the health system (gate-keeping)

96. Gate-keeping arrangements are expected to help control outpatient and inpatient costs by requiring primary care physicians to pre-authorise service use by patients, screening out unnecessary services (Docteur and Oxley 2003; OECD 1994). Despite its adoption in many OECD countries, there has been wide variation in the stringency of gate-keeping regulations and incentives across countries, and the evidence on the system-wide cost in individual countries is still limited.

97. This indicator is constructed on the basis of the information on financial incentives provided or obligation that individuals may face when registering with primary care physician, and the incentives or obligation to access secondary care. The score is based on responses provided by countries to questions 40 and 41 in 2008 and 2012; and questions 36 and 37 in 2016 following criteria shown in Table 10.

Table 10 Scoring system for the role of primary care in the health system

		Primary care physicians referral to access secondary care		
		Required	Financial incentives	No requirement, no incentive
Are individuals required or encouraged to register with a primary care physician?	Obligated	6	5	5
	Financial incentives	4	3	3
	No obligation, no incentive	2	1	1

98. The highest score was assigned when individuals were obliged to register with primary care physician and a referral was required to access secondary care. Therefore a higher score reflects a higher level of constraints for individuals.

4.2. Health care delivery systems

4.2.1 Incentives for volume increase in physicians' payment methods

99. Historically, physician payment methods have taken the form of salary arrangements, capitation or fee-for-service (FFS), for all or (more frequently) different combinations of services (Ellis and Miller 2008). Empirical studies have generally supported the theoretical predictions in that FFS may exacerbate supplier-induced demand (Gerdtham and Jönsson 2000; Ellis and Miller 2008) as physicians have full discretion over the level and mix of services they supply, whereas the advantages of a system where doctors are remunerated on a salary basis are known to be easier financial planning and cost control (OECD 1994). The main advantage claimed for capitation is that when it is combined with patient choice of doctor, it motivates doctors to practice in a way that encourages patients to join their list. Meanwhile, funders can control the overall level of expenditure (Or 2001).

100. This indicator was based on responses to questions on primary care physicians and specialists' predominant mode of payment. A score was assigned according to physicians and specialists incentives to generate volumes of services, from 0 (salary) to 6 (fee-for-services) (see Table 11 below). The final score is a simple average of the two sub-scores for primary care physicians and for specialists (which in turn is the mean of outpatient and inpatient predominant mode of payment for specialists). Responses to questions 33 in 2008, questions 33c, 34c and 35c in 2012, and questions 29b, 30c and 31c in 2016 were used to assign scores.

101. The higher the score the stronger the incentive to generate volume.

Table 11 Scoring system for incentives for volume increase in physicians' payment methods

Predominant mode of payment of primary care physicians	Score
Salary	0
Mix of salary and capitation	1
Capitation	2
Mix of fee-for-service and salary	3
Mix of fee-for-service, salary and capitation	4
Mix of fee-for-service and capitation	5
Fee-for-service	6
Predominant mode of payment of specialists	Score
Salary	0
Mix of fee-for-service and salary	3
Fee-for-service	6

4.2.2 Incentives for volume increase in hospitals' payment methods

102. Payment mechanisms to hospitals can be based on characteristics of providers (e.g., line-item budgets), services (in which providers are usually remunerated according to the volume of procedures e.g., FFS) or patients (e.g., variants of diagnosis-related groups, DRGs). Economic theory and empirical studies have suggested that, all else equal, payment schemes based on provider or patient characteristics generally give hospitals stronger incentives to contain spending than payment based on service characteristics (Ellis and Miller 2008).

103. This indicator is based on responses to questions on hospitals' predominant mode of payment - question 37 in 2008, question 31 in 2012 and question 28 in 2016. The score was assigned on the basis of the likely impact of a payment method on volumes of care - the higher the incentive to increase volumes the higher the score (see the table 12 below) – and then rebased to 6.

104. The higher the score the stronger the incentive to generate volume.

Table 12 Scoring system for incentives for volume increase in hospitals' payment methods

Payment method	Score	Rebased score
Line-item budgets	0	0
Per diem	1	1.5
Prospective global budget	2	3
Payment per case (DRG-like)	3	4.5
Payment per procedure or service	4	6

4.2.3 Degree of private provision - physicians

105. This indicator reports information on private provision of primary care and outpatient specialists' services. The indicator is based on responses to questions 27 and 28 in 2008 and 2012, and questions 24 and 25 in 2016. The score was computed as the average of the two sub-scores: private provision of primary care services and private provision of out-patient specialists' services.

106. The highest score was assigned when the predominant provision of primary care and out-patient specialist services was private only (see table 13 below).

Table 13 Scoring system for the degree of private provision

Provision of primary care services	Predominant mode	Second mode	Score
Public health care centres, only	public centres		0
Mix of public and private provision	public centres	private clinics, private group/ solo practice	3
	private/ solo practice	public centres	
Private provision only	private clinics, private group/ solo practice		6
	private clinics, private group/ solo practice	private clinics, private group/ solo practice	
Provision of out-patient specialist services	Predominant mode	Second mode	Score
Public health care centres, only	public centres, public hospitals		0
	public centres, public hospitals	public centres, public hospitals	
Mix of public and private provision	public centres, public hospitals	private clinics, private group/ solo practice, private hospitals	3
	private clinics, private group/ solo practice, private hospitals	public centres, public hospitals	
Private provision only	private clinics, private group/ solo practice, private hospitals		6
	private clinics, private group/ solo practice, private hospitals	private clinics, private group/ solo practice, private hospitals	

4.2.4 Regulation of medical staff in hospitals

107. The indicator is constructed on the basis of responses to questions relating to conditions for recruitment and remuneration of medical staff in hospitals (2008 survey: question 53; 2012 survey: question 36; 2016 survey: question 32). The score for the regulation of medical staff in hospitals was computed as the simple average of sub-scores assigned according to criteria shown in Table 14.

108. A score 0 was assigned when hospital managers have complete autonomy to recruit staff and set remuneration, and the maximum score was assigned when recruitment is decided by central or sub-national governments and pay scales are set or negotiated at the national level.

Table 14 Scoring system for the regulation of medical staff in hospitals

Score	Recruitment of medical staff
0	Hospital managers have complete autonomy
3	Hospitals must negotiate with local authorities
6	Central or sub-national level of government decides
N.A.	Not applicable (physicians are not recruited because they are co-owners of hospitals)
	Remuneration level of medical staff
0	Hospital managers have complete autonomy
6	A pay scale is set or negotiated at the national level
N.A.	Not applicable (physicians are not salaried)

4.2.5 Incentives for health care quality

109. The score for this indicator is assigned on the basis of responses to questions relating to incentives to comply with bonuses for general physicians, specialists and hospitals (2008: question 34, 35 and 38; 2012: questions 37, 38 and 39; 2016: questions 33, 34 and 35) (see table 15 below).

Table 15 Scoring system for incentives for health care quality

Bonus for primary care physicians	
0	No
(Min +2)	Yes, related to:
(+2)	Preventive care
(+2)	Management of chronic disease
(+2)	Patient satisfaction
Bonus for specialists	
0	No
(Min +2)	Yes, related to:
(+2)	Preventive care
(+2)	Management of chronic disease
(+2)	Patient satisfaction
Bonus for hospitals	
0	No
(Min +1.5)	Yes, related to :
(+1.5)	Clinical outcomes
(+1.5)	Use of appropriate processes
(+1.5)	Patient satisfaction
(+1.5)	Patient experience

110. The highest score was assigned when bonuses for physicians – both primary care and specialists - related to preventive care, management of chronic diseases and patient satisfaction were in place, and bonuses for hospitals related to clinical outcomes, use of appropriate processes, patient satisfaction and patient experience were at play. The lowest score was assigned when there were no bonuses for physicians and hospitals. The final score is the simple average of the three providers' scores.

111. A higher score reflects a system with stronger incentives for quality.

4.3. Governance and resource allocation

4.3.1 Definition of the health benefit basket

112. Many governments and other payers use positive and negative lists of therapies to define a basket of benefits covered partially or fully by pooled health funds (Mossialos and Le Grand 1999). In principle, a more generous package of benefits covered by basic health coverage can be expected to result in higher medical expenditures, although much will depend on the type of services included in the package. For instance, encouraging effective preventive and health promotion services through explicit priority setting in public health may lead to lower hospital admission rates and reduced use of expensive therapies in the longer term (Kenkel and Sindelar 2011).

113. This indicator was computed on the basis of how the benefits covered by basic primary health coverage are defined for medical procedures and for pharmaceuticals. Responses to questions 72 in 2008, 79 in 2012 and 61 in 2016 were used to assign a score.

114. The highest score was assigned when the benefit basket was defined at central level by a positive list. If the benefit basket was not considered as the preferred tool for priority setting (benefit basket is not defined), the lowest score was assigned for the indicator (see Table 16). For those countries that chose two responses for medical procedures or pharmaceuticals, the score is the simple average of the scores for those two responses. Scores are then rebased to 6.

Table 16 Scoring system for the definition of the health benefit basket for medical procedures and pharmaceuticals

Medical procedures	Score	Rebased score
Benefit basket is not defined	0	0
Benefit baskets are defined at local level by providers under budget constraints	1	1.2
Benefit baskets defined by health insurance funds by a negative list	2	2.4
Benefit baskets defined by health insurance funds by a positive list	3	3.6
Benefit baskets are defined at central level by health insurance funds by a negative list	4	4.8
Benefit baskets are defined at central level by health insurance funds by a positive list	5	6
Pharmaceuticals	Score	Rebased score
Benefit basket is not defined	0	0
Benefit baskets are defined at local level by providers under budget constraints	1	1.2
Benefit baskets defined by health insurance funds by a negative list	2	2.4
Benefit baskets defined by health insurance funds by a positive list	3	3.6
Benefit baskets are defined at central level by health insurance funds by a negative list	4	4.8
Benefit baskets are defined at central level by health insurance funds by a positive list	5	6

4.3.2 Use of Health Technology Assessments

115. The use of health technology assessments for decision-making and the creation of national agencies dedicated to assess new technologies in countries like Australia, France, Finland, Sweden and the United Kingdom has promoted value for money in public spending on health care through evaluation of the efficacy and cost-effectiveness of health interventions (Mossialos and Le Grand 1999). Although there is scarce empirical evidence on the impact of HTA processes on efficiency and cost-containment in the health sector as a whole, health technology assessment may be expected to generate overall efficiency gains primarily through its use for an evidence-based definition of the package of interventions publicly funded (and their specific reimbursement levels) within the health system. On the other hand, the creation and operation of a health technology assessment body adds another layer of administrative costs to the health sector and may increase expenditure related to the additional use of effective interventions.

116. The score for this indicator was computed on the basis of responses to questions asking about the structure and capacity for health technology assessment; whether cost-effectiveness and affordability were taken into account in HTA; and how the information from HTA was used. Responses provided by countries to question 62 in 2008, questions 80 and 81 in 2012 and questions 62 and 63 in 2016 were used to assign a score.

117. The highest score was assigned when there was a structure and capacity for undertaking HTA, when cost-effectiveness and affordability were taken into account in HTA and when HTA was used to determine coverage and level of reimbursement or price (Table 17).

Table 17 Scoring system for the use of HTA

Structure and capacity for HTA / HTA generally performed	Score (additive)
Yes	+ 2
No	0
Are cost-effectiveness and affordability taken into account ?	
Yes	+ 1
No	0
Medical procedures	
Systematically used/ used in some circumstances: Yes/No	+ 0.75/ 0
Systematically used to determine reimbursement: Yes/No	+ 0.75/ 0
Pharmaceuticals	
Systematically used/ used in some circumstances: Yes/No	+ 0.75/ 0
Systematically used to determine reimbursement: Yes/No	+ 0.75/ 0

4.3.3 Regulation of prices/fees for primary care physicians' services paid by third-party payers

118. In order to stimulate price competition and cost savings, governments have imposed direct price controls in the health sector through, among others, reduced flexibility of fee setting for physician.

119. The score assigned to this indicator is based on responses to question 54 in 2008, question 60 in 2012 and question 51 in 2016. The higher the degree of prices/fees regulation the higher the score assigned (see Table 18).

Table 18 Scoring system for the regulation of prices/fees for primary care physicians' services

Response	Score
Third-party payers are "price takers"	0
Prices/fees are negotiated between individual third-party payers and providers	1
Prices/fees are negotiated between collective third-party payers and providers at central or local level but individual insurers have the ability to negotiate prices for some services	2
Prices/fees are negotiated between collective third-party payers and providers at local level	3
Prices/fees are negotiated between collective third-party payers and providers at central level	4
Prices/fees are set unilaterally by the central government or third party payers	5
Mix of FFS and capitation. Mix of salary and FFS. Mix of salary, FFS and capitation	5.5
Salaries (or capitation formula) are set at central level by the government	6

4.3.4 Regulation of prices/fees for hospitals' services paid by third-party payers

120. This indicator is based on responses to question 56 in 2008, question 64 in 2012 and question 55 in 2016. The higher the degree of prices/fees regulation the higher the score assigned (see Table 19).

Table 19 Scoring system for the regulation of prices for hospitals' services

Response	Score
Third-party payers are "price takers"	0
Prices are always negotiated by individual third-party payers and providers	2
Most of prices are set or negotiated at central or local level, but some prices can be negotiated between individual purchasers and providers	3
Prices/rates are negotiated by collective third-party payers and providers at the local level	4
Prices/rates are negotiated by collective third-party payers and providers at the central level	5
Prices/rates are or budgets set unilaterally by the government	6

Annex C. Scores by indicator by survey year

1.1. Depth of basic coverage

1.2 Level of financial protection for health care users

1.3 Out-of-pocket payments for curative care

1.4 Degree of user choice for basic coverage

1.5 Levers for the insurance market²² ²² A score of "0" actually means "not applicable".

1.6 "Over the basic" coverage

1.7 Patient choice among providers

1.8 Role of primary care in the health system (gate-keeping)

2.1 Incentives for volume increase in physicians' payment methods

2.2 Incentives for volume increase in hospitals' payment methods

2.3 Degree of private provision - physicians

2.4 Regulation of medical staff in hospitals

2.5 Incentives for health care quality

3.1 Definition of the health benefit basket

3.2 Use of Health Technology Assessment

3.3 Regulation of prices/fees for primary care physicians' services paid by third-party payers

3.4 Regulation of prices/fees for hospitals' services paid by third-party payers

Table 20 Overview of scores by country by indicator

Country	Year	1.1 Depth of basic coverage	1.2 Level of financial protection for health care users	1.3 OOP payments for curative care	1.4 Degree of user choice for basic coverage	1.5 Levers for the insurance market	1.6 "Over the basic" coverage	1.7 Patient choice among providers	1.8 Role of primary care in the health system (gate- keeping)
Australia	2008	5.52	4.86	0.81	0	..	2.25	5.33	2
	2012	5.76	4.80	0.85	0	..	3	6	4
	2016	5.52	4.83	0.83	0	..	3	6	2
Austria	2008	6	4.95	0.97	2	0.6	0.5	2.67	0
	2012	6	4.93	0.95	2	1.5	0.5	4	0
	2016	6	4.92	0.92	2	0.9	0.5	4	0
Belgium	2008	6	4.89	1.21	0	0	1.5	5	3
	2012	6	4.92	1.32	2	1.35	1.5	4	3
	2016	6	4.95	1.28	4	2.7	1.5	6	3
Canada	2008	5.52	5.08	0.57	1	..	6	4.67	4
	2012	5.52	5.13	0.49	1	..	6	2.67	2
	2016	5.52	5.11	0.46	1	..	6	2.67	..
Chile	2012	3.96	3.97	..	4	2.4	3.75	2.67	6
	2016	3.96	4.05	..	4	2.4	2.25	2.67	6
Czech Republic	2008	6	5.03	0.65	4	2.1	0.5	6	0
	2012	6	5.08	0.59	4	1.8	0.5	6	5
	2016	6	5.18	0.62	4	1.8	0.5	6	0
Denmark	2008	5.76	5.15	0.73	1	..	0.5	2	6
	2012	5.52	5.15	0.68	0	..	0.75	4	6
	2016	5.52	5.18	0.70	0	..	0.75	3.33	3
Estonia	2012	..	4.71	0.95	..	..	0.5	..	..
	2016	5.52	4.66	1.02	0	..	0.5	4.33	6
Finland	2008	6	4.83	0.74	1	..	0.75	0	4
	2012	6	4.88	0.72	0	..	0.5	0.67	6
	2016	6	4.81	0.71	0	..	0.5	0.67	6
France	2008	6	5.53	0.56	2	0.3	6	6	3
	2012	6	5.56	0.54	2	..	6	4.33	3
	2016	6	5.59	0.50	0	0	6	4.33	3
Germany	2008	6	5.16	0.60	6	4.8	3	5.33	3
	2012	6	5.16	0.60	6	4.2	1	5.33	0
	2016	6	5.26	0.49	6	3.6	1	5.33	3
Greece	2008	6	3.64	..	2	1.8	0.75	3.33	0
	2012	6	4.16	2.36	0	..	0.75	1.33	0
	2016	6	3.78	2.48	0	..	0.75	3.33	0
Hungary	2008	6	4.42	1.49	0	..	1	6	5
	2012	6	4.24	1.65	0	..	1	2.67	..
Iceland	2008	6	5.04	1.04	0	..	..	6	0
	2012	5.52	4.92	1.06	0	..	..	..	0
	2016	5.52	5.02	1.08	0	..	..	4	0
Ireland	2008	4.74	5.29	..	0	..	..	6	2
	2012	4.74	5.32	..	0	..	..	6	6

	2016	4.74	5.32	0.93	0	0	2.5	6	6
Israel	2012	5.52	4.52	0.98	3	3.6	3	5.33	0
	2016	..	4.44	..	3	2.4	..	4.67	0
Italy	2008	5.76	4.72	..	0	..	1	6	6
	2012	5.52	4.70	..	0	..	1	..	6
	2016	5.52	4.64	1.13	0	..	1	4	6
Japan	2008	6	5.09	0.67	2	2.1	0.5	6	0
	2012	6	5.22	0.58	2	0.9	0.5	6	0
	2016	6	5.21	0.57	2	0.9	0.5	6	0
Republic of Korea	2008	5.76	3.66	2.30	0	..	0.5	5	0
	2012	5.76	3.73	2.19	0	..	1.5	4.33	0
Luxembourg	2008	6	5.40	0.48	0	..	1	6	0
	2012	6	5.37	0.59	0	..	2	6	0
	2016	6	5.39	0.57	0	..	1.5	6	0
Mexico	2008	5.76	3.08	1.47	2	1.2	0.75	0	4
	2012	5.28	3.44	1.17	2	1.2	0.75	0	1
	2016	5.28	3.52	1.10	2	3	2.25	0	1
Netherlands	2008	5.76	5.36	0.30	4	4.8	3	5	6
	2012	5.76	5.38	0.27	4	3.6	4	4.33	6
	2016	5.76	5.27	0.26	4	3.6	4	4.33	2
Norway	2008	5.52	5.06	1.15	1	..	2.5	6	6
	2012	5.52	5.11	0.95	0	..	3.75	4.67	3
	2016	5.52	5.13	0.91	0	..	3.75	6	3
New Zealand	2008	5.52	5.19	..	0	..	0.75	2	5
	2012	4.74	5.24	..	0	..	0.75	2.67	4
Poland	2008	6	4.53	1.07	0	..	0.75	6	4
	2012	6	4.54	1.01	0	..	0.75	6	4
	2016	6	4.60	0.86	0	..	0.75	6	2
Portugal	2008	6	4.45	1.16	0	..	0.5	0.67	6
	2012	5.52	4.31	1.36	0	..	2.25	0.67	6
	2016	5.52	4.36	1.30	0	..	2.25	0.67	6
Slovak Republic	2008	6	4.74	0.73	1	..	2.5	6	6
	2012	..	4.61	0.79	..	..	2.5	..	..
Slovenia	2012	6	5.25	0.61	..	..	3	6	6
	2016	6	5.25	0.62	0	..	2.5	6	6
Spain	2008	5.76	4.74	1.07	1	..	3	0.67	6
	2012	5.52	4.63	1.09	0	..	3	0.67	6
	2016	5.52	4.55	1.15	0	..	2.25	0.67	6
Sweden	2008	6	4.98	0.79	0	..	0.75	6	0
	2012	6	5.08	0.78	0	..	0.75	4	6
	2016	..	5.10	0.77	1	..	0.5	6	2
Switzerland	2008	5.52	4.51	1.46	6	3.6	2.25	4.67	3
	2012	5.52	4.34	1.62	6	4.2	3	3.33	3
	2016	5.52	4.28	1.57	6	4.8	3	3.33	3
Turkey	2008	6	4.85	..	0	..	3.75	6	0
	2012	6	5.04	..	0	..	3.75	3.33	5

	2016	6	4.98	..	0	..	3.75	3.33	5
United Kingdom	2008	6	5.42	..	0	..	0.75	4	5
	2012	6	5.36	..	0	..	0.75	4	2
	2016	5.76	5.11	0.31	0	..	0.75	4	2

Country	Year	2.1 Incentives for volume increase in physicians' payment methods	2.2 Incentives for volume increase in hospitals' payment methods	2.3 Degree of private provision - physicians	2.4 Regulation of medical staff in hospitals	2.5 Incentives for health care quality	3.1 Definition of health benefit basket	3.2 Use of HTA	3.3 Regulation of prices/fees for primary care physicians' services	3.4 Regulation of prices/fees for hospital services
Australia	2008	4.5	3	4.5	0	1.33	6	6	5	2
	2012	5.25	4.5	6	4.5	1.33	6	6	4	6
	2016	5.25	4.5	6	3	1.33	6	6	5	6
Austria	2008	4	4.5	4.5	3	0	3	4.5	3	4
	2012	4.5	4.5	4.5	3	0	6	4.5	3	6
	2016	4.5	4.5	4.5	4.5	0	6	4.5	3	6
Belgium	2008	6	6	6	3	1.83	6	5.25	4	5
	2012	6	4.5	6	..	0	6	4.5	4	6
	2016	6	4.5	6	..	0	6	4.5	4	6
Canada	2008	6	3	4.5	4.5	0	1.8	4.5	3	4
	2012	5	3	4.5	3	0	4.8	5.25	3	..
	2016	5	3	4.5	3	1.33	4.8	4.5	3	..
Chile	2012	0	3	3	6	4.33	6	4.5	6	5
	2016	0	3	3	6	4.33	6	4.5	6	5
Czech Republic	2008	3.25	3	4.5	0	1.33	5.4	0	4	3
	2012	3.5	3	6	3	1.33	5.4	2.75	4	6
	2016	4	4.5	6	3	1.33	5.4	2.75	5.5	6
Denmark	2008	2.5	3	6	3	0	3	6	4	4
	2012	2	3	4.5	3	0	3	3.5	3	..
	2016	2	3	4.5	3	1.5	3.6	3.5	5.5	..
Estonia	2012	5.5	4.5	3	..	..	..	0	..	..
	2016	5.5	4.5	3	3	1.33	6	4.5	5.5	6
Finland	2008	2	4.5	3	3	0	3	4.5	6	4
	2012	0	4.5	0	3	0	3	4.5	6	4
	2016	0	4.5	0	6	0	6	4.5	6	6
France	2008	4.5	4.5	6	6	0	6	5	4	5
	2012	2	4.5	6	3	2.67	6	5.25	4	5
	2016	3.5	4.5	6	3	3.67	6	5.25	4	6
Germany	2008	4.5	4.5	6	0	0	4.8	0	3	4
	2012	4.5	4.5	6	3	0	0	0	..	4
	2016	6	4.5	6	..	0	2.4	3.5	4	..
Greece	2008	0.75	1.5	4.5	6	0	1.8	0	4	5
	2012	3	4.5	4.5	6	0	6	4.5	4	6
	2016	1.5	4.5	4.5	6	0	6	4.5	5.5	6

Hungary	2008	1	4.5	4.5	3	0.67	3	4.5	5	6
	2012	1	4.5	1.5	3	1.33	3	5.25	6	5
Iceland	2008	1.5	3	3	0	0	3.6	2.75	4	6
	2012	1.5	3	3	3	0	5.4	1.5	4	..
	2016	1.5	3	3	3	0	5.4	4.5	..	..
Ireland	2008	2.5	3	3	6	0	3	3.75	5	6
	2012	..	3	4.5	6	0	3	5.25	6	..
	2016	..	3	4.5	6	0	3	5.25	6	..
Israel	2012	0	4	0	3	0	6	5.25	6	..
	2016	0	4	1.5	3	0	6	4.5	6	2
Italy	2008	1	4.5	0	6	1.33	6	2	3	4
	2012	1	3	0	6	0	6	4.5	4	4
	2016	1	4.5	0	4.5	0	6	4.5	4	4
Japan	2008	6	6	6	0	3.17	6	6	4	5
	2012	6	4.5	..	..	3	6	4.25	4	5
	2016	6	6	..	..	3	6	4.5	4	5
Republic of Korea	2008	4.5	6	6	0	0	6	5.25	4	6
	2012	3	6	6	4.5	0.67	5.4	5.25	4	5
Luxembourg	2008	6	3	6	0	0.5	6	0	4	2
	2012	6	3	6	0	0.67	6	1.5	5	..
	2016	6	3	6	0	1	6	4.5	5	5
Mexico	2008	0	3	3	6	0	6	5.25	4	6
	2012	0	3	1.5	4.5	2	6	4.5	..	..
	2016	..	3	3	6	2	6	4.5	..	..
Netherlands	2008	5.5	3	6	0	0	6	6	2	3
	2012	5.5	4.5	6	3	2	6	4.5	5.5	2
	2016	5.5	4.5	6	3	2	1.8	4.5	5.5	2
Norway	2008	3.25	3	6	3	0	3	4.5	4	4
	2012	2.5	3	3	3	0	3	5.25	4	4
	2016	2.5	3	3	3	1.33	3	5.25	4	6
New Zealand	2008	3	3	3	3	1.33	3	5.25	4	4
	2012	..	3	6	3	1.33	3.6	5.25	5.5	..
Poland	2008	4	4.5	4.5	0	2.67	6	5.25	6	5
	2012	..	4.5	1.5	0	0	6	4.25	6	4
	2016	..	4.5	0	0	1.83	6	5.25	6	6
Portugal	2008	0	3	0	3	1.33	3	4.5	4	6
	2012	0	3	0	4.5	2	3	2	6	..
	2016	0.75	3	0	6	2.5	3	2	..	6
Slovak Republic	2008	1	4.5	4.5	0	2.67	6	0	6	2
	2012	..	..	..	..	..	0	..	..	..
Slovenia	2012	0	4.5	1.5	3	0	5.4	4.5	6	..
	2016	0	4.5	3	3	0	3	4.5	6	..
Spain	2008	0.5	0	0	6	2	6	4.5	4	4
	2012	2	3	0	6	3.67	6	3.5	3	..
	2016	2	3	3	6	4	6	4.5	..	..
Sweden	2008	0	3	0	0	0.98	3	4.5	4	4

	2012	0	3	3	0	2	3	4.25	4	..
	2016	0	3	3	3	2	3	5.25	..	..
Switzerland	2008	6	3	6	0	0	5.4	4.5	3	4
	2012	4.5	4.5	4.5	0	0	6	4.5	4	2
	2016	5.25	4.5	4.5	0	0	6	4.5	3	2
Turkey	2008	3	0	0	6	1.83	3	0	4	6
	2012	3	3	1.5	6	0	6	3.5	..	..
	2016	3	3	1.5	6	0	6	3.5	..	..
United Kingdom	2008	2	4.5	3	3	5.33	4.8	3.75	4	5
	2012	2	4.5	0	3	4.17	3.6	3.5	4	6
	2016	2	4.5	0	3	4.83	3.6	3.5	4	6

Annex D. Robustness of baseline estimates to total health spending

Table 21 Results for the effect of policies and institutions on public and total spending on health care

Dependent variable:		LOG PUBLIC SPENDING ON HEALTH CARE	LOG TOTAL SPENDING ON HEALTH CARE
		(1)	(2)
CORE DETERMINANTS			
	Log of share of old-age population	0.205**	0.080
		(0.09)	(0.09)
	Log of GDP per capita	0.813***	0.631***
		(0.08)	(0.07)
POLICIES AND INSTITUTIONS			
Health financing and coverage arrangements	Depth of basic coverage	-0.143***	-0.097**
		(0.04)	(0.04)
	Level of financial protection for health care users	-0.243***	-0.057
		(0.09)	(0.11)
	Out-of-pocket payments for curative care	-0.201**	0.072
		(0.08)	(0.10)
	Degree of user choice for basic coverage	0.121***	-0.075
		(0.04)	(0.05)
	"Over the basic" coverage	-0.147***	-0.143***
		(0.04)	(0.04)
	Patient choice among providers	0.128***	0.133***
		(0.05)	(0.05)
	Role of primary care (gate-keeping)	0.077	-0.105
		(0.05)	(0.06)
Health care delivery systems	Incentives for volume increase in physicians' payment methods	0.043	0.208**
		(0.07)	(0.09)
	Incentives for volume increase in hospitals' payment methods	0.145***	0.048
		(0.05)	(0.04)
	Degree of private provision of physicians services	0.087**	0.064

		(0.04)	(0.05)
	Regulation of medical staff in hospitals	0.078	0.124**
		(0.05)	(0.05)
	Incentives for health care quality	0.198***	0.280***
		(0.04)	(0.04)
Governance and resource allocation	Definition of health benefits basket	-0.060	-0.120***
		(0.04)	(0.04)
	Use of HTA	0.177***	0.019
		(0.04)	(0.04)
	Regulation of prices/fees for primary care physicians' services paid by third-party payers	-0.139***	0.034
		(0.05)	(0.05)
	Regulation of prices/fees for hospitals' services paid by third-party payers	-0.136***	-0.230***
		(0.05)	(0.06)
	Country dummies	Yes	Yes
	Time dummies	Yes	Yes
	N	410	410

Note: robust standard errors in parentheses.

***Indicates statistical significance at the 1% level.

**Indicates statistical significance at the 5% level.

*Indicates statistical significance at the 10% level.

121. When the dependent variable is total rather than public spending on health care, the share of old age population shifts to a non-significant coefficient, which is in line with expectations as health care goods and services provided to old age citizens are often covered by publicly-funded benefit packages.

122. Furthermore, when the dependent variable changes, several effects of policies and institutions that were found to be large in magnitude are preserved: a negative coefficient on *depth of basic coverage*, *"over the basic" coverage*, and a positive coefficient on *incentives for health care quality*. A positive and significant coefficient for *Incentives for volume increase in physicians' payment methods* is consistent with the rise in the volume of services provided that – in turn – may increase private spending (as reflected in column 2). A more generous *health benefit basket* is associated with lower total health spending (column 2), which is plausible when benefit baskets include preventive services. As expected, the use of HTA shifts to a non-significant coefficient for total health spending as this clearly represents a public sector investment. Also in line with expectations, the coefficient of *OOP payments for curative care* shift to a positive sign, even if non-significant.

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