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Macro-Fiscal Implications of Health Care Reform in Advanced and Emerging Economies

Prepared by the Fiscal Affairs Department[1]

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Contents Page

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EXECUTIVE SUMMARY

The issue of health care reform is a difficult one, **involving complex trade-offs between policy goals (such as ensuring access and consistency with overall fiscal constraints).** Preferences over the role of the state in the provision and financing of health care services vary significantly across countries. Many of these issues go beyond the scope of this paper, which focuses on the macro-fiscal implications of health care reform. Health care reform is critical for fiscal sustainability, given the magnitude of the spending increases in this area: since 1970, public health care spending has risen from 3 to 7 percent of GDP in the advanced economies, by far the most important driver of total public spending increases. In this context, this paper: (i) presents new projections for public health care spending in advanced and emerging economies, and (ii) discusses options to contain spending in an efficient and equitable manner.

At the core of the analysis are improved projections for health care spending trends that better take into account the features of the health care system in each country, as well as pressures arising from technological progress and aging. In the advanced economies, public health care spending is projected to rise by an additional 3 percentage points of GDP over the next 20 years and by 6½ percentage points over the next 40 years. In net present value terms, these spending increases would be close to 100 percent of GDP. In emerging economies, where fiscal pressures are less severe, public health outlays are projected to rise by 1 percentage point of GDP, but are more sizable in certain regions (such as Europe and Latin America).

As highlighted in recent Board papers, stabilizing age-related public spending in relation to GDP, including containing the growth in public health spending, could constitute an important pillar of the fiscal consolidation strategy required to reduce the high public debt ratios accumulated in many countries in the wake of the global financial crisis. Is this feasible, or would some countries have to cut spending even more in other areas to make room for increased health care spending? To some extent, this is a matter of public preference, but efficiency-improving reforms can help; indeed, while spending increases were large almost everywhere, some countries were more successful than others in containing spending. Past experience points to the importance of four major policy options to contain spending in advanced countries in an efficient and equitable manner. First, budget caps and central oversight of budget allocations: among the countries with the lowest public spending increases, Italy, Japan, and Sweden have a greater reliance on budget caps. Second, reforms that strengthen the role of market mechanisms by introducing competition and choice: Germany and Japan score relatively high in this regard and are among the countries with the lowest spending growth in the past. Third, strong incentives for the provision of cost-effective health care: this includes the introduction of case-based payment systems which have been used with relative success in Germany and Italy. Fourth, greater reliance on private financing: Australia, Canada, and France rely significantly on private insurance for services not covered by the public package. It is estimated that enhancing these health system

features in countries currently lagging behind could reduce the projected increase in the public spending-to-GDP ratios, but at least in some countries, savings may not be large enough to avoid still sizable increases in health care spending to GDP ratios. If so, even deeper cuts in other spending areas or additional revenue increases may be needed to support fiscal adjustment. In implementing health reforms, basic health services for the poor should be maintained because they are targeted and effective, serving both equity and efficiency objectives of public policy.

The challenges facing emerging economies differ across regions. In emerging Europe, more limited fiscal space means that these countries will need to rely on efficiency enhancing reforms to improve health outcomes, such as those that strengthen incentives for cost-effective medical care. Emerging economies in Latin America, and especially Asia, have lower coverage levels and more scope to expand spending. In order to maintain fiscal sustainability, it is essential to restrict the benefit package to the most essential health services, until the capacity to finance higher public health spending increases. Thailand and Chile have successfully expanded basic coverage at a low fiscal cost and provide valuable lessons for other countries. There is scope in emerging economies for reforms that provide greater financial incentives for the provision of cost-effective health care—such as primary and preventive care—and to shift the composition of spending toward the prevention of infectious diseases and to activities that benefit poorer rural areas.

I. INTRODUCTION

1. **Health care reform will be a key fiscal policy challenge in coming years.** In the advanced economies, public health spending has risen by about 4 percentage points of GDP since 1970, about half the overall increase in non-interest (that is primary) public spending. These spending pressures are expected to intensify over the next two decades, particularly if technological advances and other non-demographic factors continue to drive up costs. Over the longer term, the challenge is even more severe, as the net present value of these spending increases over 2011–50 is close to 100 percent of today's GDP. In the emerging economies, health care reform is also important, given their substantially lower health indicators relative to the advanced economies and limited fiscal resources.

2. **These increases will occur at a time when countries need to undertake large fiscal adjustments to reduce public debt ratios in the wake of the global financial crisis (IMF, 2010a).** To lower the general government debt-to-GDP ratio to 60 percent by 2030, advanced economies would have to improve their cyclically adjusted primary balance by some 8 percentage points of GDP, on average, during 2011–30 (IMF, 2010c).[2] This will require both revenue increases and expenditure reductions in many countries. On the expenditure side, stabilizing age-related spending to GDP ratios, including on health by containing its growth, could constitute an important pillar of this strategy in advanced economies (IMF, 2010a). In some emerging economies, the challenge ahead is to expand basic coverage to a larger share of the population in a fiscally sustainable manner while avoiding the inefficiencies and resulting high costs of the health systems of advanced economies; in others, where coverage is already extensive, the challenge is to enhance the efficiency of public spending and limit its increase as a share of GDP.

3. **Health care reform is among the most complex areas of public policy.** The pervasiveness of market failures in the health sector, and a desire to ensure that access to basic health care reflects need and not ability to pay, have motivated extensive government involvement in this sector in advanced and emerging economies (Musgrove, 1996). However, the nature of government intervention (e.g., mandates, regulations, provision, and financing) has varied substantially across countries and over time, as has the level of public health spending. These differing approaches to providing and financing health care, and the resulting differences in the level of public health spending across countries, reflect differences in country preferences and constraints. Therefore, there is no unique "optimal" level of public health spending that can provide a benchmark for comparing countries. Countries may place different weights on equality of access, face differing fiscal constraints, or attach different weights to health spending as opposed to other uses of public funds. Yet, there is a need to ensure that whatever "model" for health care is adopted, public health care services are provided in an efficient way.

[2]See November 2010 *Fiscal Monitor* (IMF, 2010c, p. 47 and Appendix Table 1).

4. **In this context, the focus of this paper is on identifying differences in public health spending pressures across countries and providing options to contain these pressures through efficiency gains.** Country experiences in containing public health spending vary widely, and several questions remain. These include:

- **What are the trends in spending in different time periods and country groups?** What has influenced these trends? How much does population aging account for the increase in spending?

- **What is the outlook for public health spending over the next 20 years?** Given differing degrees of success in controlling the growth of public health spending, which countries face the largest public health spending pressures?

- **What reforms could advanced countries consider to control the growth of public health spending in an efficient and equitable manner?** What are the potential savings that could be realized with different reforms? What needs to be done to ensure that health reforms do not conflict with goals for ensuring equitable access to health care?

- **How can emerging economies expand health coverage and improve health outcomes without incurring high fiscal costs?**

5. **This paper addresses these questions and makes several contributions to the literature.** It provides an analysis of the developments in public health spending over the past 40 years, as well as projections of public health spending for 50 advanced and emerging countries over 2011–50. The projections for advanced economies improve upon existing studies by using country-specific estimates. The paper also quantifies the effects of specific health reforms on the growth of public health spending by drawing on a range of analytical approaches, including country case studies.

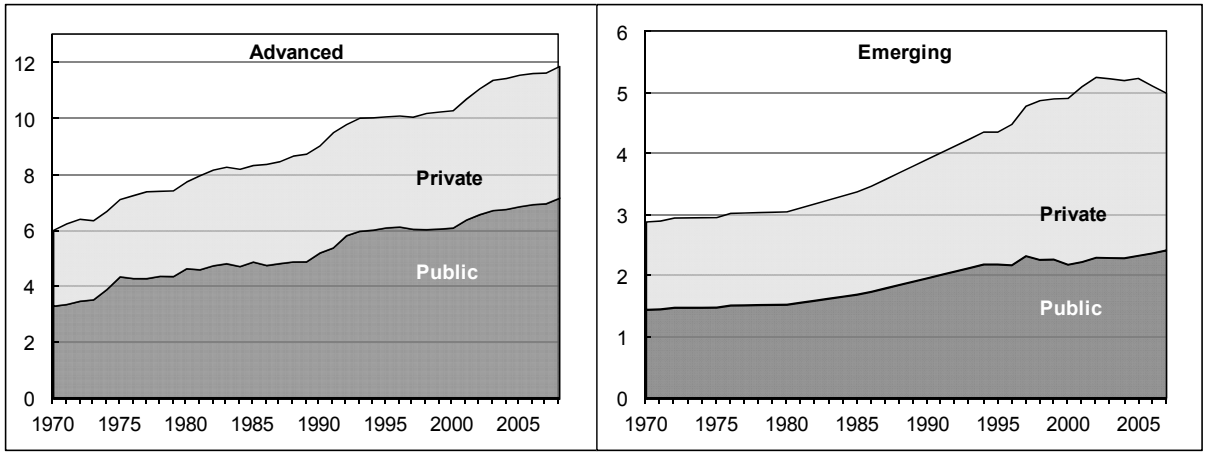
6. **The rest of the paper is structured as follows.** Section II evaluates the factors behind the past growth of health care spending in advanced and emerging economies, and updates projections for the next 20 years. Section III provides an assessment of the potential impact of a range of reforms on spending growth. Section IV analyzes public health spending in emerging economies. Section V provides issues for discussion.

II. Evolution of Public Health Expenditures

A. Trends in Public Health Expenditures

7. **Total health expenditures have risen sharply in recent decades, particularly in advanced economies (Figure 1).**[3] Since 1970, real per capita total health spending has increased fourfold in advanced economies, while spending as a share of GDP has increased from 6 percent to almost 12 percent.[4] Two-thirds of this increase was due to greater public health spending, with its share of total health spending rising from 55 percent to 60 percent. In the emerging economies, the increase in total health spending has been more moderate over the same period—from below 3 percent of GDP to about 5 percent—and public spending on health has increased from around 1½ to 2½ percent of GDP, about the same as the increase in private spending.

Figure 1. Total, Private, and Public Health Expenditures, 1970–2008
(Percent of GDP)



Sources: OECD Health Database, WHO, Sivard (1974–96), and IMF staff estimates.

Note: Average spending is weighted on the basis of GDP at Purchasing Power Parity. For advanced economies without 2008 data (five countries), 2006 or 2007 data were used. The final year for spending data for the emerging economies is 2007.

[3]The advanced economies in this study comprise some 27 countries: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, the United Kingdom, and the United States. The 23 emerging economies are Argentina, Brazil, Bulgaria, Chile, China, Estonia, Hungary, India, Indonesia, Latvia, Lithuania, Malaysia, Mexico, Pakistan, Philippines, Poland, Romania, Russia, Saudi Arabia, South Africa, Thailand, Turkey, and Ukraine.

[4]All country group averages are weighted on the basis of GDP at Purchasing Power Parity, unless otherwise noted. The public health spending data have been adjusted for structural breaks to ensure comparability over time (See Appendix I).

8. **Public health spending in advanced countries has been characterized by short periods of accelerated growth followed by periods of cost containment** (Figure 1). The rapid increase in spending during 1971–75 (1 percentage point of GDP) reflected the expansion of health insurance coverage in most countries. This was followed by a longer period of relative cost control as many countries introduced health reforms as part of broader fiscal consolidation efforts. Public health spending increased by less than 1 percentage point of GDP over the 15-year period from 1975 to 1990. Expenditures again began to accelerate in the early 1990s, before another period of containment in the second half of the decade. The slowdown in spending growth reflected reforms in both the United States and Europe as part of a broader restraint of total government spending. The growth of public health spending picked up after 2000, with outlays rising one percentage point (to 7 percent of GDP) by 2008. This is reflected in a more widespread increase in government spending over the 2000–08 period of 2 percentage points of GDP, after a period of spending containment in the 1990s (IMF, 2010a).

9. **The literature has identified income, aging, technology, and health policies as the key factors behind rising public spending-to-GDP ratios.** On the demand side, health care spending tends to rise as a share of GDP as countries develop. In addition, elderly people consume on average more health services than their younger counterparts. On the supply side, technological change has expanded the scope of what is medically possible by improving treatments and diagnostics. This has increased the cost of medical services, reflecting improvements in quality (e.g., the diffusion of angioplasty or the use of MRIs instead of x-rays). Additionally, health costs have been driven upward by the relatively low productivity growth of services relative to other sectors of the economy (the so-called Baumol effect).[5] Among these drivers, non-demographic factors dominate. On average, approximately one-fourth of the increase in public spending-to-GDP ratios is explained by changes in the age distribution of the population ("aging"). The rest—known as excess cost growth (ECG)—is attributable to the combined effect of non-demographic factors including rising incomes, technological advances, the Baumol effect, and health policies and institutions.[6] Of course, positive ECG should not be interpreted to mean that the costs of public spending have exceeded its benefits, because technological advancements—the main driver of higher health care costs—have yielded enormous improvements in health status and

[5]The Baumol effect refers to the rising unit labor costs in sectors where it is difficult to achieve productivity gains, usually in services. Because salaries rise in these sectors in line with economy-wide averages, while productivity does not, unit labor costs rise in relative terms. For evidence of the Baumol effect in health spending, see Pomp and Vujic (2008).

[6]The precise breakdown of the role of these different factors in driving health spending has varied across studies, as very few consider all of these factors simultaneously. The literature has primarily focused on the drivers of total health spending, rather than public health outlays. In Smith, Newhouse, and Freeland (2009), the residual for technological advances explains between one-third and one-half of the increase in total health spending over 1960–2007 for the United States, depending on assumptions about income elasticity and medical care productivity. The remainder is due to changes in income, the Baumol effect, the rise of insurance coverage, and demographics.

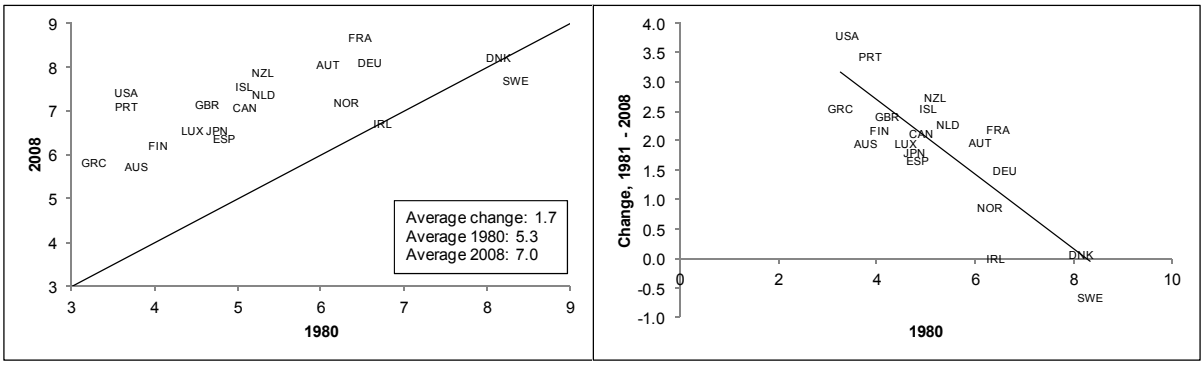
well-being (Cutler and McClellan, 2001). In any case, the benefits of higher health spending would also need to be weighted off against their costs, which is a task that is beyond the scope of this paper.

10. **The magnitude of increases in the ratio of public health spending to GDP has varied substantially across countries over the last three decades and has led to some convergence in this ratio.** Public spending as a share of GDP increased in virtually all advanced countries over the last three decades (Figure 2). In 1980, the gap between the lowest spending country (Greece) and the highest spending country (Sweden) was 5 percentage points of GDP. By 2008, spending ranged from 5½ percent of GDP (Australia) to 8.7 percent (France)—a markedly lower spread than in 1980. On average, spending increased more rapidly in countries with low initial spending ratios (the correlation coefficient between increases in the spending ratio and the initial ratio is -0.8; Figure 2, right panel). The biggest increases occurred in the United States (3.8 percentage points), Portugal (3.4 percentage points), and New Zealand (2.7 percentage points); while the lowest increases were in Sweden (-0.7 percentage points), Ireland (zero percentage points), and Denmark (0.1 percentage points). Since 2000, 11 countries have experienced an increase in their public health spending ratio by 1 percentage point or greater—Canada, Denmark, Finland, Greece, Ireland, Italy, the Netherlands, New Zealand, Luxembourg, the United Kingdom, and the United States (Appendix Figure 1). The countries with the smallest increases (0.2 percentage point of GDP or less) were the Czech Republic, Germany, and Norway.

11. **What explains the convergence in spending ratios?** The low correlation between initial per capita GDP in 1980 and the increase in spending ratios over 1980–2008 indicates that income convergence was not a key factor. Furthermore, changes in relative age structures have been slow and are also unlikely to explain this convergence. Indeed, controlling for income and demographics, regression analysis indicates significantly higher spending growth for countries with below-mean spending to GDP ratios. This suggests that convergence was driven by "imitation" effects, borrowing from other countries some features of the public health system that appeared appealing. This led, for example, to the provision of health services previously not covered. Of course, this required changes in health institutions and policies, including factors that determine the diffusion of technology. This raises the question of whether the rates of increase in spending observed during the convergence period will continue in the future (see Box 1).

Figure 2. Public Health Spending in Advanced Economies, 1980–2008

(Percent of GDP)



Sources: OECD Health Database and IMF staff estimates.

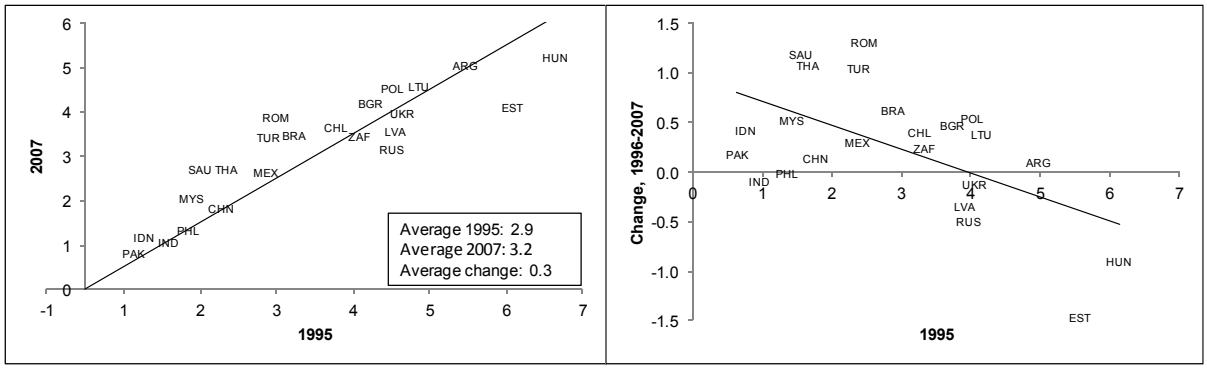
Note: The figures and averages exclude Korea, where spending as a share of GDP increased from 0.8 percent in 1980 to 3.6 percent in 2008. Data for 2008 refer to 2008 or latest year available. Averages are unweighted.

12. **Spending levels and increases have been substantially lower in all the emerging economies.** During 1971–95, public health spending increased by ½ percentage point of GDP, to 2 percent. Spending accelerated after that with an additional ½ percentage point of GDP in the following decade.[7] Public spending ratios are substantially higher in emerging Europe and Latin America than emerging Asia with no evidence of convergence in ratios across emerging economies over time (Figure 3). Since 1995, the largest increases in spending have been in Romania, Saudi Arabia, Thailand, and Turkey (1–1½ percentage points of GDP), while spending ratios have fallen in Estonia, Hungary, India, Latvia, Russia, and Ukraine. Since 2000—when average public health spending to GDP ratios started to rise—only six countries have had increases of more than ½ percentage point (Brazil, Bulgaria, Chile, Poland, Thailand, and Ukraine—see Appendix Figure 2).

[7] Public health spending in low-income countries, at 2 percent of GDP, is broadly similar to that in emerging economies.

Figure 3. Public Health Spending in Emerging Economies, 1995–2007

(Percent of GDP)



Sources: WHO and IMF staff estimates.

Note: Averages are unweighted.

13. **The modest increases in public health spending to GDP ratios reflect the low priority given this sector against other needs**. Public health spending has remained at low levels, even in countries where the constraints to higher spending—such as revenue to GDP ratios—have eased. For example, between 2000 and 2007, revenue to GDP ratios have risen in emerging economies in the sample (excluding Turkey) by 3½ percentage points of GDP, while public health outlays rose by about ½ percentage point. Developing economies have allocated half as much spending to health as to education during 1987–2007 (Arze del Granado, Gupta, and Hajdenberg, 2010). In contrast, the shares have been approximately equal in advanced economies. Demand-side factors have also kept total and public health spending low, including lower per capita incomes and differences in demographics, such as lower age-dependency ratios. Additionally, many emerging economies have not yet completed the shift in disease pattern—from infectious to chronic diseases such as cancer, diabetes, and heart disease—that typically occurs with economic development and raises health care costs.

14. **Health outcomes vary widely in both advanced and emerging economies.** In advanced economies, life expectancy (at birth) averages about 80 years, but ranges from a low of 74 years in the Slovak Republic to 83 years in Japan (Joumard, Andre, and Nicq, 2010). The ranking of advanced countries on other health indicators related to longevity such as life expectancy at age 65 and health-adjusted life expectancy is similar to that for life expectancy at birth. Infant mortality rates also vary, ranging from a low of three deaths per thousand or less in Iceland, Luxembourg, and Sweden to more than five in Canada, the Slovak Republic, and the United States. At 71 years, average life expectancy in emerging economies is about nine years less than in advanced economies. Within the emerging economies, both life expectancy and infant mortality rates are more favorable in emerging Europe, on average, than in other regions. Life expectancy ranges from 52 years in South Africa to 79 years in Chile.

15. **Inefficiencies in public health spending are large.** While higher spending can help, improving the efficiency of these outlays is even more critical for improving health outcomes. This can be illustrated by examining the gains from reducing the "efficiency gap" for countries. This provides an estimate of the difference between the life expectancy they achieve—taking account also of the effects of socio-economic and lifestyle factors—and that of the best-performing country at similar levels of spending.[8,9] Cutting the efficiency gap of OECD countries in half, for example, would increase life expectancy by over one year. Achieving this through higher spending, in contrast, would require an increase of over 30 percent. Countries where spending has been identified as the most efficient include Australia, Korea, and Switzerland; while Hungary, the Slovak Republic, and the United States are among the least efficient. In developing and emerging countries, health spending is also an important determinant of health outcomes (Baldacci and others, 2008). As in the advanced economies, the efficiency of these outlays varies widely (Gupta and Verhoeven, 2001; Gupta and others, 2008), again suggesting ample room to improve health outcomes without raising spending.

B. Public Expenditures Projections

16. **Large increases in public health spending are projected in the advanced economies (Figure 4).** Public health spending in advanced economies is projected to rise on average by 3 percentage points of GDP over the next 20 years (Box 1 describes the projection methodology). Spending is projected to increase by over 2 percentage points of GDP in 14 of the 27 advanced economies. Around one-third of the increase would be due to the effects of population aging, a slightly higher share than in the past. The remaining two-thirds would be due to excess cost growth, reflecting technological change, income growth, the Baumol effect, and health policies.

17. **The projections suggest that the outlook is grim in the United States, but also in Europe, where the fiscal challenge posed by health spending is sometimes underestimated.** In the United States, public health spending is projected to rise by about 5 percentage points of GDP over the next 20 years, the highest of the advanced economies.[10]

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[8]See Appendix III for a discussion of approaches to measuring the efficiency of health spending. The efficiency results cited here from Joumard, Andre, and Nicq (2010) control for the effects of these non-spending inputs on life expectancy. Still, the limitations of this analysis should be kept in mind, as health spending that leads to improvements in the quality of life, but no effect on life expectancy, will be measured as inefficient under this approach.

[9]Although life expectancy is only one dimension of health status, it is highly correlated with other widely used health status indicators (Joumard, Andre, and Nicq, 2010).

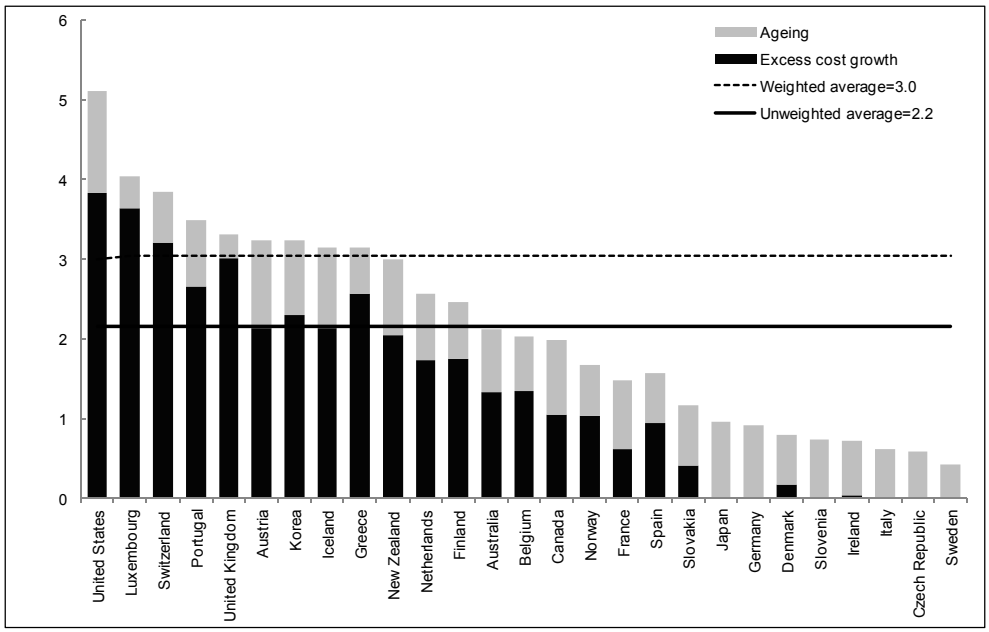
[10]Recent long-term projections of the Congressional Budget Office (CBO) under the baseline scenario indicate that mandatory federal spending (Medicare and Medicaid) will rise by 3.2 percentage points of GDP between 2010 and 2030. These projections incorporate the effects of the 2010 health care reform (Box 2). Assuming that spending by state governments on Medicaid and non-mandatory federal and state spending (which are not

(continued…)

Spending increases are expected to be driven by continued high rates of excess cost growth. In Europe, public health spending is also expected to rise substantially, by 2 percentage points of GDP, with spending expected to rise by over 3 percentage points of GDP in seven countries. This stands in marked contrast to the baseline projection of the European Commission's Aging Report, which anticipate that spending will rise by about ¾ percentage point of GDP over the next 20 years (European Commission, 2009). This low increase reflects a relatively low excess cost growth (about 0.2 percent)—based on the assumption that technology does not increase costs—which would imply a sharp break from past trends (Figure 5).[11]

Figure 4. Projected Increases in Public Health Spending in Advanced Economies, 2011–30

(Percent of GDP)



Sources: OECD Health Database, WHO, and IMF staff estimates.

Note: Excess cost growth (ECG) is defined as the growth in public health spending in excess of GDP growth after controlling for aging (Appendix II). Weighted averages are based on GDP at Purchasing Power Parity.

projected by the CBO) would rise in line with mandatory spending, total public health spending would increase by 5.2 percentage points of GDP, which is slightly higher than our model estimates.

[11]The "technology scenario (convergence by 2060)" of the Aging Report (see Annex 2) incorporates excess cost growth of about 0.8 percent for all countries and results in a weighted average increase in public health spending of 3 percentage points of GDP over 2010–30 in advanced Europe.

Box 1. Methodology for Public Health Spending Projections

The methodology used for projecting spending ratios for advanced economies improves upon earlier studies by using country-specific estimates of excess cost growth (ECG). The projections are based on an econometric model that explains the growth of real per capita public health spending as a function of the growth of real per capita income, demographic factors, and country-specific effects (Appendix II). This model provides country-specific estimates of ECG (the excess of growth in real per capita health expenditures over the growth in real per capita GDP after controlling for the effect of demographic change). ECG is estimated using 1980–2008 data to reflect the varying success of countries in containing the growth of health spending over the last three decades which exhibit periods of both accelerated growth and cost containment.[1] More recent years capture a period of expanding expenditure on both health and non-health spending, which may not be representative of longer-term trends. The average ECG arising from this model is about 1.0 percent (Appendix Table 3, weighted average basis), which is comparable to the estimates from previous studies.[2]

The projections reflect the varying success of countries in containing the growth of health spending over the last three decades. The evidence of convergence implies that once convergence has been achieved, spending should decelerate with respect to the convergence period (paragraphs 10 and 11). However, recent trends do not suggest a slowdown in ECG as countries with low spending ratios converge toward the advanced economy mean. Although it is possible that some countries, especially those with initially high spending growth, could have recently introduced reforms to rein in spending growth, this is not supported by the data: ECG has increased, rather than decreased, in more recent periods. Therefore, there is no reason to believe that, absent reforms, the projected ECGs—derived from a model in which the convergence term is not included—overstate future spending pressures.[3]

For emerging economies, the projections assume that spending growth will be similar to the average growth in advanced countries over the last three decades. For emerging economies, the short time series of data (1995–2007) resulted in a relatively poor fit of the model and the ECG estimates were judged to be a poor guide of future trends in health spending. The projections are therefore based on a common ECG of 1.0 percent across all countries. This is consistent with the assumption that excess cost growth in these countries will follow the average level observed in advanced countries over 1980–2008. It is also broadly consistent with the average excess growth observed for emerging economies in the raw data (Appendix Table 4). The projections incorporate differences across countries in spending by age group, as well as expected changes in the age structure of the population.

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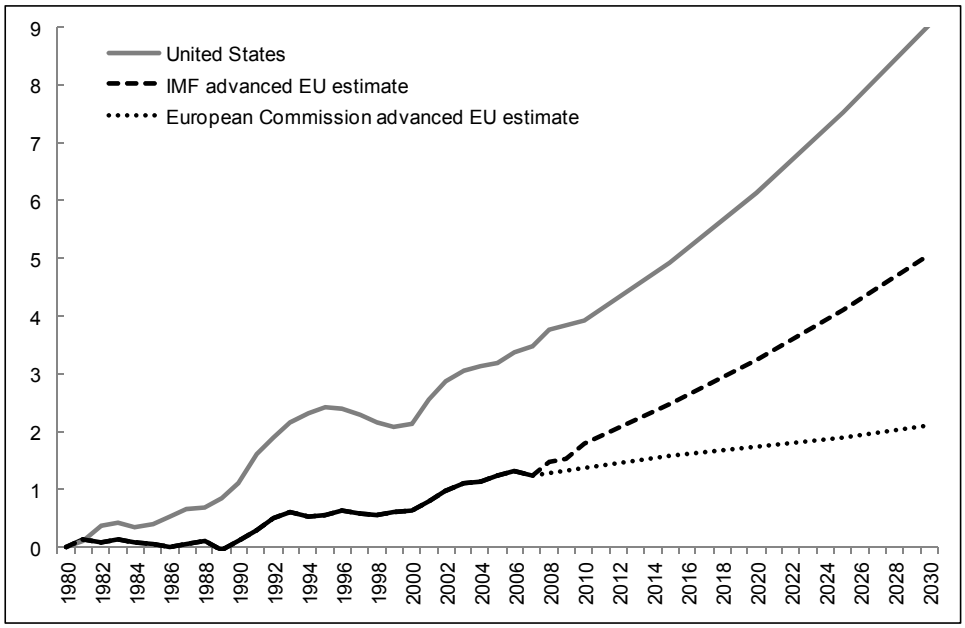
[1]Since the starting point was set at 1980—when most advanced countries had achieved nearly universal insurance—increases in coverage would not play a major role in these estimates.

[2]For three countries (Norway, Switzerland, and the United States), using more recent data produces slightly lower estimates of ECG, which are incorporated in the projections. See Appendix II for a description of methodology.

[3]In any case, ECG estimates using a model that includes the convergence term do not differ much from those excluding the convergence term.

Figure 5. Actual and Projected Increases in Public Health Spending in the United States and Advanced Europe, 1980–2030



Source: European Commission and IMF staff estimates.
Note: European Commission estimates are based on OECD health spending data for 2008 and changes (in percent of GDP) in the baseline scenario in the European Commission's Aging Report.

18. **The cumulative fiscal burden of public spending increases will be large.** The net present value of the projected increases in public health spending increases during 2011–30 is 26 percent of today's GDP. This figure rises dramatically—to 98 percent of GDP—when increases over 2011–50 are considered, based on the staff's longer-term projections of spending increase of 6½ percentage points of GDP over this period (Appendix Table 5).[12]

19. **Recent health care reforms in most countries are unlikely to alter long-term public health spending trends.** In the United States, a sweeping reform expanding coverage was introduced, and is expected to reduce the budget deficit primarily because of higher payroll and excise taxes on health. The envisaged expenditure savings, however, are small, and remain highly uncertain (Box 2). In Europe, fiscal adjustment plans affecting general government employment and compensation could have an effect on health spending in the near term, but their long-term effect on excess cost growth is uncertain. Recent reforms have also addressed spending on pharmaceuticals, which constitutes about 15 percent of public health spending. In the United Kingdom, a broader effort to contain spending increases is envisaged, with real health spending budgeted to rise by less than ½ percentage point over the next four years as part of the government's fiscal adjustment efforts. In Germany, health

[12]The estimates assume a discount rate of 1 percent.

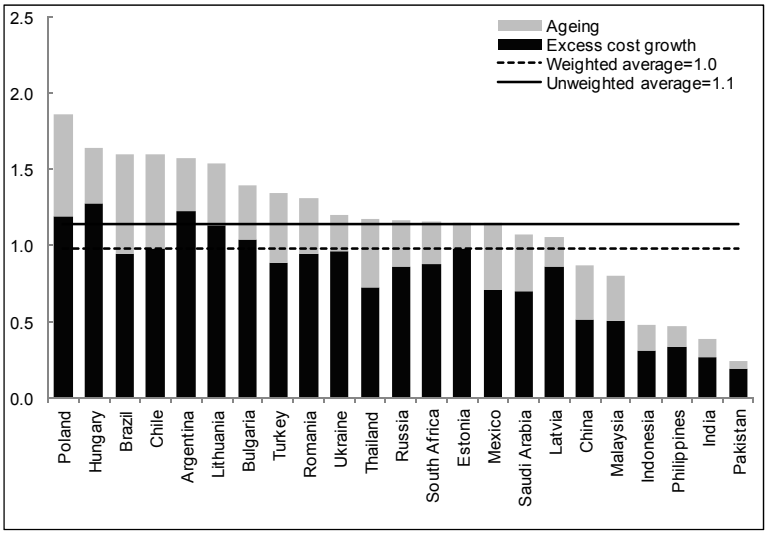
reforms include the reversal of the reduced health care contribution which was approved in November 2010. Spending reductions are expected to be small (0.1 percentage point of GDP). These reforms in advanced economies have not been incorporated into the projections, including those being undertaken in Greece as part of its fiscal adjustment program.

20. **Public health spending in emerging economies is projected to rise by 1 percentage point of GDP over the next 20 years, a third of the increase in the advanced economies (Figure 6).** This is consistent with the assumption that excess cost growth in these countries will follow the average level observed in advanced countries over 1980–2008, and also with the lower initial health expenditure ratios in emerging economies. In most countries, the increase would range between ½ to 1½ percentage points of GDP. Aging would account for about ½ percentage point of GDP increase in this spending, and would have the largest effect on spending in Brazil, Chile, and Poland.

21. **Spending pressures in emerging Europe and Latin America are expected to be higher than in emerging Asia.** On average, spending would rise by 1½ percentage point of GDP in both emerging Europe and Latin America, with all countries projected to raise spending by at least 1 percentage point of GDP. In emerging Asia, spending increases would be about half this amount reflecting the low initial spending levels in these countries. The modest increases projected across all regions suggest that rising health spending is unlikely to pose a heavy fiscal burden in emerging economies over the next 20 years, consistent with the view that the primary challenge for these countries is to improve the efficiency of this spending.

Figure 6. Projected Increases in Public Health Spending in Emerging Economies, 2011–30

(Percent of GDP)



Sources: OECD Health Database, WHO, and IMF staff estimates.
Note: Excess cost growth (ECG) is defined as the growth in public health spending in excess of GDP growth after controlling for the effect of aging. Weighted averages are based on GDP at Purchasing Power Parity.

Box 2. Recent Health Care Reforms in the Advanced Economies

The 2010 health care reform in the United States significantly expands health insurance coverage but its effect on long-term trends in spending is uncertain. Coverage is expected to rise by 11 percentage points to reach 94 percent of the population by 2019. The expansion will be achieved by raising limits on Medicaid eligibility to 133 percent of the poverty line and providing tax breaks and subsidies to individuals between 133 and 400 percent of the poverty line who purchase insurance. The law also forbids insurance companies from denying coverage for pre-existing conditions.

The legislation includes measures for both cost containment and revenue increases, which the Congressional Budget Office (CBO) projects will result in a reduction of the budget deficit. CBO projections suggest that spending in 2030 would be 0.2 percent of GDP lower than forecast earlier on account of the reforms. Medicare spending growth would be slower, due to savings from cuts in payments to Medicare health care providers. There is considerable uncertainty regarding the savings from this reform, however, as previous efforts to curtail these payments have been overridden by Congress. Public health spending would rise under the reform with the expansion of eligibility for Medicaid and provision of subsidies to purchase insurance. The reform also included an increase in payroll taxes for Medicare hospital insurance and introduced an excise tax on expensive employer-provided health plans. Taking into account these revenue measures, the health care reform is expected to reduce the budget deficit by an average of 0.1 percent of GDP per year during 2010–19 and ½ percentage point of GDP per year over 2020–29.[1]

Broader-based efforts to contain spending or raise health care contributions have been implemented in the United Kingdom and Germany, while reductions in employment and compensation across the public sector will also affect health spending in a number of countries. In the United Kingdom, the government has committed to limit the growth of real health spending to a cumulative ½ percentage point in 2011–15, which is projected to reduce spending by ¾ percentage point of GDP by 2015. Consideration is also being given to a plan to reduce administrative costs by 45 percent, with the savings reinvested in patient care. In Germany, the reform approved by parliament in November 2010, includes the reversal of the reduced health care contribution for stimulus purposes in 2011. The reform aims at saving 0.4 percent of GDP. Fiscal adjustment efforts affecting the government wage bill across all sectors (e.g., in Ireland, Italy, Portugal, and Spain) will also help contain health spending in the near term.

Recent cost-containment efforts in Europe have also addressed spending on pharmaceuticals, but this is unlikely to have a major effect on the long-term outlook for spending. Ireland and the United Kingdom have taken steps to effectively reduce the prices paid for pharmaceuticals. Prescription practices were tightened in France, Germany, and Ireland; while reimbursement methods were altered in Germany, Italy, and Ireland. These developments are expected to help reduce spending in the short term, with savings, for example, of 0.5 percent of GDP in Ireland. They are unlikely to have a major effect on spending over the longer term, especially given the modest share of pharmaceutical outlays in total public health spending (about 15 percent in the OECD).

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[1]See IMF (2010a, 2010b) for further details on the effect of separate components of the reform.

III. Impact of Health Reforms In Advanced Economies

A. Overview

22. **Country case studies, event study analysis, and econometric analysis are used here to gain insights into the policy options available to contain the growth of public health spending.**[13] Data limitations and the fact that various policy reforms are often implemented together and in response to spending pressures make the identification of reform impacts difficult. Therefore, this paper uses three complementary methodologies:

- **Case studies**: Eight episodes of successful containment of health expenditure in advanced economies were examined. In each of these episodes, countries achieved a sustained reduction in the ratio of public health spending-to-GDP and a moderation in real spending growth rates (Appendix Figure 1). The advanced countries and time periods covered are: Canada (late 1970s and 1990s); Finland (1990s); Germany (2000–07); Italy (1990s); the Netherlands (early 1980s and 1990s); Sweden (1980s and early 1990s); the United Kingdom (1980s); and the United States (1990s) (See Supplement 1 for detailed case studies).

- **Event analysis**: The event analysis focused on the impact of reforms in 24 countries. It provides an assessment of developments in public health spending before and after a specific reform. Thus, unlike the case studies, it is not confined to reforms that were successful in reducing spending as a share of GDP. Spending trends of non-reforming countries during the same period are also used as a basis of comparison.

- **Econometric analysis**: The econometric analysis uses recently compiled OECD data on key indicators of health care systems (Joumard, Andre, and Nicq, 2010) to evaluate the relationship between these characteristics (such as the extent of private healthcare provision, degree of regulation, patient choice, and stringency of budget constraints) and the growth of public health spending. The impact of particular reforms on the growth rate of public health expenditure is then simulated by changing a country's rating on these indices.

23. **Reforms are grouped into three categories: macro constraints on available resources, micro reforms to improve efficiency, and demand-side reforms** (Box 3). Many governments have experimented with macro-level controls (e.g., budget caps, volume controls on inputs and outputs, and price controls on inputs and health services) to restrain public health spending, often as part of broader fiscal consolidation efforts. While these reforms were initially effective at reducing costs, they sometimes shifted spending to areas not covered by the controls or led to undesired side-effects (e.g., waiting lists for essential

[13]Detailed results are provided in Appendix II (econometric analysis) and Supplement 1 (case studies).

procedures). To reduce the resulting pressures on cost containment, many countries turned to micro-level reforms which targeted not only cost containment, but also higher efficiency and continued high-quality provision of health care. These included improving the organizational arrangements between different parts of the health care system, reimbursing providers through contracts specifying services and prices, and greater reliance on market mechanisms that increased the choices available to purchasers and patients. On the demand side, the most prominent reform has been to increase cost-sharing.

24. **The econometric results suggest that a range of options has proven effective in reducing the growth of public health expenditures.** Table 1 shows the estimated impact on excess cost growth of a country moving up one unit in any given OECD index, keeping all other indices fixed. The OECD indices range from a score of zero to six, with a mean score for the different indices of 2.6 (see Appendix Table 6). The results suggest that substantial reductions in ECG could be obtained from extending market mechanisms (-0.50), improving public sector management and coordination (-0.30) and strengthening budget caps (-0.24)—relative to the 1.0 average ECG. Some measures appear ineffective in controlling health spending, e.g., price controls are associated with higher excess cost growth (+0.11). In what follows, the effects of specific reforms on health spending are described in greater detail, drawing also on the complementary findings provided by the case studies and event study analysis.

Box 3. Reforms in Advanced Countries: A Typology

Reforms implemented in advanced countries over the past three decades can be grouped into three categories (Oxley and MacFarlan, 1995):

Macro-level controls

- **Budget caps**: These are the bluntest instrument for restraining resources allocated to the public health sector. They can be expressed as limits on overall healthcare spending or on sub-sectors, such as hospitals or pharmaceuticals. Examples include global budgets for hospitals or expenditure ceilings for general practitioners.
- **Supply constraints**: Here the focus is on regulating the volume of either inputs into or outputs from the health care system. Input controls include limits on admittance to physician training colleges, defining positive lists for drugs, or rationing of high-tech capital equipment. Output controls include delisting of certain treatments, such as eye tests and dental treatment.
- **Price controls**: Price controls regulate prices of inputs or outputs. They include wage controls for health care professionals, reference pricing for pharmaceuticals products, and price controls on specific treatments.

Micro-level reforms

- **Public management and coordination**: These reforms seek to alter the organizational arrangements between different parts of the health care system in order to reduce costs through improved coordination, alignment of responsibility and accountability, better incentive structures, and/or reduction in overlap or redundancy. Examples of such changes include abolition of managerial levels, decentralization of health care functions, and introduction of gatekeeping arrangements (i.e., a physician who manages a patient's healthcare services, coordinates referrals to secondary and tertiary levels, and helps control healthcare costs by screening out unnecessary services).
- **Contracting**: How providers are reimbursed is one of the most important factors impacting the micro-level efficiency of health spending. There are many different ways to pay physicians, hospitals, and other providers but three of the most general methods include: (i) salaries or budgets; (ii) case-based payment like capitation or DRGs; and (iii) fee-for-service.
- **Market mechanisms**: These reforms seek to improve micro-level efficiency and/or control costs by introducing varying degrees of market mechanisms into the health sector. These reforms operate not so much on the supply side, as on the nexus between supply and demand. Examples include the creation of internal markets (e.g., where primary care physicians purchase services from hospitals), separating the purchase of health services from provision (thus allowing competition among providers), and promoting patient choice (e.g., where patients can choose among primary care providers and hospitals).

Demand-side reforms

These reforms include policies intended to increase the share of health care costs borne by patients, often with the objective of avoiding excessive consumption of specific health services. The two important issues on the demand side are the level of patient cost-sharing (this can take form of lump-sum or percentage copayments) and the tax treatment of private health insurance.

Table 1. Relationship Between System Characteristics and Excess Cost Growth

Reform Areas and indices	Impact of a one-unit change in index on excess cost growth [1]
Budget caps	**-0.24**
Of which:	
Budget constraint: rules and/or targets to fix the health budget and its allocation across sub-sectors and/or regions.	**-0.03**
Central government oversight: number of key decisions overseen by central government.	**-0.22**
Supply constraints	**-0.06**
Of which:	
Reg. of workforce and equipment: degree of regulation on the number and distribution of health care workforce and hospital high-tech equipment and activities, and control of recruitment and remuneration of hospital staff.	**-0.05**
Priority setting: definition of health benefit basket, effective use of health technology assessment, and definition and monitoring of public health objectives.	**-0.01**
Price controls	**0.11**
Of which:	
Reg. of providers prices: regulation of drug prices and of prices billed by physicians and hospitals.	**0.05**
Reg. of prices paid by third-party payers: regulation of prices paid by third-party payers for primary care physicians, specialists, hospital services and drugs.	**0.06**
Public management and coordination	**-0.30**
Of which:	
Gate-keeping: obligation or incentive to register to a general practitioner and/or to get referrals to access secondary care.	**-0.04**
Subnational government involvement: number of key decisions taken at the sub-national level.	**-0.36**
Delegation: number of key decisions taken at the insurer level.	**0.10**
Contracting methods	**0.09**
Of which:	
Volume incentives: degree of payment modes to incentivize less services.	**0.09**
Market mechanisms	**-0.50**
Of which:	
Choice of insurers: ability of people to choose their insurer for basic coverage.	**-0.22**
Insurer levers: ability of insurers to compete and availability of insurer information for consumers.	**-0.17**
User information: availability of information on quality and prices of health care services.	**0.11**
Private provision: degree of private provision of physician and hospital services.	**-0.14**
Choice among providers: degree of freedom in choosing among primary care physicians, specialists and hospitals.	**-0.08**
Demand-side reforms	**-0.09**
Of which:	
Over-the-basic coverage: share of the population covered by non-primary insurance, share of health care expenditures financed out of private insurance and degree of market concentration.	**-0.10**
Price signals on users: extent to which patients face out-of-pocket expenses.	**0.01**

Sources: Joumard, Andre, and Nicq (2010) and IMF staff estimates.

[1]Impact on excess cost growth of public health spending due to one-unit change in each OECD index. OECD indicators range between zero and six. In the regression analysis, the effect of each individual reform option is estimated keeping all other indices fixed. In practice, some reforms may require offsetting changes in other indices. In addition, simultaneous reforms across different health system characteristics may be undesirable.

B. Country Experience with Different Reform Instruments

Macro-level controls

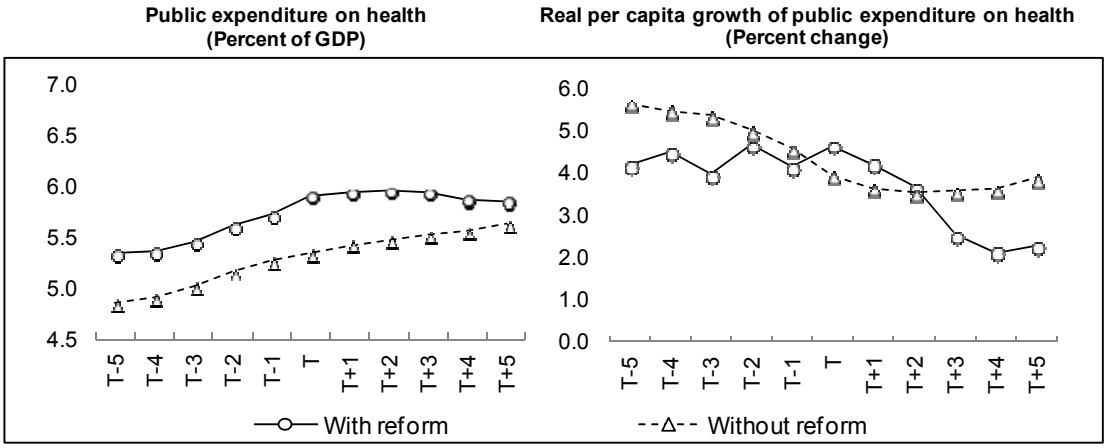
Budget caps

25. **Budget caps and central oversight have been effective in reducing spending growth.** According to the econometric analysis, the combined effect of a one unit improvement in the budget constraint index and central government oversight of key decisions, such as the total health-care budget or the financing of high-cost equipment, reduces excess cost growth by ¼ percentage point.[14] Event studies confirm the potential of budget caps to contribute to cost containment: in the 19 episodes (in 13 countries) in which a budget cap was implemented, increases in spending-to-GDP ratios slowed substantially, while spending ratios continued to rise in countries without caps (Figure 7). In six out of the eight successful reform episodes covered by case studies, budget caps were used to contain cost increases. Budget caps were also typically employed before or during periods of broader fiscal consolidation. Nevertheless, even effective budget caps may suffer from some drawbacks: they can limit access to health care, as evidenced by growing waiting times for elective surgery in Canada, Sweden, and the United Kingdom during the period of expenditure consolidation. They may also be inequitable as rich households can often circumvent waiting lists by purchasing private health care. Furthermore, budget caps alone are unlikely to incentivize greater efficiency, as they are most often based on historical costs.

26. **Budget caps are most effective when applied to broad health expenditure aggregates.** Budget constraints that are applied partially (e.g., only to in-patient care spending) can lead to expenditure increases in areas that are not controlled. In the Netherlands, the partial budget cap on in-patient care was unwound by subsequent reform efforts to introduce a managed care model; and in Italy partial caps on capital investment proved ineffective. In Finland, the introduction of fixed transfers to municipalities to finance health care, alongside other constraints, was successful in containing the costs of in-patient care. However, it was offset by higher pharmaceutical expenditure, much of which was financed through a different source and not subject to the cap on transfers.

[14] "Central government oversight" is based on the OECD's "consistency" index, with a low score for consistency implying a high score for central government oversight. In the econometric estimates, increasing a country's score on the consistency index increases excess cost growth. This owes to the construction of the OECD index on consistency, which gives countries a low rating on consistency if several levels of government are involved in decisions, which is interpreted here as a type of budget constraint imposed under decentralized systems. According to the OECD indices, highly decentralized systems with low consistency generally reflect the involvement of the central government in key health decisions.

Figure 7. Reform Episodes of Budget Caps or Constraints



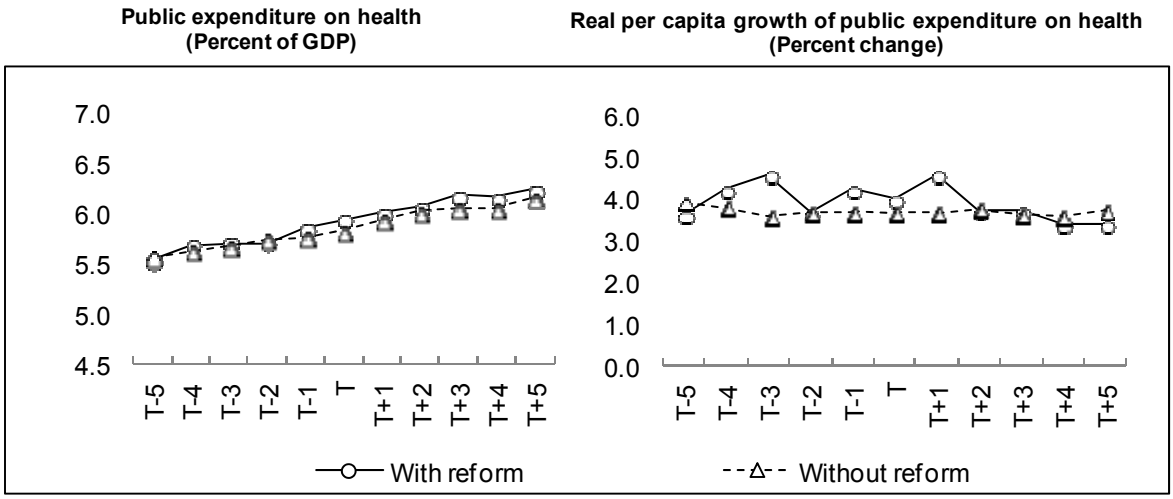
Sources: OECD Health Database and IMF staff calculations.

Supply and price controls

27. **Supply and price controls appear to have only modest effects on the growth of public health spending.** According to the econometric analysis, limiting the supply of health services, for example by imposing regulatory controls on the health workforce and equipment, lowered excess cost growth only slightly (less than 0.1 percentage point). Event studies also reinforce this finding (Figure 8). In practice, supply constraints are often combined with budget caps as a way of targeting cost containment measures. Restrictions on supply were used in Canada (hospital closures, mergers, and reduction in the number of beds), Finland (reduction in the number of hospital beds), Germany (delisting ineffective treatments and positive drug lists), Italy (positive list for pharmaceuticals), and the Netherlands (delisting certain treatments). Price controls, on the other hand, have been ineffective (see below), and the econometric results suggest that increased reliance on these measures actually increases excess cost growth. Price controls were implemented mainly in those countries where the public sector contracts with the private sector to provide services—Canada (regulated fees for physicians), and Germany and the Netherlands (both reference pricing for pharmaceuticals).

28. **The mixed success of price and volume controls owes to supplier responses that have circumvented or offset the effect of controls.** For example, the impact of price controls can be eroded by supplier responses such as increasing volumes or directing patients to higher-cost services (OECD, 2003). Country case studies also find variable levels of effectiveness. In Germany, the reduction in pharmaceutical expenditure was short-lived as drug companies were successful in working around the controls so that pharmaceutical spending did not decrease over the longer term (see Supplement 1 for additional details). In contrast, in the Netherlands real per capita expenditure on pharmaceuticals declined over five years.

Figure 8. Reform Episodes of Supply and Price Controls



Sources: OECD Health Database and IMF staff calculations.

Cost-effectiveness evaluations to control supply

29. **More recently, governments have sought to use cost-effectiveness evaluations to determine what treatments should be financed from public funds.** Many countries (such as Australia, Finland, the Netherlands, Sweden, and the United Kingdom) have established government bodies that assess the cost-effectiveness of new and existing technologies. In some countries, such as the United States, formal cost-effectiveness analysis is not used to make public reimbursement decisions. However, the United States is moving in this direction by supporting Comparative Effectiveness Research in its 2010 health care reform. Similarly, more effective and cheaper health care can be achieved through greater efforts to define and promote "best practice" medicine, and updating this in line with technology advancements. This approach can also provide greater incentives for the private sector to develop technologies that are cost effective and cost reducing.

Micro-level reforms

Strengthened public management and contracting methods

30. **Greater involvement of sub-national governments in key health care decisions can reduce expenditure growth if central oversight is maintained.** According to the econometric analysis, a one unit increase in the index measuring involvement of local and regional governments in key health care decisions reduces excess cost growth by about 0.30 percentage points. This impact, however, would be smaller if oversight is loosened—a one-unit reduction in the central oversight index would offset the majority of the impact—suggesting that checks and balances are necessary to control spending growth in decentralized systems. Health systems that score high on sub-national involvement and central government oversight (Canada, Sweden) tend to have lower excess cost growth than

those with relatively weak oversight (Spain).[15] As indicated in the case studies of Canada and Sweden, the decentralization of additional responsibilities to lower levels of government was accompanied by measures to enhance accountability for respecting resource ceilings, contributing to success in containing spending growth.

31. **The econometric evidence on other public management and contracting reforms is mixed.** Changes in the gatekeeping index have a small effect on excess cost growth. However, incentives to reduce volumes (such as reduced reliance on fee-for-service payments) and increased delegation to insurers are associated with higher excess cost growth.

32. **The event and case studies provide more resounding evidence in favor of these contracting reforms that improve incentives to provide cost-effective care.** The event studies show that in the aggregate, management and contracting reforms have helped slow the growth of spending (Figure 9). In many cases, this has reflected innovations in contracting. In the United States, the major change in this area was the adoption of managed care.[16] Cost-containment approaches used by managed care include requiring pre-authorization for services (a type of gatekeeping), and selective contracting with providers who are willing to accept the plan's payment arrangements and utilization reviews. Additionally, in many countries there are now explicit contracts that target cost control, efficiency, and quality of care (Docteur and Oxley, 2003). To contain spending, payment methods have shifted from traditional fee-for-service methods to case-based payments such as Diagnostic Related Groups (DRGs) in Finland, Germany, Italy, and the United Kingdom.[17] Case-based payment methods, however, can be less effective if providers affect quantities through increasing admissions.[18] Other countries have moved from paying the provider on the basis of costs towards prospective or forward-looking budgets, often as part of aggregate budget control (Finland and Sweden). Forward-looking budgets constrain spending by providing a hard budget constraint based on projected demand and average cost per patient or case.

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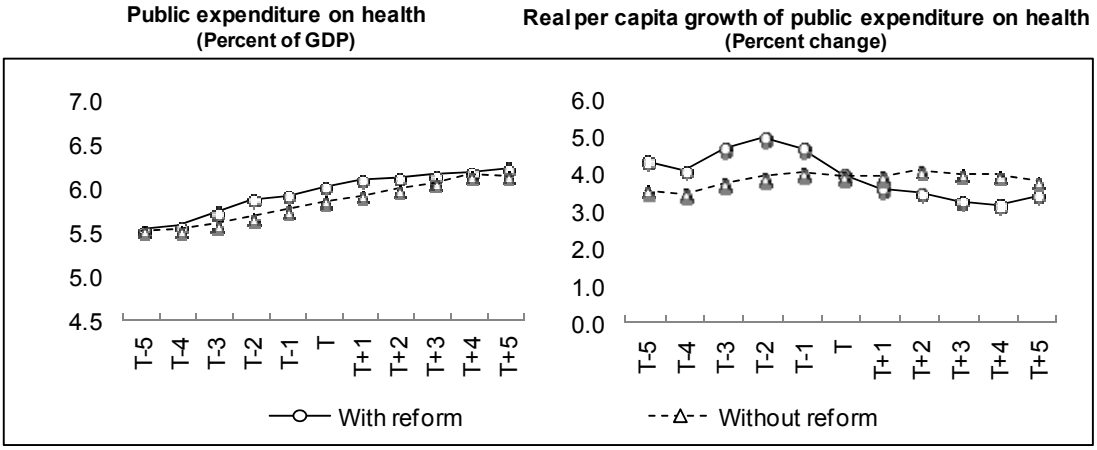
[15]Thornton and Mati (2008) also emphasize the role of institutional arrangements, such as administrative controls and fiscal rules, in ensuring good performance under decentralization. Recent work on decentralization and health spending underscore the detrimental effect of soft budget constraints (Crivelli, Leive, and Stratmann, 2010).

[16]Managed care is a general term for health plans that are proactive in seeking to affect the type or amount of care their enrollees receive. Unlike traditional insurance-based plans, they tend to have detailed contractual or employment relationships with health care providers.

[17]DRGs specify treatment protocols for medical conditions and provide an associated price schedule.

[18]Changes in payment methods can be combined with budget ceilings to help address these concerns. For example, in some Canadian provinces, individual physicians are reimbursed according to a fee-for-service schedule. However, once certain billing thresholds are reached, a declining fraction of the negotiated fees are reimbursed.

Figure 9. Reform Episodes of Public Management and Contracting



Sources: OECD Health Database and IMF staff calculations.

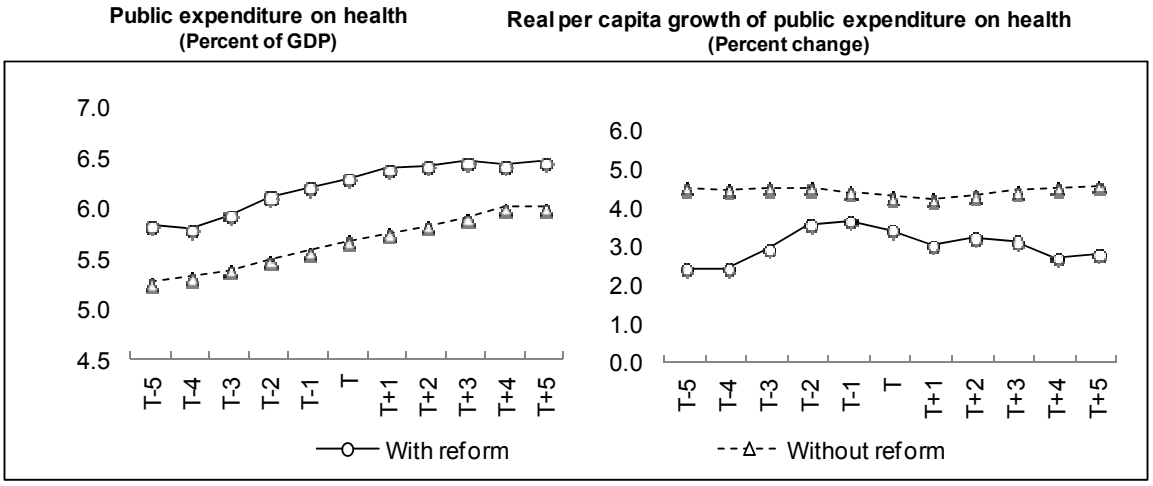
Market mechanisms

33. **Market mechanisms can also slow the growth of health expenditures.** The econometric analysis shows that a one-unit increase in the indices for choice of providers and insurers, private provision, and the ability of insurers to compete would altogether reduce excess cost growth by about ½ percentage point.[19] Event studies also find that the growth in public health spending as a share of GDP slowed after reforms that increased the use of market mechanisms, especially relative to countries not adopting them (Figure 10).

34. **Market-oriented reforms have to be carefully designed if cost containment is to be achieved.** Italy, Sweden, and the United Kingdom separated the roles, within government, of purchasing and providing health care services. These arrangements allow for more active contracting for health care services from primary care providers. The United Kingdom and Sweden also allowed greater competition among hospitals in order to improve responsiveness and efficiency, but evidence from these two experiments is mixed. In the United Kingdom there are some indications that primary care physicians that contracted health services from competing NHS Trusts (hospitals) were more successful in controlling costs, but there is little evidence of improved hospital outcomes. Introducing competition in Sweden, alongside the introduction of case-based (DRG) payment methods, initially increased the volume of hospital care and raised expenditure (Docteur and Oxley, 2003). To address these effects, DRG rates were reduced, and penalties imposed on providers. Sweden also introduced charges for municipalities that were not ready to receive discharged hospital patients (e.g., if a nursing home was not available) and this has been effective in reducing the number of long-term care patients treated in hospitals, as opposed to nursing homes.

[19]Providing greater information on the quality and prices of health care services, however, is associated with higher excess cost growth.

Figure 10. Reform Episodes of Market Mechanisms



Sources: OECD Health Database and IMF staff calculations.

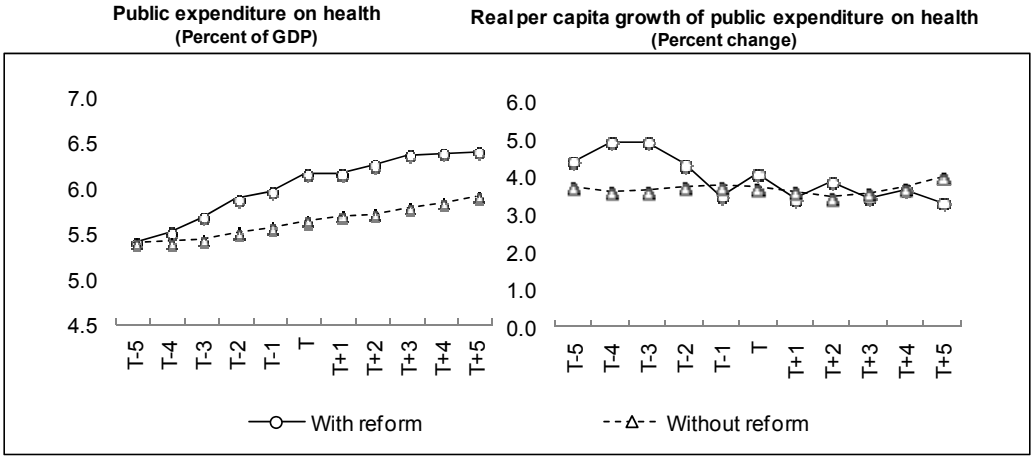
Demand-side reforms

35. **Demand side reforms can also help curtail spending growth.** The econometric results indicate that extending the use of supplementary and complementary private insurance has a dampening effect on excess cost growth (-0.10 percentage points). The evidence on the effects of raising copayments is mixed, although this reflects the small share of spending covered by copayments (such as pharmaceuticals) to date. Event studies of 17 reforms where cost-sharing was increased show that they were successful in slowing the growth of health spending relative to GDP for about a year after the reform, but this decline was reversed by subsequent increases (Figure 11). The potential for reducing costs from higher copayments is potentially large, given the substantial share of outpatient spending (30 percent). Other demand-side reforms include abolishing tax deductions for medical expenses, as in Finland. The size of these tax expenditures can be large and often benefit the rich the most. The issue is often discussed in the U.S. context where these benefits amount to 2 percent of GDP. However, tax subsidies for private insurance also exist in a number of countries. The size of these subsidies is small, owing to the predominate role of the public sector in health care financing in most countries.

36. **Demand-side policies can raise equity and access concerns.** Sweden and Finland helped increase the political acceptability of these reforms by providing greater discretion on copayments for health services to lower levels of government, along with increased responsibility for health care provision. While patient cost-sharing may act to discourage moral hazard, it can raise concerns about equity and access of poor households to health care. To address this concern, cost-sharing can be income related. Similarly, to avoid adverse health consequences, chronic medical conditions are also often exempted from cost-sharing (Newhouse and others, 1993; Gruber, 2006; Chernew and others, 2007). Cost-sharing can also be allowed to vary by services or treatments according to their cost-effectiveness

through so called "value-based benefit" design (Chernew and others, 2007). Although the financial contribution of these charges is often small, appropriately directed they can decrease cost pressures.

Figure 11. Reform Episodes of Demand-Side Measures (Patient Cost-Sharing)



Sources: OECD Health Database and IMF staff calculations.

Other lessons

37. **Continued monitoring and refinement of health reforms, based on real-time data on the behavior of providers and patients, is required to contain cost pressures over the long term.** Success appears to be linked to a continuous tweaking and reformulation of reform initiatives as players adapt to the rules of the game and find ways around them. The effectiveness of reforms needs to be continuously monitored to ensure that providers, insurers, and patients are responding as expected to incentives.

38. **Improved use of health information technology (HIT) can help improve efficiency, but its benefits are yet to be fully exploited.** The use of HIT varies widely across advanced economies; and could, for example, increase adherence to clinical guidelines, enhance disease surveillance, decrease medication errors, and reduce service duplication (OECD, 2009).

39. **Raising the emphasis on preventive care could contribute to decreasing health spending.** Health outcomes are driven by factors other than public health spending, including income and the behavior of individuals. While governments can play an important role in promoting behaviors conducive to improved health outcomes (e.g., issues related to smoking, alcohol, diet, exercise, driving, etc.), market mechanisms can also play a crucial role. For example, linking cost sharing or insurance premia to having regular checkups can reinforce a preventive approach to health care.

40. **Access to a basket of basic health care services by the poor should be maintained during health reforms, as a part of advanced countries' social safety nets.** Countries with less dispersion in health outcomes tend to have better aggregate outcomes (Joumard, Andre, and Nicq, 2010), suggesting that improving the health care outcomes of the most disadvantaged may be an efficient way to improve overall population health. Thus, cost containment reforms need to be carefully formulated to minimize any potential adverse effects on the poor by maintaining mean-tested programs during and after reforms. Most advanced economies have achieved universal access to basic health services. Health reforms should seek to maintain this pillar of the safety net.

Summary of results

The key conclusions from the above analysis can be summarized as follows:

- Effective reforms combine a mix of both macro-level instruments to contain costs and more micro-level reforms to improve the efficiency of spending.
- Among macro instruments, budget caps and central oversight are powerful tools for reducing spending growth.
- Among micro-level reforms, strengthening market mechanisms—increasing patient choice of insurers, allowing greater competition between insurers, relying on a greater degree of private provision, and allowing more competition between providers—is particularly important to contain costs. Management and contracting reforms, such as extending the use of managed care or shifting toward case-based payments, are central to improving the efficiency of spending.
- Although used less extensively, demand-side reforms—such as expanding private insurance and increasing the level of cost sharing—have also been successful in containing the growth of spending. However, demand-side policies can raise equity and access concerns.
- Price controls appear to be among the less successful approaches for containing health care costs. These controls are often eroded by supplier responses such as increasing volumes or directing patients to higher-cost services. Furthermore, some types of public management and contracting reforms, and reforms to market mechanisms, are not effective. In particular, increasing the extent to which key decisions are taken at the insurer level, providing greater user information on the quality and price of health care services, and incentives to reduce the volume of services are all associated with higher excess cost growth. These reforms may nevertheless be desirable from the perspective of increasing the quality of health care.

41. **These conclusions help explain the varying success of countries in containing the growth of public health spending in recent decades.**

- Italy, Japan, and Sweden, with above-average scores in the indices related to budget caps and central oversight, are among the countries projected to experience the lowest excess cost growth. Macro instruments also played key roles in the successful containment episodes in Canada, Sweden, and the United Kingdom.
- The use of market mechanisms in Germany and Japan is an important factor explaining the low excess cost growth observed in these countries—both of which score relatively high in the indices for choice of insurer, choice of provider, and private provision.
- Countries that have been less successful at controlling the growth of spending tend to use macro- and micro-level instruments less extensively. These countries score low in several health system indices, implying that room for reform exists. Luxembourg and Greece, for example, score below average in the majority of the indices evaluated; Switzerland and the United States score low on the budget caps; and Portugal and the United Kingdom score below average on market mechanisms.

C. Impact of Further Reforms

42. **Health reforms could help slow the growth of spending over the next 20 years.** The focus is on reforms that are effective in containing the growth of spending based on the analysis presented in Table 1. As an illustration, Figure 12 shows the average impact of reforms on public health spending to GDP ratios in 2030, grouped in five categories: budget caps (including budget constraints and central oversight); public management and coordination (including gatekeeping and greater sub-national government involvement); market mechanisms (including choice of insurers and providers, the degree of private provision, and the ability of insurers to compete); demand-side reforms (including expansion of private insurance and cost-sharing); and supply controls (including regulation on the health care workforce and the use of a well defined health basket). The figure shows the combined effect of raising countries to the mean score in each of these indices.[20] The results suggest that reforms of market mechanisms can be powerful, yielding a reduction of spending of 0.5 percentage points of GDP.[21] This exercise also underscores the importance of budget caps, which can reduce spending by 0.25 percentage points. Finally, the simulated impacts of demand-side reforms (-.10) and supply constraints (-0.05) are small, but not negligible.

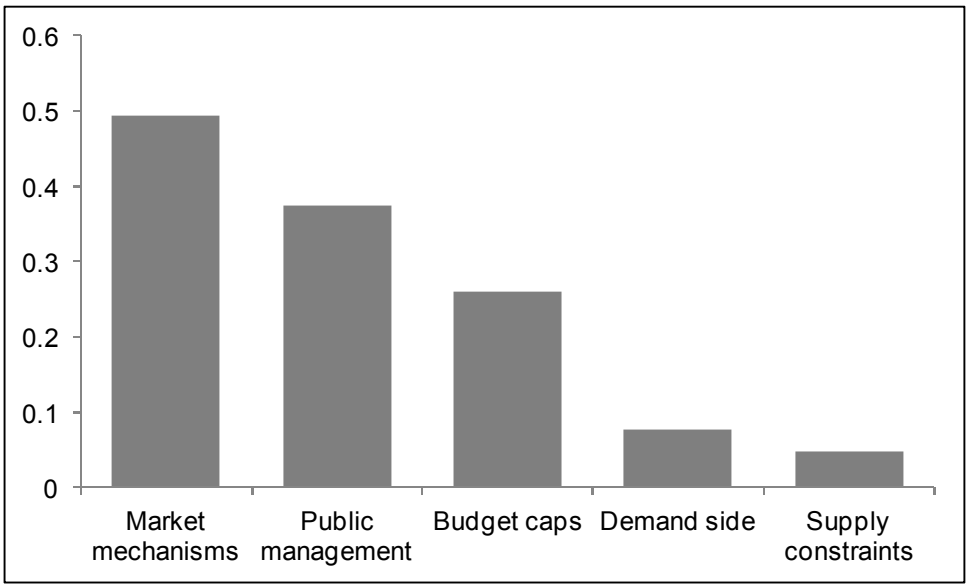
[20]For the United States, the simulations only show the impact of an increase in this index for a strengthening of budget constraints and supply constraints. The United States was not included in the OECD study of health institutions, as it did not respond to the OECD questionnaire. For this exercise, the value of the budget caps and supply constraints indices for the United States is set equal to the average for countries that are below the sample average in each of these indices.

[21]In the regression analysis, the effect of each individual reform is estimated keeping all other indices fixed.

43. **The possible savings under reforms is subject to uncertainty.** Simultaneous reforms across different aspects of the health system may be undesirable or counterproductive. For example, efforts to increase central government oversight could be inconsistent with attempts to promote greater sub-national involvement. Thus, the effect of the reforms across the categories described in Figure 12 cannot necessarily be aggregated. Some reforms, however, could be complementary, implying that the estimates of savings under a particular individual reform are understated.

Figure 12. Average Impact of Reform Components on Health Spending, 2030

(Decrease relative to the baseline, percent of GDP)



Sources: OECD Health Database and IMF staff estimates.
Note: Unweighted averages of the impact of reforms.

44. **Reform options and the appropriate mix of reforms will depend on country characteristics and the projected outlook for the growth of public health spending.** The reform impacts simulated above focus on strengthening health systems characteristics and policies where countries score below the OECD mean (Appendix Table 8). Of course, all of the identified reforms using this methodology may not necessarily apply to every country. Nevertheless, this approach provides a systematic way to identify potential reforms that could have a significant payoff in terms of their effect on the growth of public health care spending. The recommendations under this approach are broadly consistent with a recent OECD assessment on health systems. The OECD study, using a different methodology,

focuses on priorities for improving the efficiency of health systems (Joumard, Andre, and Nicq, 2010), and covers both the private and public sectors.[22]

Among the group of countries that rely more heavily on market mechanisms:

- Canada, the Czech Republic, France, Germany, Japan, and Slovakia are projected to have relatively low ECG. For these countries, staying the course with marginal reforms would be enough to keep ECG low, although bolder reforms could still be needed to offset the effects of demographics on health spending. The relatively low efficiency ranking of Slovakia also suggests that room for reform exists in this country.
- In Australia, Austria, Belgium, and the Netherlands, the projected ECG is moderate (¾ to 1 percentage point). These countries tend to combine macro- (some central oversight and tight regulations for work force and equipment) and micro-level components (extensive private provision and over-the-basic insurance). Possible strategies to curb the growth of spending in these countries include tightening budget constraints, strengthening gatekeeping, and increasing cost-sharing.
- Greece, Korea, Luxembourg, Switzerland, and the United States are projected to have relatively high ECG indicating the need for future reforms, especially for countries that score low in efficiency measures (Greece and Luxembourg).[23] These countries score relatively low in macro-level instruments—they tend have a less stringent budget constraints, minimal central oversight (Korea and Luxembourg), lax regulations of the workforce and equipment, and little gatekeeping. Future efforts to contain spending growth in these countries should address these weaknesses.

Among the group of countries that rely more heavily on public insurance and provision:

- Denmark, Ireland, Italy, and Sweden are projected to have a relatively low ECG. Of these countries, Denmark and Ireland could focus on efficiency-enhancing reforms to reduce ECG further. Denmark could also consider using budget caps to reduce the growth of spending. Italy and

[22]For one variable, the focus of the OECD study (on efficiency)—compared with the focus in this paper on reducing expenditure growth—produces different results. In the OECD paper, a high degree of central government oversight of spending in decentralized systems (a high score on consistency) is considered to be positive from the standpoint of efficiency. In our paper, the empirical results indicate that this oversight helps reduce excess cost growth. This points to a potential trade-off between cost containment and efficiency in this area.

[23]The assessment does not take into account reforms in Greece as part of its fiscal adjustment program initiated in 2010.

Sweden, both of which score highly in efficiency and have low ECG, could improve their score on priority setting (for example, by better monitoring public health objectives and the composition of the public health package).

- Norway and Spain are projected to have a moderate growth in health spending—with ECG of 0.6 and 0.7 respectively. In these countries, containing the future growth of spending could require tightening macro-controls (including increasing central oversight), broadening insurance for over-the-basic care (Norway) and improving priority setting (Spain).

- Iceland, Finland, Portugal, New Zealand, and the United Kingdom have the highest ECG in this group—all above 1 percentage point. This group of countries could also strengthen supply constraints on workforce and equipment. In addition, these countries could benefit from extending the role of private health insurance for over-the-basic health care and increasing choice among providers (especially in Finland, New Zealand, and the United Kingdom).

45. **The impact of the simulated reforms is substantial, but may still fall short of what would be needed in some countries to stabilize public spending to GDP ratios at current levels.** Therefore, additional efforts would be needed to achieve this target. If this is not sufficient, fiscal adjustment may need to rely more on cuts in other areas or additional revenue increases.[24]

- Successful implementation of reforms may not yield enough savings to offset projected increases in public health spending in some countries of advanced Europe. This is especially important in countries with relatively high projected growth in public health spending such as Austria, Portugal, Switzerland, and the United Kingdom.

- In the United States, the challenge would be even larger. The illustrative savings from an assumed increase to the mean in the category of budget caps would yield savings of about 1 percentage point of GDP, and is consistent with recent reform proposals.[25] Other options to reduce spending, beyond those captured in the econometric analysis include the extension of health

[24]As discussed in Section I, in order to lower the general government debt-to-GDP ratio to 60 percent by 2030, advanced economies would have to increase their cyclically adjusted primary balance by some 8 percentage points of GDP, on average, during 2011–30. To the extent that some spending is allowed to increase as a ratio of GDP, other spending would have to be cut correspondingly, or revenues would have to increase more.

[25]A recent reform proposal, sometimes referred to as the Rivlin-Ryan proposal, is based on a voucher system for Medicare (which is similar to a stringent budget cap with some market mechanism reforms) and an increase in the age of eligibility for Medicare. This reform is estimated to save up to 1¼ percentage points of GDP by 2030 (CBO, 2010). See also Committee for a Responsible Federal Budget (2010).

information technology, which would yield savings of 0.2 percent of GDP.[26] Curtailing the favorable tax treatment of health insurance contributions (these tax expenditures are about 2 percent of GDP) could potentially yield large savings, and recent proposals in this area would yield an additional 0.5 percentage points of GDP on an annual basis.[27] All told, these reforms, including those simulated in the econometric analysis, would reduce spending (including tax expenditures) by about 2 percentage points of GDP. This would still leave health spending rising by 3 percentage points of GDP.

46. **These reform scenarios raise two important questions.** First, whether the impact of cost-reducing reforms on health outcomes will be adverse. Second, whether they imply a fundamental change in the role of the state in the provision of health care services.

47. **Will cost-containing reforms necessarily affect health outcomes?** The relationship between cost containment and the provision of high-quality health services varies by reform. For example, there is strong evidence that the expansion of managed care in the United States in the 1990s, while reducing spending growth, did not have large deleterious impacts on health outcomes, compared to fee-for-services (Cutler, 2004). The general practitioner (GP) fund-holding scheme in the United Kingdom, whereby GPs receive a fixed and pre-determined amount to provide or purchase care for their patients, and keep any surplus that they generate, reduced patient waiting times, but the evidence on costs, referral rates, patient satisfaction, and inequality is mixed (Brereton and Vasoodaven, 2010). While a few studies show that the introduction of DRGs has led to higher readmission rates or slower quality gains (Forgione and others, 2004; Busato and von Below, 2010), most studies find no evidence of the adverse effects of DRGs on health outcomes (Or and Hakkinen, 2010). Greater cost-sharing, on the other hand, reduces both essential and non-essential health services, and is found to be associated with worse health outcomes for individuals of poor health (Newhouse and others, 1993; Gruber, 2006).

48. **More generally, continued high levels of inefficiency in health spending suggest ample opportunities to improve health outcomes without raising spending.** Research on spending efficiency implies that the potential gains from improving efficiency are very large (paragraph 15 and Appendix III). Most micro-level efficiency reforms, such as the introduction of competition, can improve the responsiveness of the health system to patient needs but also reduce excess cost growth. It is thus possible to control costs without adverse effects on health outcomes with an appropriate mix of reforms. This said, because of the limited research to date, it will be necessary to closely monitor the impact of

[26]See Hillestad and others (2005) and Congressional Budget Office (2008).

[27]See U.S. Senate, Joint Committee on Taxation (2008). A recent proposal to replace the employer-sponsored health insurance tax exclusion in the United States with a credit indexed to the CPI is estimated to save a little over 5 percent of GDP cumulatively over the next 10 years (Committee for a Responsible Federal Budget, 2010).

cost-containment reforms on health outcomes during the course of implementation. Reform measures may need to be fine-tuned to prevent adverse effects on health outcomes.

49. **The above reforms have implications for the range of services or products financed by the public sector.** If containing increases in public spending is a key feature of consolidation efforts, countries may need to eliminate some health services or products that are currently part of the public benefit package (e.g., dental services, non-generic pharmaceuticals) or more heavily rely on the private sector for their financing. For predominately public sector systems, this could be achieved through much greater reliance on cost-sharing than has typically been the case in many countries. Alternatively, these countries could increase the role of private insurance. For example, private health insurance could be available to cover health services not covered by the public package, as is already the case in Australia, Canada, France, Ireland, Italy, Spain, and the United Kingdom. As indicated earlier, the econometric evidence suggests that greater shares of private insurance are associated with lower excess cost growth. However, there are considerable market failures associated with private insurance markets, such as adverse selection[28] and risk selection.[29] The expansion of private insurance thus needs to be accompanied by appropriate regulations to ensure access, equity, and efficiency. For example, health insurers should be required to offer coverage to all individuals, regardless of their health status or claims history, and insurance premiums should only be allowed to vary by certain demographic characteristics—such as age—but not by health status. Regulators also need to ensure adequate competition in the private insurance market.

IV. Healthcare Reform in Emerging Economies

50. **This section draws on the general lessons of the literature and case studies of six economies to assess the challenges of health care reform in emerging economies.** The country case studies cover Estonia, Hungary, China, Thailand, Chile, and Mexico (see Supplement 1). They were selected to provide an overview of the diverse issues facing emerging economies. As these economies have experienced varying degrees of success with health reform, they provide an excellent source of lessons for other countries.

51. **The challenges facing emerging economies are different from those in advanced economies.** As noted earlier, average life expectancy in emerging economies is about nine years less than in advanced economies, and infant mortality rates are significantly higher (Table 2). In emerging Europe, spending is relatively high by emerging economy standards, as coverage of the population is nearly universal and disease patterns mirror those of

[28]High risk individuals drive up insurance premiums to such an extent that low-risk individuals leave the market, which may result in limited risk pooling, and at the extreme, the collapse of the insurance market.

[29]Health insurers selectively offer insurance coverage only to those with favorable risks, which may result in no market for those with less favorable risks.

advanced economies. However, overall health outcomes remain relatively poor and the challenge is to enhance the efficiency of spending to improve lagging health outcomes and the quality of service delivery. In most emerging economies of Asia and Latin America, the main challenge remains to expand basic coverage to a larger share of the population without generating undue fiscal pressures over the medium term as incomes rise and these systems expand. In these economies, increased public spending, in addition to improving health indicators, could also catalyze growth (Baldacci and others, 2008). These economies should aim to expand their systems in a way that avoids the inefficiencies and resulting high costs of health systems in the advanced economies.

Table 2. Selected Expenditure and Social Indicators by Country Group, 2007

		Emerging		
	Advanced	All	Europe	Other
GDP per capita	36,567	11,981	14,408	10,542
Total health expenditures				
Per capita	3,351	728	935	612
% of GDP	9.2	5.8	6.5	5.4
Public health expenditures				
Per capita	2,446	424	651	295
% of GDP	6.7	3.2	4.2	2.5
% of government expenditures	15.8	9.8	11.0	8.6
Out-of-pocket expenditures				
Per capita	533	198	273	164
% of total health expenditures	17.2	33.0	29.3	37.1
% of population above 60	21.2	13.5	21.3	9.0
Life expectancy	80.1	71.0	72.6	69.5
Infant mortality	3.7	18.9	8.0	27.0

Sources: WHO and IMF staff calculations.
Note: Estimates based on simple averages.

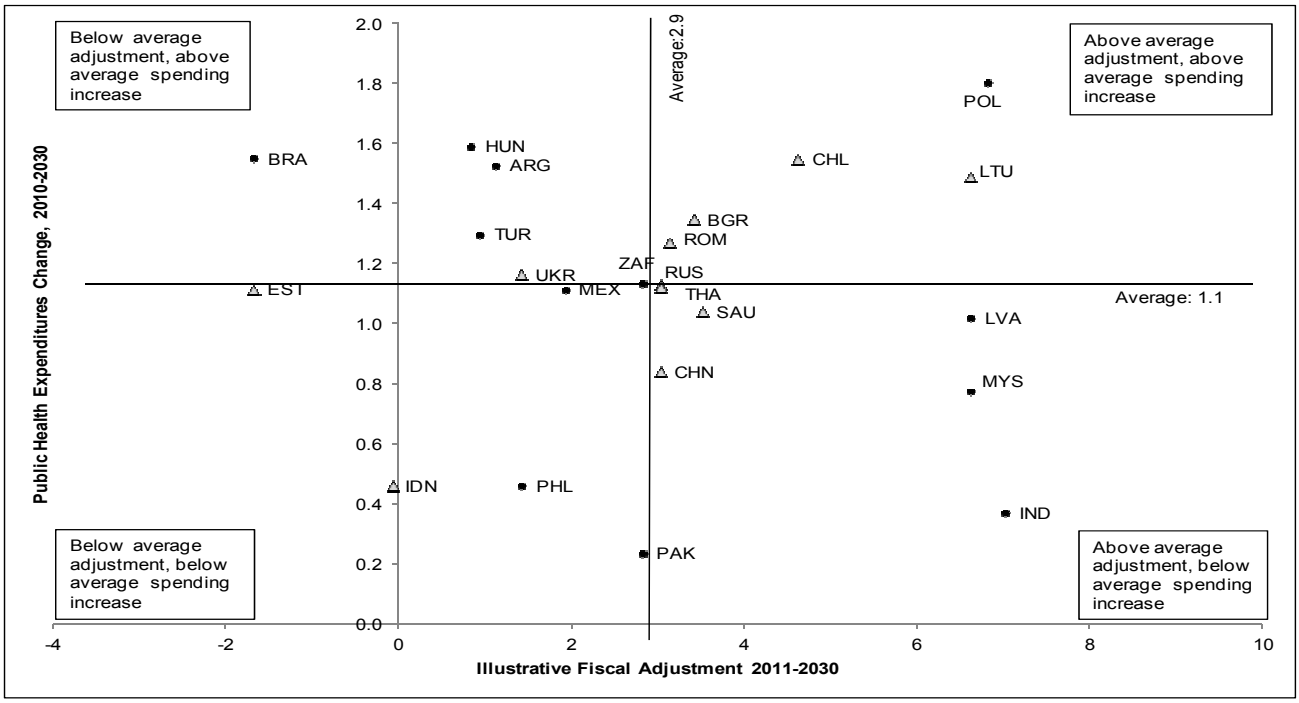
52. **The fiscal space in emerging economies to increase public health spending varies.** This can be assessed vis-à-vis the adjustment required for them to reduce debt to an illustrative target of 40 percent of GDP over the next 20 years.[30] Figure 13 indicates the adjustment required in each country to meet this target, as well as the projected increase in public health spending, in percent of GDP, in 2011–30. For some countries, no fiscal adjustment would be needed to achieve the illustrative target, thus making it easier for these countries to accommodate the projected rise in health spending (Brazil, Estonia). However, adjustment needs are high and above the emerging economy average in a number of emerging European countries (Bulgaria, Latvia, Lithuania, Romania, and Poland) that are projected to have above-average increases in health spending. While all countries should be

[30]See IMF (2010a, 2010c) for a further description of the methodology used for these estimates.

targeting improvements in efficiency, this is especially important for these countries with limited fiscal space. In emerging Asia, adjustment needs are generally lower. Whereas fiscal conditions are conducive to expanding public health spending in some countries with relatively low current levels (Indonesia, Philippines), they limit the room for increases in others (India, Malaysia). Countries with high economic growth will also be in a better position to expand health spending, owing to its favorable effects on fiscal sustainability. Countries with more moderate growth prospects will need to take a more gradual approach.

Figure 13. Emerging Economies: Illustrative Fiscal Adjustment and Projected Public Health Expenditure Increase, 2011–30

(Percent of GDP)



Sources: IMF (2010c) and IMF staff estimates.

Note: Illustrative fiscal adjustment refers to the change in the cyclically adjusted primary balance (CAPB) needed to reduce public debt to GDP ratios to 40 percent by 2030 or stabilize debt to GDP ratios at the end of 2012 levels. See IMF (2010c, Appendix Table 2) for details. Circles indicate debt ratios above 40 percent projected at end-2012. Triangles indicate debt ratios below 40 percent projected at end-2012. The vertical and horizontal lines represent unweighted averages. In computing the primary balance, policy lending was excluded from primary expenditure. CAPB reported in percent of nominal GDP. In the illustrative fiscal adjustment strategy, the CAPB is assumed to improve in line with WEO projections in 2011–12 and gradually from 2013 until 2020; thereafter, the CAPB is maintained constant until 2030. The analysis is illustrative and makes some simplifying assumptions: in particular, up to 2015, an interest rate-growth rate differential of zero percentage point is assumed, broadly in line with WEO assumptions, and 1 percentage point afterward regardless of country specific circumstances. For large commodity producing countries, even larger fiscal balances might be called for in the medium term than shown in the illustrative scenario given the high volatility of revenues and the exhaustibility of natural resources. For Saudi Arabia, maintenance of primary surpluses at their projected 2012 level is assumed. For Ukraine, the primary deficit excludes costs related to bank recapitalization and gas utility.

53. **Given limited fiscal space, most of emerging Europe will need to rely on additional micro-level reforms to improve health outcomes, rather than increasing spending.** Most of these countries (including Estonia, Hungary, Latvia, Russia, and Ukraine) have successfully contained spending, in some cases implementing reforms similar

to those of the advanced economies. Estonia and Hungary, for example, implemented a single insurance fund and a global budget, which helped contain spending growth and reduced transaction costs. There is nonetheless scope for additional micro-level reforms, as many countries are still hampered by provider payment systems that do not provide the appropriate incentives for cost-effective medical care. In Hungary, for example, primary care doctors are paid on the basis of capitation fees alone, and have little incentive to treat patients. This has led to excessively high referral rates to specialists. Estonia provides a positive example of how to modify incentives to improve the efficiency of spending, using a mix of payment methods (capitation, fee-for-service, and lump sum) to promote provision of preventive care by primary care physicians.

54. **Emerging economies in Latin America and Asia have more scope to expand spending but will need to avoid putting health systems on a fiscally unsustainable path as they expand coverage.** In many of these economies, the public system provides coverage for only a small share of the population, and in some cases the benefit package, even for those covered, is insufficient to protect against all key health risks. Thailand and Chile have successfully expanded basic coverage at a low fiscal cost and provide valuable lessons for other countries. By extending benefits to a wide share of the population, health risks can be pooled for much of the population. This can lead to a substantial improvement in aggregate social welfare and equity, as it helps reduce the burden of catastrophic health events on low-income groups.

55. **The country case studies underscore the advantages of extending coverage to a wide share of the population with a fiscally sustainable benefit package.** In order to keep costs low, including over the longer term, it is essential to restrict the benefit package to the most essential health services, until the capacity to finance higher public spending increases. More efficient use of resources, such as improvements in the composition of spending, can lead to better health outcomes without incurring additional costs. For example, in some countries the allocation of spending to combat infectious diseases is too low, with the benefits of spending concentrated in urban areas with relatively well-off populations (Wagstaff and others, 2009; Hsiao and Heller, 2007).

56. **The experiences of advanced countries that successfully expanded health insurance coverage in the recent past provide valuable lessons for emerging economies on the road ahead.** The experiences of Taiwan Province of China and Korea are instructive in this regard:[31]

[31]Korea gradually expanded health insurance coverage to different segments of its population. The coverage rate was 30 percent in 1980 and reached 100 percent in 1988. Public health spending as a share of GDP increased from 0.8 percent in 1980 to 3.6 percent in 2008. Taiwan Province of China expanded its social insurance program from 57 percent of the population in 1994 to 90 percent in 1995. Public health spending as a share of GDP increased from 2.7 percent in 1994 to 4.1 percent in 2005 (IMF staff estimates based on Wen and others, 2008; and Iwamoto and others, 2005).

- **Cost containment is one of the biggest challenges following a successful coverage expansion.** The profit-seeking behavior of health care providers during an expansion of coverage can put considerable pressure on public health spending. It is important to put in place mechanisms that ensure that the increase in outlays is consistent with the government's long-term expenditure plans. For example, to achieve this objective, Taiwan Province of China adopted a global budget system.[32] Successful emerging economy reforms have followed a similar route. Chile, for instance, has used explicit annual budgetary ceilings and the elimination of direct budget support to public providers to help achieve broad coverage at a reasonable fiscal cost.

- **A judicious mix of roles for the public and private sector in the post-reform era can help contain the level of public expenditures.** Even after a swift and broad expansion of coverage, public spending in Korea remains well below the OECD average with private spending accounting for about 45 percent of total health spending (Jones, 2010).

- **Improving efficiency is the key to long-term health system performance.** Taiwan Province of China and Korea undertook important reforms to better align provider incentives, promote primary and preventive care, and improve public management and coordination. Both have introduced case-based (DRG) payment methods for reimbursement of certain diseases and treatments. Taiwan Province of China has also initiated a fee-for-outcome program in which physicians receive bonus payments based on clinical outcomes. In Mexico, by contrast, the health care system remains highly fragmented and vertically integrated. This has ruled out competition and contributed to the highest public health administrative costs in the OECD (OECD, 2009). Similarly, in China, reforms to the provider payment system are needed to encourage greater use of preventive and primary care.

57. **An expansion of benefits financed by taxes, rather than social insurance, should be the first option for most countries seeking to expand coverage where labor market informality is high.** Social insurance systems can help contain spending by limiting benefits to contributors. However, if the goal is to expand coverage and labor market informality is high—as it is in many emerging economies—tax-financed provision of universal basic health care (such as in Thailand) may be the best starting point (Box 4). For countries where labor market informality is limited and revenue administration is of high quality, expansion of social insurance-based systems could be considered. The experience of Chile suggests that sustainable financing flows can be achieved through a combination of mandatory contributions in the formal labor market, individual cost-sharing through copayments, and supplementary budget financing (especially where subsidization is necessary and in the public interest).

[32] See Lu and Hsiao (2003).

Box 4. Health Care Financing: Is Taxation Better than Social Insurance?

In a social insurance system, the receipt of benefits is, at least in principle, contingent on the payment of mandatory contributions (usually from both employers and employees). In a tax-financed system, the receipt of benefits is not contingent. In practice, however, it is often impossible to deny the provision of health services to those who need them. This has implications for the choice between the tax and social insurance model.

Tax-financed systems can be most appropriate when informality is large and the objective is to provide universal coverage of a basic package of health services. A tax-financed system can draw on a broad revenue base for raising resources. In Thailand, general revenue financing played a key role in enabling the achievement of universal coverage. Relying on contributions would not work unless the threat of non-provision of health services were credible, so as to induce informal workers to join the formal work force. But such a threat is unlikely to be credible, at least for essential services.

Social insurance schemes can be an effective way of providing coverage when labor market informality is low. Social insurance schemes often cover only a limited population (for example, those who work in large formal sector enterprises), at least at their early stages, and provide a source of non-distortionary financing as contributors see a strong link between contributions and benefits (Gottret and Schieber, 2006). Additional benefits include their potential for pooling funds and risk. However, expanding coverage to vulnerable groups, such as those in the informal sector and pensioners, could be difficult under social insurance schemes, especially when labor market informality is high. Social insurance systems are also often more complex and expensive to manage than tax-based systems.

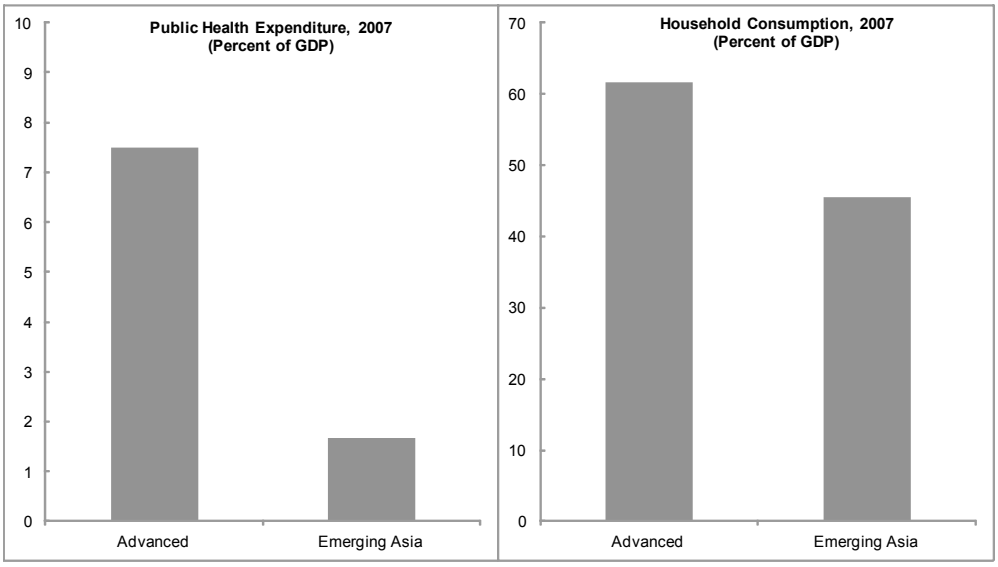
In practice, many countries have hybrid systems, and the system chosen should fit the specific socioeconomic and institutional context. For countries where labor market informality remains high, a tax-based system with a focus on primary health services is important in order to ensure universal access to basic health care without excessively high labor taxes. In many countries, social insurance does not cover the majority of the population, contributions are insufficient to cover public health expenditures, and the system effectively relies on fiscal transfers to be sustainable. In these countries, expansion of the social insurance system should only occur if accompanied by greater formalization of the labor market, and fiscal resources should be oriented toward providing a basic package of services.

58. **In emerging Asia, higher public health care spending could also help reduce household precautionary savings and stimulate growth.** Empirical evidence suggests that increasing public health expenditures could have a powerful effect in reducing precautionary savings that are accumulated to finance large out-of-pocket health spending (Box 5). This would assist countries in this region in their efforts to make domestic demand a stronger engine of growth.

Box 5. Public Health Expenditure and Household Consumption in Emerging Asia

Precautionary motives play an important role in explaining household savings and consumption behavior. This is an especially relevant consideration for countries where out- of-pocket health payments are high and where households need to accumulate savings to pay for lumpy health expenditures. In China, for example, households facing high health expenditure risk tend to have a savings rate 20 percentage points higher than households not facing these risks (Chamon and Prasad, 2008).

Higher public expenditure on health could increase household consumption rates. In 2007, average public health expenditure for six emerging Asia economies (China, India, Indonesia, Malaysia, Philippines, and Thailand) was about 1½ percent of GDP, well below the average of 7½ percent for advanced economies. Raising these public outlays in emerging Asia could help raise private household consumption. For China, Baldacci and others (2010) find that a 1 percent of GDP increase in public health spending would raise consumption by 1.3 percent, while Barnett and Brooks (2010) find a slightly larger effect. The 1995 introduction of the National Health Insurance in Taiwan, Province of China, was found to have reduced household savings rates by 9–14 percent (Chou and others, 2003). Cross-country econometric estimates from Baldacci and others (2010) imply that, for these emerging Asia countries, an increase in public health spending of 1 percent of GDP would result in an average increase in household consumption of more than 1 percent of GDP.



Sources: OECD, WHO, WEO, and IMF staff estimates.
Note: Figures are PPP-weighted. Emerging Asia comprises China, India, Indonesia, Malaysia, Philippines, and Thailand.

Appendix I. Data Sources

The data for advanced economies are drawn from the OECD's Health Database. For most countries, data on health expenditure (total, public, and private), as a percent of GDP and in real per capita terms, are available. The availability of data in earlier years varies, and for most countries, the most complete set of data is available for 2008. The OECD data are subject to a number of structural breaks. To address these and allow for a consistent comparison of spending trends over time, we follow the procedure of Joumard and others (2008). For a year in which a structural break is identified, the average growth rate of real spending over the past five years is used to project spending growth in that year.[1] In effect, this predicts spending in the year of the break, based on trend spending increases. The series are interpolated backwards in time, based on the growth of spending in the unadjusted series. These adjusted data are used for all charts and tables showing developments in spending over time.

Appendix Table 1 provides summary statistics of public health spending for selected OECD countries between 1960 and 2008, unadjusted for these structural breaks. In some cases, data from adjacent year was used when data were not available. For 1970, the data for Australia refers to 1969 and for the Netherlands 1972. For the Netherlands, current public spending is used for data from 2003 onward, and for Belgium, the entire series refers to current (rather than total) public health spending. Appendix Table 2 presents the data adjusting for the structural breaks. These data are used in the figures and charts in the text. In both tables, Columns 2–8 show public health spending as a share of GDP for selected years, and columns 9–12 in Appendix Table 2 show the increase in this ratio over selected years to 2008. For the emerging economies, public expenditure data are derived from the World Health Organization (WHO). Ratios to GDP are calculated on the basis of data from the World Economic Outlook database. For data from1970 to 1994, public health spending from Sivard (various years) as a share of GDP was used. It was assumed that private spending was a constant share of total spending over the 1970–1995 period.

[1]In the case of Germany, no adjustment was made for the series break in 1991. In France, to address the large structural break in 1995, spending in that year, as a share of GDP, was set equal to the level of 1996. The series were then adjusted in earlier years to be consistent with the new, higher level.

Appendix Table 1. Unadjusted Public Expenditure on Health: Advanced Economies, 1960–2008

(Percent of GDP, unadjusted for structural breaks)

	1960	1970	1980	1990	2000	2007	2008
Australia	1.8	2.3	3.8	4.4	5.4	5.7	…
Austria	3.0	3.3	5.1	6.1	7.6	7.9	8.1
Belgium	…	…	…	5.7	6.1	7.3	7.4
Canada	2.3	4.8	5.3	6.6	6.2	7.1	7.3
Czech Republic	…	…	…	4.6	5.9	5.8	5.9
Denmark	…	6.6	7.9	6.9	6.8	8.2	…
Finland	2.1	4.1	5.0	6.3	5.1	6.1	6.2
France	2.4	4.1	5.6	6.4	8.0	8.6	8.7
Germany	…	4.4	6.6	6.3	8.2	8.0	8.1
Greece	…	2.3	3.3	3.5	4.7	5.8	…
Iceland	2.0	3.1	5.5	6.8	7.7	7.5	7.6
Ireland	2.8	4.1	6.8	4.4	4.6	5.8	6.7
Italy	…	…	…	6.1	5.8	6.6	7.0
Japan	1.8	3.2	4.7	4.6	6.2	6.6	…
Korea	…	…	0.8	1.5	2.2	3.5	3.6
Luxembourg	…	2.8	4.8	5.0	5.2	6.6	…
Netherlands	…	4.1	5.1	5.4	5.0	7.3	7.4
New Zealand	…	4.2	5.2	5.7	6.0	7.2	7.9
Norway	2.2	4.0	5.9	6.3	6.9	7.5	7.2
Portugal	…	1.5	3.4	3.8	6.4	7.1	…
Slovak Republic	…	…	…	…	4.9	5.2	5.4
Slovenia	…	…	…	…	6.1	5.6	6.0
Spain	0.9	2.3	4.2	5.1	5.2	6.1	6.5
Sweden	…	5.8	8.2	7.4	7.0	7.4	7.7
Switzerland	…	…	…	4.3	5.6	6.3	6.3
United Kingdom	3.3	3.9	5.0	4.9	5.6	6.9	7.2
United States	1.2	2.6	3.7	4.8	5.8	7.1	7.4
Average							
Weighted	1.7	3.3	4.6	5.2	6.1	6.9	7.3
Unweighted	2.2	3.7	5.0	5.3	5.9	6.7	6.9

Sources: OECD Health Database and IMF staff estimates.
Notes: See discussion in text for description of data for 1970. For Luxembourg and Portugal data, 2007 refers to 2006.

Appendix Table 2. Adjusted Public Expenditure on Health: Advanced Economies, 1960–2008

(Percent of GDP, adjusted for structural breaks)

	1960	1970	1980	1990	2000	2007	2008	Changes (Percentage points) [1]			
								1960-2008	1970-2008	1980-2008	1990-2008
Australia	1.8	3.0	3.8	4.4	5.4	5.7	…	3.9	2.7	2.0	1.3
Austria	3.5	3.9	6.1	6.1	7.6	7.9	8.1	4.5	4.2	2.0	1.9
Belgium	…	…	…	6.2	6.5	7.3	7.4	…	…	…	1.3
Canada	2.4	4.9	5.1	6.3	6.2	7.1	7.3	4.9	2.4	2.2	0.9
Czech Republic	…	…	…	3.9	5.9	5.8	5.9	…	…	…	1.9
Denmark	…	6.9	8.1	7.2	7.1	8.2	…	…	1.4	0.1	1.1
Finland	1.7	3.3	4.1	5.1	5.1	6.1	6.2	4.5	2.9	2.2	1.1
France	2.8	4.7	6.5	7.4	8.0	8.6	8.7	5.9	4.0	2.2	1.3
Germany	…	4.4	6.6	6.3	8.2	8.0	8.1	…	3.7	1.5	1.8
Greece	…	2.3	3.3	3.5	4.7	5.8	…	…	3.5	2.6	2.3
Iceland	2.0	2.8	5.1	6.2	7.1	7.5	7.6	5.5	4.7	2.5	1.3
Ireland	3.0	4.5	6.7	4.4	4.6	5.8	6.7	3.7	2.2	0.0	2.4
Italy	…	…	…	6.1	5.8	6.6	7.0	…	…	…	0.9
Japan	1.8	3.3	4.8	4.7	6.2	6.6	…	4.8	3.4	1.9	1.9
Korea	…	…	0.8	1.5	2.2	3.5	3.6	…	…	2.8	2.1
Luxembourg	…	2.6	4.6	4.7	5.2	6.6	…	…	4.0	2.0	1.8
Netherlands	…	4.2	5.3	5.5	5.2	7.3	7.4	…	3.2	2.2	1.9
New Zealand	…	4.2	5.2	5.7	6.0	7.2	7.9	…	3.7	2.7	2.2
Norway	2.4	4.3	6.3	6.7	6.9	7.5	7.2	4.8	2.9	0.9	0.4
Portugal	…	1.6	3.7	4.1	6.4	7.1	…	…	5.6	3.4	3.0
Slovak Republic	…	…	…	…	4.9	5.2	5.4	…	…	…	…
Slovenia	…	…	…	…	6.1	5.6	6.0	…	…	…	…
Spain	1.0	2.6	4.8	5.9	5.8	6.1	6.5	5.5	3.9	1.7	0.6
Sweden	…	5.9	8.3	7.5	7.2	7.4	7.7	…	1.8	-0.7	0.2
Switzerland	…	…	…	4.0	5.6	6.3	6.3	…	…	…	2.3
United Kingdom	3.1	3.6	4.6	4.6	5.6	6.9	7.2	4.1	3.5	2.5	2.6
United States	1.2	2.6	3.7	4.8	5.8	7.1	7.4	6.2	4.9	3.8	2.7
Average											
Weighted	1.7	3.4	4.7	5.2	6.1	7.0	7.3	5.6	4.1	2.8	2.1
Unweighted	2.2	3.8	5.1	5.3	6.0	6.7	6.9	4.9	3.4	1.9	1.7

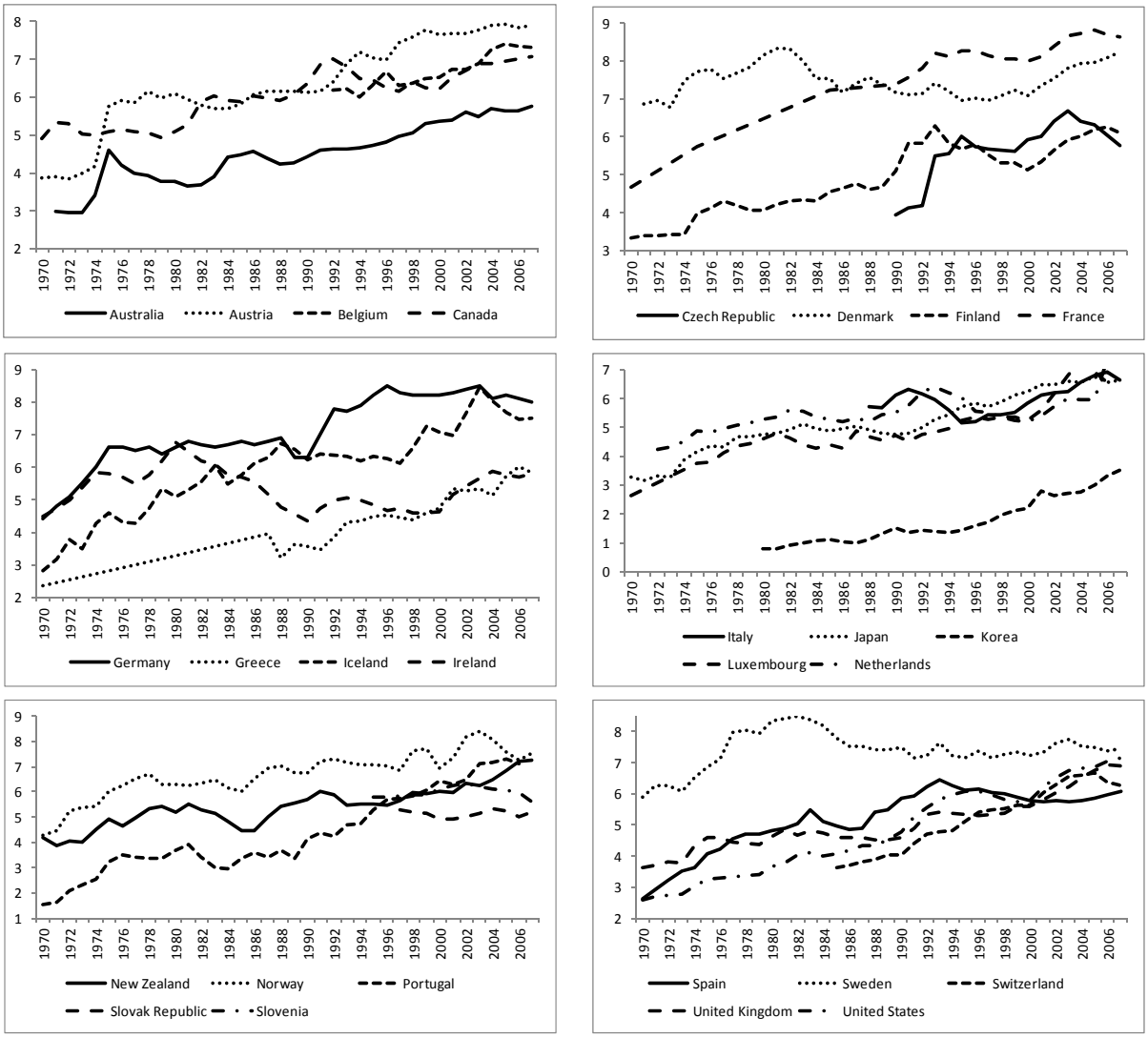
Sources: OECD Health Database and IMF staff estimates.

Note: See text for a description of methodology for adjusting for structural breaks. See Appendix I text for a description of the data for 1970. For Luxembourg and Portugal data, 2007 refers to 2006. The averages for given years (e.g., 1960, 1970) reflect different sample sizes, and comparisons should thus be done with caution.

[1]For comparisons of changes up to 2008, the most recent year with available data are used (in some cases 2007).

Appendix Figure 1. Public Health Spending in Advanced Economies

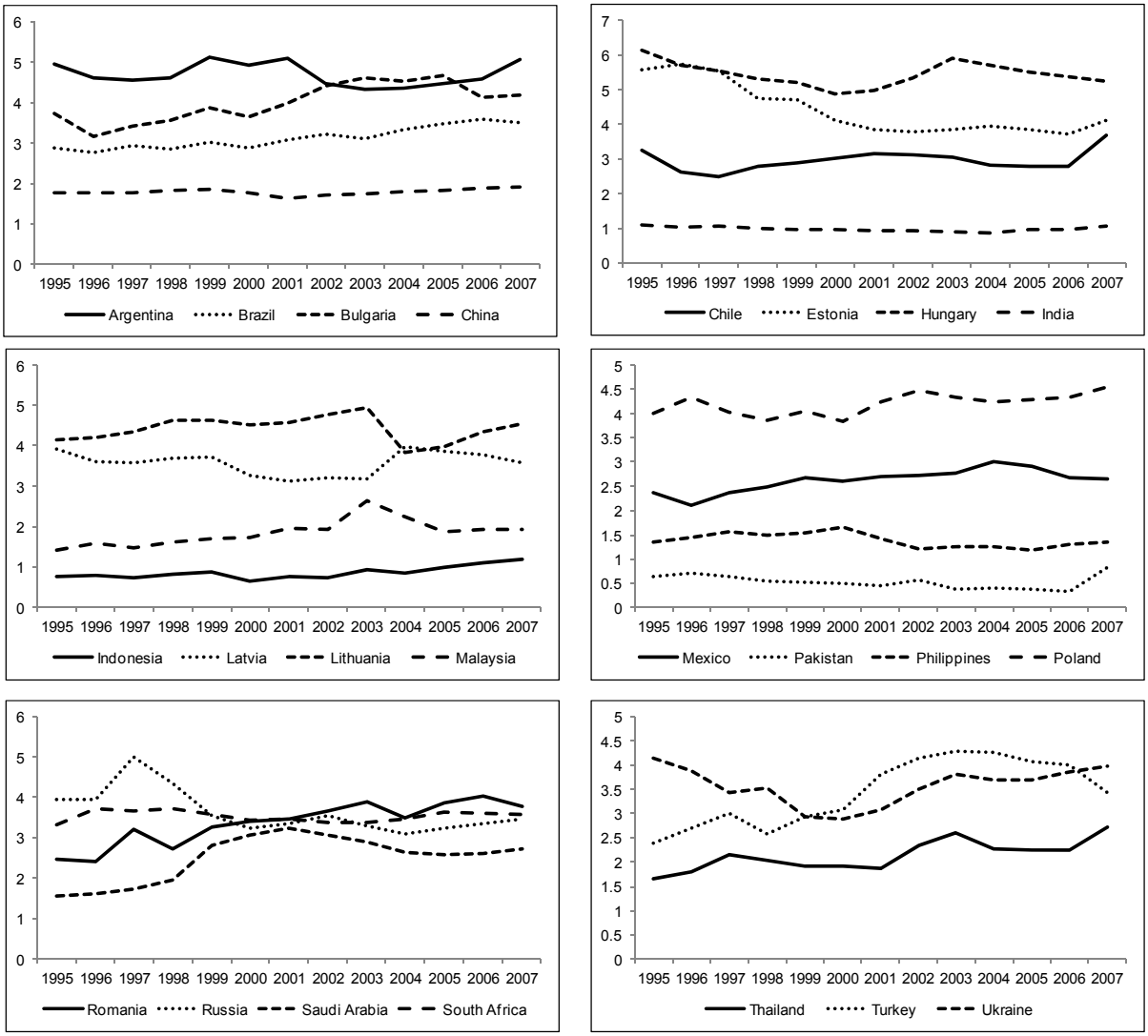
(Percent of GDP, adjusted for structural breaks)



Sources: OECD Health Database and IMF staff estimates.

Appendix Figure 2. Public Health Spending in Emerging Economies

(Percent of GDP)



Sources: WHO and IMF staff estimates.

Appendix II. Econometric Estimation of Excess Cost Growth and Reform Impacts[1]

This appendix sets out the methodology adopted in the report to estimate excess cost growth in public health expenditures and the impact of health reform measures.

Excess Cost Growth

Excess cost growth (ECG) is defined as the excess of growth in real per capita health expenditures over the growth in real per capita GDP after controlling for the effect of demographic change.

The Econometric Model

The key determinants of health expenditures are income levels, demographic composition, technology, and other factors that may vary across countries (e.g., climate or diet). The health system adopted in each country determines how these factors translate into public health expenditures. Reflecting data limitations, the model specification takes the following form:

$$\log(\frac{h_{i,t+1}}{h_{i,t}}) = \beta_0 + \beta_1 \log(\frac{g_{i,t+1}}{g_{i,t}}) + \beta_2 \log(\frac{x_{i,t+1}}{x_{i,t}}) + \beta_{3,i} * \mu_i + \varepsilon_{i,t} \qquad (1)$$

where $h_{i,t}$ denotes real per capita public health spending for country i in year t; $g_{i,t}$ denotes the corresponding real per capita GDP; $x_{i,t}$ denotes demographic composition; μ_i denotes country fixed effects; and $\varepsilon_{i,t}$ is a random error term. This model assumes that public health spending growth (in log terms) is a function of a common growth rate across all countries, GDP growth rate (in log terms), change in demographic composition (in log terms) and a country-specific growth rate.[2] The common growth rate and the country-specific growth rate capture the effects of factors other than income and demographics, such as technology, the Baumol effect, and health policies and institutional settings, to the extent that they do not vary over time. Country-specific ECG can then be expressed as the following (holding demographic composition constant over time):

[1]The authors are grateful to Lawrence Kotlikoff for helpful comments on an earlier draft.

[2]It can be shown that the specification in growth is the first-difference of the following model in levels which is typically used in the literature, for example, in Smith, Newhouse, and Freeland (2009):

$$\log(h_{i,t}) = \beta_c + \beta_1 \log(g_{i,t}) + \beta_2 \log(x_{i,t}) + \beta_0 * t + \beta_{\mu,i} * \mu_i + \beta_{3,i} * \mu_i * t + \varepsilon^*_{i,t}$$

$$ECG_i = \hat{\beta}_0 + \hat{\beta}_{3,i} + (\hat{\beta}_1 - 1)(GDP\ \text{Growth}_i) \quad (2)$$

Here $\hat{\beta}_0$, $\hat{\beta}_{3,i}$ and $\hat{\beta}_1$ are estimates from equation (1). Under this specification, a country's ECG is a function of a common spending growth factor, a country-specific spending growth factor, a common income elasticity, and the country's GDP growth rate.

For sensitivity analysis, ECG is also estimated under the OLS specification (without the country fixed effects):

$$\log(\frac{h_{i,t+1}}{h_{i,t}}) = \alpha_0 + \alpha_1 \log(\frac{g_{i,t+1}}{g_{i,t}}) + \alpha_2 \log(\frac{x_{i,t+1}}{x_{i,t}}) + \varepsilon'_{i,t} \quad (3)$$

The country specific ECG is calculated as the following:

$$ECG_i = \hat{\alpha}_0 + \frac{1}{T_i}\sum_{t=1}^{T_i} \hat{\varepsilon}''_{i,t} + (\hat{\alpha}_1 - 1)(GDP\ \text{Growth}_i) \quad (4)$$

Here T_i denotes the number of years of data available for country i and $\hat{\varepsilon}''_{i,t}$ denotes the residual for country i in time period t. After estimating equation (3), two steps need to be taken to obtain country specific ECG: first, calculate the residuals for each observation; and then calculate the average residual for each country for all the time periods (second term in equation (4)).

The fixed effects and OLS models are estimated separately for advanced economies and emerging economies. The data for advanced economies are taken from OECD while the data for emerging economies are taken from the OECD and WHO. To address the structural breaks in the OECD data, years with structural breaks were excluded from the regression analysis.

Comparison with Earlier Methodologies

The methodology builds on best practice in the literature. Consistent with previous studies, the full panel is used along with common assumptions about some key relationships across countries (e.g., demographics and income). Using pooled data is likely to be superior to country-specific regressions due to data limitations—only recent data are available for certain countries (Hewartz and Theilen, 2002). Although the focus of the literature has typically been on expenditure levels, here the empirical analysis focuses on first differences (i.e., on expenditure growth).[3] The choice of the regressions on first differences rather than on levels offers two advantages.

[3]This approach is also used by Barros (1998); Hewartz and Theilen (2002); and Okunade, Karakus, and Okeke (2004).

First, the log series of health spending and GDP levels are generally found to be non-stationary, while the first differences are stationary (Blomqvist and Carter, 1997; Dreger and Reimers, 2005). One approach used in the literature to address stationarity has been to use the levels and provide tests suggesting that the series in levels are cointegrated and that they are linked in the long run (Blomqvist and Carter, 1997; Gerdtham and Loghgren, 2000; Hagists and Kotlikoff, 2005; European Commission, 2009; Baltagi and Moscone, 2010; Przywara, 2010). However, these tests are usually less reliable for short series such as the ones available for health care spending (Hewartz and Theilen, 2002) and structural breaks in the data might also lower the power of these tests (Clemente and others, 2004).

Second, using growth rates provides an easy interpretation in terms of ECG, which is the main focus of the paper. For example, the constant can be interpreted as an underlying common ECG across countries, while the inclusion of country fixed effects allows for heterogeneity in ECG across countries. Finally, the income elasticity and demographic terms in this model have the same interpretation as in regressions based on levels, which allows for comparisons with previous literature.

Excess Cost Growth Estimates for Advanced Economies

For advanced economies, the country-specific ECG econometric estimates are based on 1980–2008 data. To assess the sensitivity of the results to different time periods, the results were also estimated on the basis of a shorter period (1995–2008). Of the 27 advanced economies, only for five countries (Germany, Japan, Norway, Switzerland, and the United States) was ECG lower in the most recent period. This is consistent with the acceleration of public health spending observed in most countries since 2000.

Appendix Table 3 presents ECG estimates for advanced economies based on the two time periods, 1980–2008 and 1995–2008. Columns 2 and 3 show the ECG estimates without adjusting for changes in demographics—subtracting per capita GDP growth from per capita health spending growth—with an average of about 1.2 and 1.5 percent (unweighted) respectively for periods 1980–2008 and 1995–2008. Under the country fixed-effects model, equation (2) is used to calculate country-specific ECG by applying coefficient estimates from equation (1)—the coefficient estimates are shown in the bottom panel of Appendix Table 3. The average of ECG estimates from country fixed effects (columns 4 and 5) are 0.8 percent and 1.7 percent respectively for the periods 1980–2008 and 1995–2008.[4]

The estimates of ECG from the econometric analysis are comparable to those in the literature. OECD (2006) finds ECG to be 1.0 percent for 1980–2005 using a decomposition

[4]The ECG estimates under an alternative OLS specification (not shown) are, on average, lower than the estimates under the fixed-effects model. This indicates that the simple OLS estimates are biased downwards, as too much of the spending growth is attributed to demographic variables.

approach and their baseline assumes that ECG would decline from 1.0 percent in 2005 to zero percent in 2050, with an average of 0.7 percent from 2011–2030. Hagist and Kotlikoff (2005) estimate ECG at about 1.5 percent over 1970–2002 for ten OECD countries. A recent report by the European Commission finds an ECG of 1.4 percent in their econometric analysis, but it is only used in their technology scenario which assumes it declines from 1.4 percent in 2007 to zero percent in 2060 (EC, 2009). ECG estimates from other studies (O'Connell, 1996; Christiansen and others, 2006; Blomqvist and Carter 1997; Przywara, 2010) are broadly consistent with those in the above studies.

Appendix Table 3. Excess Cost Growth in Advanced Economies

Country	Difference between public health spending growth and GDP growth		Fixed effects	
	1980-2008	1995-2008	1980-2008	1995-2008
Australia	1.5	1.6	0.9	1.8
Austria	1.1	1.0	1.0	1.3
Belgium	1.0	1.1	0.8	1.4
Canada	1.3	0.9	0.6	1.4
Czech Republic	-0.5	-1.2	-0.9	0.3
Denmark	0.0	1.3	0.1	1.2
Finland	1.5	0.7	1.1	1.7
France	1.4	0.8	0.3	0.3
Germany	-0.1	-0.1	-0.1	-0.3
Greece	1.9	2.2	1.6	3.5
Iceland	1.1	0.6	1.1	2.5
Ireland	0.1	2.6	0.0	3.7
Italy	1.2	2.7	-0.1	1.1
Japan	1.1	1.3	-0.7	-0.8
Korea	5.5	7.3	3.5	4.1
Luxembourg	1.3	2.4	2.4	2.5
Netherlands	1.3	1.8	0.9	1.9
New Zealand	1.5	2.8	1.0	2.9
Norway	0.6	0.2	0.7	0.6
Portugal	2.1	2.4	1.4	1.9
Slovakia	0.2	0.2	0.3	1.6
Slovenia	0.2	0.2	-0.1	0.9
Spain	1.3	0.8	0.6	1.1
Sweden	-0.3	0.8	-0.4	1.8
Switzerland	2.3	1.6	1.9	1.8
United Kingdom	1.5	2.2	1.7	3.1
United States	2.4	1.4	2.3	1.8
Average				
Weighted	1.7	1.5	1.2	1.3
Unweighted	1.2	1.5	0.8	1.7

Regression (dependent variable: log of real per capita public health spending) [1]		
Log of GDP per capita	0.303 ***	0.097
	(0.079)	(0.110)
Log of age 14 and under	0.104	0.450
	(0.193)	(0.321)
Log of age 65 plus	0.638 ***	0.614 **
	(0.201)	(0.273)
Constant	0.023 ***	0.035 ***
R^2	0.040	0.021
N	618	324

Sources: OECD Health Database and IMF staff estimates.

Note: Standard errors in parentheses. * p<.1; ** p<.05; *** p<.01.

[1]All variables are expressed in first differences except the constant. The coefficients of these set of regressions are robust to different specifications. The relatively low R2 reflects the large variability in the annual changes observed in the data. Using a model with five-year differences produces similar results but increases R2 from 0.02 to 0.16.

ECG Estimates for Emerging Economies

For emerging economies, the average ECG without adjusting for changes in demographics is 0.8 percent, and the average ECG under the fixed effects model, adjusting for demographic changes, is -1.8 percent (Appendix Table 4). The results show that the estimates of country-specific ECG in emerging economies display considerable variation for two reasons.[5] First, reliable data for emerging economies are only available for recent years. Second, the experiences of emerging economies are very diverse: there are countries that have recently completed economic and political transitions, while some others are still in transition; some countries have achieved universal coverage (including most emerging eastern European countries, Thailand, and Chile), while others are still in the process of doing so. As a result, the econometric estimates of ECG from historical data may not be a reliable source for projecting forward. Instead, an ECG of 1 percent, which is close to emerging economy average without adjusting for changes in demographics, is assumed in the projections of public health spending.

There have been relatively few estimates of ECG in emerging economies. The Aging Report (European Commission, 2009) assumes that ECG in emerging European countries (Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, and Romania) would be similar to other European countries. Their baseline scenario assumes an ECG of 0.2, while their "technology convergence" scenario assumes that ECG would decline from 1.4 percent in 2007 to zero percent in 2060, with an average ECG of 1.1 percent between 2010 and 2030. An OECD study (OECD, 2006) assumes that ECG for emerging OECD economies (Hungary, Mexico, Poland, and Turkey) declines from 1.0 percent in 2005 to zero percent in 2050 in the baseline scenario, with an average of 0.7 percent between 2010 and 2030, and a constant ECG of 1.0 percent in the cost-pressure scenario. A recent World Bank study takes into account future increases in coverage in total health spending projections for four representative economies, but does not provide country-specific projections (World Bank, 2010). The implicit ECG is above 1.0, given the large increase in spending to GDP ratios (a doubling over 2010–30). Projections by Jackson, Howe, and Nakashima (2010) assume a catch-up factor[6] for emerging economies (Chile, China, India, Mexico, Poland, and Russia). However, these projections only involve public health spending for the elderly population so the ECG figures are not comparable to those used in our study. The ECG that is implicit in the projections assumptions appears high, as spending to GDP ratios triple (from 1 percent of GDP in 2007 to 3 percent of GDP in 2040).

[5]The ECG estimates, under an alternative OLS model (not shown), also display a large degree of variation, with an average of -0.1 percent.

[6]If per capita health spending as a share of GDP in a country is less than two-thirds of the developed country average, the gap is assumed to narrow by 5 percent per year until spending reaches two-thirds of the developed country average.

Appendix Table 4. Excess Cost Growth in Emerging Economies

Country	Difference between public health spending growth and GDP growth	Fixed effects
Argentina	0.2	-1.2
Brazil	1.7	-1.3
Bulgaria	1.0	-1.6
China	0.6	-3.8
Chile	1.0	-2.2
Estonia	-2.5	-6.6
Hungary	-1.3	-3.0
India	0.0	-2.2
Indonesia	3.8	0.2
Latvia	-0.8	-5.1
Lithuania	0.7	-3.5
Malaysia	2.7	0.0
Mexico	1.0	-2.3
Pakistan	2.1	1.0
Philippines	0.0	-1.8
Poland	1.1	-2.7
Romania	3.6	0.3
Russia	-1.1	-4.9
Saudi Arabia	4.7	4.6
South Africa	0.6	-2.5
Thailand	4.3	-0.3
Turkey	3.1	0.4
Ukraine	-0.3	-3.8
Average:		
Weighted	0.9	-2.4
Unweighted	1.1	-1.8

Regression (dependent variable: log of real per capita public health spending) [1]	
Log of GDP per capita	0.545 ***
Log of age 14 and under	-0.758
Log of age 65 plus	0.908
Constant	0.006
R^2	0.285
N	276

Sources: WHO and IMF staff estimates.

Note: * p<.1; ** p<.05; *** p<.01.

[1]All variables are expressed in first differences except the constant.

Projections of Public Health Spending

The ECG estimates are combined with projected changes in demographic composition to project future public health spending (Appendix Table 5). The projections incorporate country-specific assumptions for spending patterns by different age groups. In most countries, for example, spending increases substantially toward the end of life, although the extent to which this occurs varies. In using these age-spending profiles, an important assumption is whether projected increases in life expectancy will result in years of good health and lower spending (typically associated with younger years of life) or years of relatively poor health and higher spending (associated with later years of life). Following the European Commission (2009) and its baseline (reference) scenario, it is assumed that one-half of the gains in longevity are spent in good health. For the emerging economies, due to data limitations, a common age-spending profile is used, based on the OECD average.

Figures for 2010 are estimated on the basis of 2008 figures and the reported ECG estimates. ECG. As such, the 2010 figures can be interpreted as an estimate of health spending as a share of potential GDP. This provides a better basis for projections than more recent data, where spending to GDP ratios reflect the effect of the recent economic crisis.

For advanced economies, ECG estimates from country fixed-effects regressions based on 1980–2008 data are used. However, the ECG estimates are capped between zero and 2.0 percent, as the estimates from the econometric model are less reliable for outliers.[7] The results are largely consistent with previous estimates (IMF, 2010b), and public health spending in advanced economies is projected to increase, on average, by 3 percentage points of GDP between 2010 and 2030.

Estimation of Reform Impacts in Advanced Economies

This section describes measures of health institutions and policies, econometric estimates of the impacts of these measures on excess cost growth, and the simulated impacts of potential reforms based on these measures.

OECD indicators on health institutions and policies

A recent OECD report provides comprehensive and systematic measures of health institutions and policies in advanced economies. Joumard, Andre, and Nicq (2010) collected information on 269 key qualitative characteristics of health institutions and policies, and transformed these characteristics into 20 indicators related to market signals and regulations affecting users, providers, and insurers; the extent of insurance coverage; budget and

[7]For three countries (Norway, Switzerland, and the United States), more recent ECG estimates from 1995–2008 were used in the projections, as staff judged these a better predictor of future spending pressures.

management approaches affecting the level of available resources; and the degree of delegation of decision making. All advanced economies (except the United States for which data were not provided) were scored according to these indicators on a scale of zero to six. Of the 20 indicators, 17 were used in the principal component analyses in the OECD report to create four composite indices that capture most of the variation across countries: "reliance on market mechanisms," "intensity of regulation," "intensity of budget constraint," and "degree of decentralization," and three were not mapped because of lack of variation across countries.[8] The first column of Appendix Table 6 shows the mapping of the 17 characteristics to the reforms identified in Box 3. Columns 2 and 3 show the means and standard deviations of the 17 indicators, and columns 4–7 show the principal component analysis weights of the 17 indicators in constructing the four composite indices.

Econometric estimation of reform impacts

The econometric analysis estimates the effects of each of the four composite indices on public health spending growth. The econometric analysis includes the four composite indices as explanatory variables (along with additional variables for GDP and demographic composition) in the regression model:

$$\log(\frac{h_{i,t+1}}{h_{i,t}}) = \gamma_0 + \gamma_1 \log(\frac{g_{i,t+1}}{g_{i,t}}) + \gamma_2 \log(\frac{x_{i,t+1}}{x_{i,t}}) + \gamma_{3,j} * I_{i,j} + \varepsilon''_{i,t} \quad (5)$$

Here $I_{i,j}$ denotes the score of country i on composite indices j. Since these indices are time-invariant, it is not possible to also include country-fixed effects. Excess cost growth can thus be calculated as the following:

Country observations with structural breaks in the data were excluded from the econometric analysis. Given that the indicators and composite indices provide a snapshot of health institutions and policies in 2009, more recent years (1995–2008) are used to estimate the impact of health reforms on public health spending growth. The coefficients should be interpreted as indicating the relationship between health system characteristics in 2009 and

[8]Principal component analysis 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. The first principal component accounts for as much of the variability in the data as possible, and each succeeding component accounts for as much of the remaining variability as possible. In the OECD study, two principal component analyses were performed and only the top two components were selected for subsequent analysis. "Reliance on market mechanisms" and "intensity of regulation" are the two principal components from the first principle component analysis and input variables include "choice of insurers," "insurer levers," "over-the-basic coverage," "private provision," "volume incentives," "regulation of provider prices," "user information," "regulation of the workforce and equipment," "choice among providers," "gatekeeping," and "price signal on users." "Intensity of budget constraint" and "degree of decentralization" are the two principal components from the second principle component analysis and input variables include "priority setting," "budget constraint," "regulation of workforce and equipment," "regulation of prices paid by third-party payers," "decentralization," "delegation," and "consistency."

spending growth in 1995–2008. The exercise thus assumes that the 2009 snapshot provides an accurate characterization of the health care system over 1995–2008.The results indicate that reliance on market mechanisms and the stringency of budget constraints are negatively related to public health spending growth while intensity of regulations and degree of centralization are positively related to public health spending growth (Appendix Table 7).

Appendix Table 5. Projections of Public Health Spending 2010–50

(Percent of GDP)

	Baseline Projections									Change, 2010-2030		
Country	2010	2015	2020	2025	2030	2035	2040	2045	2050	Baseline	Optimistic	Pessimistic
Advanced economies:												
Australia	6.0	6.4	6.9	7.5	8.1	8.7	9.3	9.8	10.3	2.1	1.4	3.0
Austria	8.3	9.1	9.8	10.7	11.6	12.5	13.5	14.4	15.2	3.2	2.2	4.4
Belgium	7.6	8.1	8.5	9.1	9.6	10.2	10.8	11.3	11.7	2.0	1.1	3.0
Canada	7.4	7.9	8.4	8.9	9.4	9.9	10.4	10.8	11.1	2.0	1.1	3.0
Czech Republic	5.8	6.0	6.1	6.3	6.4	6.6	6.7	6.8	6.8	0.6	0.0	1.3
Denmark	8.6	8.8	9.0	9.2	9.4	9.5	9.6	9.6	9.6	0.8	-0.1	1.8
Finland	6.4	7.0	7.6	8.3	8.9	9.5	10.1	10.7	11.2	2.5	1.6	3.4
France	9.0	9.4	9.7	10.1	10.5	10.8	11.1	11.4	11.6	1.5	0.5	2.6
Germany	8.1	8.4	8.6	8.8	9.0	9.3	9.4	9.6	9.6	0.9	0.1	1.9
Greece	6.2	6.9	7.6	8.4	9.4	10.4	11.5	12.7	13.9	3.2	2.3	4.1
Iceland	7.8	8.4	9.1	9.9	10.9	12.0	13.0	14.1	15.2	3.2	2.1	4.3
Ireland	6.8	6.9	7.0	7.2	7.5	7.7	7.9	8.1	8.3	0.7	0.0	1.5
Italy	6.9	7.0	7.2	7.3	7.5	7.7	7.8	7.9	8.0	0.6	-0.1	1.4
Japan	6.8	7.1	7.3	7.6	7.8	7.9	8.0	8.1	8.2	1.0	0.2	1.8
Korea	3.9	4.5	5.2	6.1	7.1	8.2	9.5	10.9	12.3	3.2	2.6	4.0
Luxembourg	7.1	7.9	8.9	9.9	11.2	12.5	14.1	15.7	17.5	4.0	3.0	5.2
Netherlands	7.6	8.2	8.9	9.5	10.2	10.8	11.4	12.0	12.5	2.6	1.6	3.6
New Zealand	8.1	8.8	9.5	10.3	11.1	12.0	12.9	13.7	14.5	3.0	1.9	4.1
Norway	7.2	7.5	7.9	8.4	8.8	9.3	9.7	10.1	10.5	1.7	0.8	2.6
Portugal	7.6	8.4	9.2	10.1	11.1	12.2	13.4	14.7	15.9	3.5	2.5	4.6
Slovakia	5.5	5.7	6.0	6.3	6.7	7.0	7.3	7.6	7.9	1.2	0.5	1.9
Slovenia	6.1	6.3	6.5	6.6	6.8	7.0	7.2	7.3	7.3	0.7	0.1	1.5
Spain	6.6	6.9	7.3	7.7	8.2	8.7	9.3	9.7	10.1	1.6	0.8	2.4
Sweden	7.8	7.9	8.0	8.1	8.2	8.3	8.3	8.3	8.3	0.4	-0.4	1.3
Switzerland	6.6	7.4	8.4	9.4	10.5	11.7	13.0	14.3	15.6	3.9	2.9	4.9
United Kingdom	7.3	8.0	8.7	9.6	10.6	11.7	12.9	14.2	15.5	3.3	2.3	4.4
United States	7.6	8.6	9.8	11.2	12.7	14.2	15.7	17.3	18.9	5.1	3.9	6.4
Emerging economies:												
Argentina	5.1	5.4	5.8	6.2	6.6	7.1	7.7	8.2	8.9	1.5	0.9	2.2
Brazil	3.6	3.9	4.2	4.7	5.1	5.6	6.2	6.7	7.3	1.6	1.1	2.1
Bulgaria	4.2	4.5	4.8	5.2	5.6	6.0	6.5	6.9	7.4	1.3	0.8	1.9
China	1.9	2.1	2.3	2.5	2.8	3.1	3.3	3.6	3.9	0.8	0.6	1.1
Chile	3.7	4.1	4.5	4.9	5.3	5.8	6.2	6.7	7.2	1.5	1.1	2.1
Estonia	4.2	4.4	4.7	5.0	5.3	5.6	6.0	6.4	6.7	1.1	0.6	1.7
Hungary	5.3	5.6	6.0	6.4	6.9	7.3	7.8	8.3	8.9	1.6	0.9	2.3
India	1.1	1.2	1.2	1.3	1.5	1.6	1.7	1.9	2.0	0.4	0.2	0.5
Indonesia	1.2	1.3	1.4	1.5	1.7	1.8	2.0	2.1	2.3	0.5	0.3	0.6
Latvia	3.6	3.9	4.1	4.3	4.6	5.0	5.4	5.7	6.1	1.0	0.6	1.5
Lithuania	4.6	5.0	5.3	5.7	6.1	6.6	7.1	7.5	8.0	1.5	0.9	2.1
Malaysia	2.0	2.1	2.3	2.5	2.7	3.0	3.2	3.5	3.8	0.8	0.5	1.1
Mexico	2.7	2.9	3.2	3.5	3.8	4.2	4.6	5.0	5.4	1.1	0.8	1.5
Pakistan	0.8	0.9	0.9	1.0	1.1	1.1	1.2	1.3	1.4	0.2	0.1	0.3
Philippines	1.4	1.4	1.6	1.7	1.8	2.0	2.1	2.3	2.5	0.5	0.3	0.6
Poland	4.6	5.0	5.4	5.9	6.4	7.0	7.5	8.1	8.7	1.8	1.2	2.5
Romania	3.8	4.1	4.4	4.7	5.1	5.5	6.0	6.4	6.9	1.3	0.8	1.8
Russia	3.5	3.8	4.0	4.3	4.6	5.0	5.3	5.7	6.0	1.1	0.7	1.6
Saudi Arabia	2.7	3.0	3.2	3.5	3.8	4.1	4.5	4.9	5.4	1.0	0.7	1.4
South Africa	3.6	3.9	4.1	4.4	4.7	5.0	5.4	5.7	6.1	1.1	0.7	1.6
Thailand	2.8	3.0	3.3	3.6	3.9	4.3	4.6	4.9	5.2	1.1	0.8	1.5
Turkey	3.5	3.7	4.0	4.4	4.8	5.2	5.7	6.2	6.7	1.3	0.9	1.8
Ukraine	4.0	4.3	4.5	4.8	5.2	5.6	6.0	6.3	6.7	1.2	0.7	1.7
Average:	5.4	5.9	6.4	7.0	7.6	8.3	8.9	9.6	10.3	2.2	1.5	3.0
Advanced	7.3	7.9	8.7	9.5	10.4	11.2	12.1	13.0	13.9	3.0	2.1	4.1
Emerging	2.5	2.7	2.9	3.2	3.5	3.8	4.1	4.4	4.7	1.0	0.6	1.3

Sources: OECD Health Database, WHO, and IMF staff estimates.

Note: The optimistic (pessimistic) scenario assumes excess cost growth that is 0.5 percentage points lower (higher) than in the baseline.

Appendix Table 6. Description of OECD Indicators on Health Institutions and Policies

Reform Areas/OECD Indicators	Descriptive statistics		Principal Component Analysis weights			
	Average	Standard deviation	Intensity of regulation	Reliance on market mechanism	Stringency of budget constraint	Degree of centralization
Budget caps						
Budget constraint	2.90	2.06	-	-	0.75	0.55
Consistency [1]	4.62	1.51	-	-	-0.41	0.29
Price controls						
Reg. of providers prices	4.26	1.05	0.04	-0.12		
Reg. of prices paid by third-party payers	4.55	0.75	-	-	0.00	0.19
Supply constraints						
Reg. of workforce and equipment	2.92	1.32	0.23	0.03	0.17	-0.09
Priority setting	3.02	1.16	-	-		
Public management and coordination						
Gate-keeping	3.07	2.40	0.68	0.48	0.06	0.02
Decentralization	1.92	1.72	-	-	0.36	-0.75
Delegation	0.89	0.98	-	-	-0.32	0.03
Contracting methods						
Volume incentives	3.14	1.13	-0.18	0.19	-	-
Market mechanisms						
Choice of insurers	1.31	1.77	-0.24	0.53	-	-
Insurer levers	0.74	1.44	-0.22	0.40	-	-
User information	1.08	1.28	-0.05	0.31	-	-
Private provision	2.77	1.34	-0.28	0.28	-	-
Choice among providers	4.43	2.05	-0.51	-0.02	-	-
Demand-side reforms						
Over-the-basic coverage	1.51	1.58	0.01	0.31	-	-
Price signals on users	1.16	0.59	0.03	-0.02	-	-

Sources: Joumard, Andre, and Nicq (2010) and IMF staff estimates.

[1]This is referred to as central government oversight in Table 1.

Appendix Table 7. Impact Estimates of Health Institutions and Policies

Dependent variable: log of real per capita public health spending		
	1995-2008	
Log of GDP per capita [1]	0.2954 **	(0.1124)
Log of age 14 and under [1]	0.1953	(0.1953)
Log of age 65 plus [1]	0.6766 ***	(0.2424)
Intensity of regulations	0.0017	(0.0011)
Reliance on market mechanisms	-0.0033 **	(0.0013)
Stringency of budget constraint	-0.0029 *	(0.0017)
Degree of centralization	0.0034 *	(0.0017)
R^2	0.135	
N	345	

Sources: Joumard, Andre, and Nicq (2010) and IMF staff estimates.

Note: * p<.1; ** p<.05; *** p<.01. Standard errors in parentheses.

[1] All variables expressed as first difference s. The coefficients are robust to different specifications. The relatively low R2 reflects the large variability in the annual changes observed in the data. Using a model with five-year differences produces similar results but increases R2 from 0.13 to 0.40.

Simulations of Reform Impacts

To estimate the impacts of these reforms on excess cost growth, a one-unit increase is applied to each of the 17 variables underlying the four composite indices; the resulting changes in the four composite indices are calculated based on the principal component analysis weights in Appendix Table 6. These changes are then multiplied by the coefficients from the regression analysis (Appendix Table 7) to get the impacts on ECG, with a negative sign indicating a decrease in ECG (Table 1).

To further illustrate the potential impacts of these reforms on public health spending growth in each country, in all of the variables that are shown to reduce ECG, country scores are raised to the mean if their scores are below the mean. This provides the basis of the estimates of the savings under each of the categories in Figure 12. Appendix Table 8 provides a list of countries scoring below the mean in different categories and the types of reform strategies that would help them improve performance in these areas.

Appendix Table 8. Potential Reform Strategies for Different Country Groupings

Potential Reform Strategies for Different Countries	
Countries Scoring Below Mean	**Potential Reform Strategies**
1) Budget Caps: Budget Constraint	
Australia; Austria; Belgium; Czech Republic; Denmark; Finland; France; Germany; Greece; Iceland; Japan; Korea; Luxembourg; Netherlands; Slovak Republic; Spain; Switzerland; United States.	Make health sector budgets more stringent. Countries should: introduce prospective budget caps for the most critical health services where there are none; reduce flexibility on overruns for existing caps; or target caps at the entire health sector.
2) Budget Caps: Central Oversight of Key Decisions	
Belgium; Czech Republic; Finland; France; Germany; Greece; Iceland; Ireland; Korea; Luxembourg; Netherlands; New Zealand; Norway; Slovak Republic; Spain; Switzerland; United States.	Increase the role of the center in oversight of macro-level decisions related to resource allocation. For example, the total budget dedicated to health care and level of social contributions. Although consistency declines when several levels of government are involved in key decisions, this is correlated with low cost growth.
3) Supply Constraints: Regulation of Workforce and Equipment	
Czech Republic; Finland; Germany; Greece; Iceland; Japan; Korea; Luxembourg; Netherlands; New Zealand; Sweden; Switzerland; United Kingdom; United States.	Exert greater central control over physician numbers and hospital activities and staff. For example, moving from hospitals with full autonomy towards negotiating capacity and staffing levels with government.
4) Supply Constraints: Priority Setting	
Austria; Canada; Czech Republic; Finland; Germany; Greece; Iceland; Italy; Luxembourg; Portugal; Spain; Sweden; United States.	Put more emphasis on affordability in terms of deciding the publicly funded benefit package. For example, complement cost-effectiveness evaluation with a consideration of budget impact; use positive lists; and regulate the coverage of new procedures by the state via guidelines.
5) Public Management: Sub-national Government Involvement	
Belgium; Czech Republic; France; Germany; Greece; Iceland; Ireland; Korea; Luxembourg; Netherlands; Portugal; Slovak Republic.	Increase the number of health policy decisions taken at a subnational level, such as decisions on remuneration methods and financing new facilities. For example, involve lower levels of government in health policy decisions alongside central government or delegate policy responsibility to regions/states.
6) Public Management: Gatekeeping	
Australia; Austria; Belgium; Czech Republic; Greece; Ireland; Japan; Korea; Luxembourg; Sweden; Switzerland.	Create incentives to steer demand to more appropriate resources. For example, encouraging patients to register with a primary care physician, or requiring a compulsory referral to access secondary care.
7) Market Mechanisms: User Choice of Insurers	
Australia; Belgium; Canada; Denmark; Finland; Iceland; Ireland; Italy; Korea; Luxembourg; New Zealand; Norway; Portugal; Spain; Sweden; United Kingdom.	Increase the degree of user choice over insurers (including not-for-profit public insurers). For example, by increasing the number of insurers. Most relevant for Public Contract health care systems.
8) Market Mechanisms: Insurance Levers	
Australia; Austria; Belgium; Canada; Czech Republic; Denmark; Finland; France; Germany; Greece; Iceland; Ireland; Italy; Japan; Korea; Luxembourg; Netherlands; New Zealand; Norway; Portugal; Slovak Republic.	Allow greater freedom to insurers to vary the scope, premium, etc., for basic insurance packages and more freedom in negotiating with health providers. Most relevant for Public Contract and Private Insurance health care systems.
9) Market Mechanisms: Private Provision	
Czech Republic; Finland; Iceland; Ireland; Italy; New Zealand; Portugal; Spain; Sweden; United Kingdom.	Foster contestability by allowing/encouraging greater private provision of both primary and acute care (regardless of financing source).
10) Market Mechanisms: Choice Among Providers	
Austria; Denmark; Finland; Greece; New Zealand; Portugal; Spain.	Allow greater patient choice over primary care physicians, specialists and hospitals, even if some limitations remain.
11) Demand-Side Reforms: Over-the-Basic Coverage	
Austria; Czech Republic; Denmark; Finland; Greece; Iceland; Italy; Japan; Korea; Luxembourg; Norway; Portugal; Slovak Republic; Sweden; United Kingdom.	Encourage insurers to offer complementary (e.g., reimbursing patients for cost-sharing required by the public system) and supplementary (e.g., filling gaps not covered by the public system) insurance over-the-basic packages.

Source: IMF staff estimates, based on Joumard, Andre, and Nicq (2010).
Note: The policy reform strategies indicate the characteristics of countries that score highly in each index. Hence, all of the identified reforms may not necessarily apply to every country scoring below the mean. For Greece, the assessment does not take into account the effect of recent reforms.

Appendix III. Measuring the Efficiency of Public Health Spending

Introduction

Efficiency studies provide important insights for health care reform. These studies generally find that there are substantial inefficiencies in many countries, as measured by the relationship between spending inputs and health outcomes. This implies that achieving better health outcomes is possible by addressing these inefficiencies, even if spending does not increase.

Overview of different approaches

Nonparametric methods

Under a nonparametric technique such as Data Envelopment Analysis (DEA), the first step in assessing efficiency is to create a production frontier that links spending inputs and health outcomes (e.g., public health spending per capita and life expectancy). The production frontier indicates the combinations of spending inputs and outputs that are equally efficient. The distance of countries to the frontier is the measure of their inefficiency. Free Disposable Hull (FDH) analysis is similar to DEA but is less restrictive (see Gupta and Verhoeven, 2001, for further discussion).

The major advantage of nonparametric techniques is that no assumption is made about the functional form of the relationship between spending inputs and outputs. The drawback is that the frontier is formed by the outliers that establish "best practices," with a large risk of measurement error.

Parametric methods

Under a regression (REG) approach, researchers typically take advantage of the panel structure of data (e.g., WHO or OECD Health data) to utilize a large number of observations (e.g., Evans and others (2000), WHO (2000)). This approach allows for the inclusion of a large number of explanatory variables. Efficiency is typically measured in terms of the size of the country fixed effect in the equation. Under Stochastic Frontier Analysis (SFA), regression analysis is used to estimate the production frontier, and the efficiency of spending is measured using the residuals from the estimated equation. The disadvantage of these techniques is that a functional form of the relationship between spending inputs and outputs must be assumed.

Empirical Findings

Nonparametric methods

Joumard and others (2008, 2010) take into account three variables as inputs in explaining cross-country differences in health status in the OECD: health care spending per capita, a proxy for economic status derived from the Program for International Student Assessment (PISA) education survey, and a lifestyle variable. The main findings are that population health status could be improved significantly in most OECD countries by raising the efficiency of spending, and that increasing per capita health spending would have smaller effects on life expectancy than improvements in efficiency.

A large number of studies, including by staff of the Fiscal Affairs Department, have used DEA and FDH to evaluate the efficiency of education and health care expenditure (Gupta and Verhoeven (2001), Hauner (2007), Mattina and Gunnarsson (2007), Verhoeven, Gunnarsson and Carcillo (2007), and Gupta and others (2008)). These papers all conclude that there is considerable inefficiency in health spending in many countries.

Parametric methods

Joumard and others (2008, 2010) estimate a panel regression and finds that health care spending, lifestyle, and socio-economic factors are all important determinants of population health status. Importantly, the ranking of countries (in terms of efficiency) is similar to that obtained using their DEA analysis. Evans and others (2000) and The World Health Report (2000) estimate a fixed effects (FE) model by using data from 191 countries from 1993–1997. Hollingsworth and Wildman (2003) reexamine WHO's study by using both a time-variant FE model and DEA. They find that non-OECD countries show more variation in efficiency than OECD countries. Using the same WHO data, Self and Grabowski (2003) find that the comparatively higher life expectancy in wealthier countries is not a result of greater public health expenditures. In middle-income and less-developed countries, however, there is some evidence that public spending does improve health outcomes. Hollingsworth and Wildman (2003) implement a SFA and compare its results with DEA and REG. They find a high degree of correlation in efficiency measures across methods, as in Joumard and others (2008, 2010).

References

Arze del Granado, J., S. Gupta, and A. Hajdenberg, 2010, "Is Social Spending Procyclical?" IMF Working Paper No.10/234 (Washington: International Monetary Fund).

Baldacci, E., and others, 2008, "Social Spending, Human Capital, and Growth in Developing Countries," *World Development,* Vol. 36, pp. 1317–41.

Baldacci, E., and others, 2010, Public Expenditures on Social Programs and Household Consumption in China, IMF Working Paper No. 10/69 (Washington: International Monetary Fund).

Baltagi, B. H., and F. Moscone, 2010, "Health Care Expenditure and Income in the OECD Reconsidered: Evidence from Panel Data," IZA Discussion Paper 4851 (Bonn: Institute for the Study of Labor).

Barnett, S., and R. Brooks, 2010, "China: Does Government Health and Education Spending Boost Consumption?" IMF Working Paper No.10/16 (Washington: International Monetary Fund).

Blomqvist, A., and R. Carter, 1997, "Is Health Care Really a Luxury?" *Journal of Health Economics*, Vol. 16, No. 2, pp. 207–29.

Brereton, L., and V. Vasoodaven, 2010, "The Impact of the NHS Market: An Overview of the Literature," CIVITAS: Institute for the Study of Civil Society.

Busato, A., and G. von Below, 2010, "The Implementation of DRG-based Hospital Reimbursement in Switzerland: A Population-based Perspective," *Health Research Policy and Systems*, Vol. 8, No. 31.

Christiansen, T., M. Bech, J. Lauridsen, and P. Nielsen, 2006, "Demographic Changes and Aggregate Health-Care Expenditure in Europe," ENEPRI Research Report 32 (Brussels: European Network of Economic Policy Research Institutes).

Carrion-i-Silvestre, J.L., 2005, "Health Care Expenditure and GDP: Are They Broken Stationary?" *Journal of Health Economics*, Vol. 24, pp. 839–54.

Chamon, M., and E. Prasad, 2008, "Why Are Saving Rates of Urban Households in China Rising?" *American Economic Journal,* Vol. 2, No. 1, pp. 93–130.

Chernew, E. M., A. B. Rosen, and A. M. Fendrick, 2007, "Value-Based Insurance Design," *Health Affairs*, Vol. 26, No. 2, pp. 195–203.

Chou, S.-Y., J.-T. Liu, and J. K. Hammitt, 2003, "National Health Insurance and Precautionary Saving: Evidence from Taiwan," *Journal of Public Economics*, Vol. 87, pp. 1873–94.

Clemente, J., C. Marcuello, A. Montañes, and F. Pueyo, 2004, "On the International Stability of Health Care Expenditure Functions: Are Government and Private Functions Similar?" *Journal of Health Economics*, Vol. 23, pp. 569–613.

Committee for a Responsible Federal Budget, 2010, "Principle #5: Continued Vigilance in Health Reform" (Washington).

Congressional Budget Office (CBO), 2008, *Evidence on the Costs and Benefits of Health Information Technology*, Publication No. 2976 (Washington: U.S. Government Printing Office).

———, 2010, Preliminary Analysis of the Rivlin-Ryan Health Care Proposal, analysis transmitted by letter to Rep. Paul Ryan.

Crivelli, E., A. Leive, and T. Stratmann, 2010, "Subnational Health Spending and Soft Budget Constraints in OECD Countries," IMF Working Paper No. 10/147 (Washington: International Monetary Fund).

Cutler, D., and M. McClellan, 2001, "Is Technological Change in Medicine Worth It?" *Health Affairs*, Vol. 20, No. 5, pp. 11–29.

Docteur, E., and H. Oxley, 2003, "Health-Care Systems: Lessons from the Reform Experience," OECD Health Working Papers No. 9 (Paris: Organization for Economic Cooperation and Development).

Dreger, C., and H.E. Reimers, 2005, "Health Care Expenditures in OECD Countries: A Panel Unit Root and Cointegration Analysis," IZA Discussion Paper 1469 (Bonn: Institute for the Study of Labor).

European Commission, 2009, "Aging Report: Economic and Budgetary Projections for the EU-27 Member States, 2008–2060," European Economy Economic Papers No. 2 (Brussels: European Commission and Economic Policy Committee).

Evans, D. B., and others, 2000, "The Comparative Efficiency of National Health Systems in Producing Health: An Analysis of 191 Countries," *GPE Discussion Paper Series*: No. 29 (Geneva: World Health Organization).

Forgione, D., and others, 2004, "The Impact of DRG-based Payment Systems on Quality of Health Care in OECD Countries," *Journal of Health Care Finance*, Vol. 31, No. 1, pp. 41–54.

Gerdtham, U.G., and M. Löthgren, 2000, "On Stationarity and Cointergration of International Health Expenditure and GDP," *Journal of Health Economics*, Vol. 19, pp. 461–75.

Gottret, P., and G. Schieber, 2006, Health Financing Revisited: A Practioner's Guide (Washington: The World Bank).

Gruber, J., 2006, "The Role of Consumer Copayments for Health Care: Lessons from the RAND Health Insurance Experiment and Beyond" (Washington: The Henry J. Kaiser Family Foundation).

Gupta, S., 2010, "Effects of Development Assistance on Domestic Health Expenditure," The Lancet, Vol. 376, August, pp. 593–94.

Gupta, S., and others, 2008, *Fiscal Management of Scaled-Up Aid* (Washington: International Monetary Fund).

Gupta, S., and M. Verhoeven, 2001, "The Efficiency of Government Expenditures: Experiences from Africa," *Journal of Policy Modeling*, Vol. 23, pp. 433–67.

Haigst, C., and L. Kotlikoff, 2005, "Who's Going Broke? Comparing Health Care Costs in Ten OECD Countries." NBER Working Paper No. 11833 (Cambridge: National Bureau of Economic Research).

Hauner, D., 2007, "Benchmarking the Efficiency of Public Expenditure in the Russian Federation," IMF Working Paper No. 07/246 (Washington: International Monetary Fund).

Herwartz, H., and B. Theilen, 2002, "The Determinants of Health Care Expenditure: Testing Pooling Restrictions in Small Samples," *Journal of Health Economics*, Vol. 12, pp. 113–24.

Hillestad, R., and others, 2005, "Can Electronic Medical Record Systems Transform Healthcare? An Assessment of Potential Health Benefits, Savings, and Costs," *Health Affairs*, Vol. 24, No. 5.

Hollingsworth B., and J. Wildman, 2003, "The Efficiency of Health Production: Re-estimating the WHO Panel Data Using Parametric and Non-parametric Approaches to Provide Additional Information," *Economics of Health Care Systems*, Vol.12, pp. 493–504.

Hsiao, W., and P. Heller, 2007, *What Macroeconomists Should Know about Health Care Policy* (Washington: International Monetary Fund).

International Monetary Fund, 2010a, "From Stimulus to Consolidation: Revenue and Expenditure Policies in Advanced and Emerging Economies," IMF Departmental Paper No. 10/03 (Washington).

———, 2010b, "United States: Staff Report for the 2010 Article IV Consultation," IMF Country Report 10/249 (Washington).

———, 2010c, "Fiscal Exit: From Strategy to Implementation," Fiscal Monitor, November (Washington).

Iwamoto, Y., and others, 2005, "Policy Options for Health Insurance and Long-term Care Insurance," ESRI Collaboration Projects 2004, Macroeconomic Issues (Japan: Economic and Social Research Institute).

Jackson, R., N. Howe, and K. Nakashima, 2010, *The Global Aging Preparedness Index*, Center for Strategic International Studies.

Jones, R.S., 2010, "Health-Care Reform in Korea," Economics Department Working Paper No. 797 (Paris: Organization for Economic Cooperation and Development).

Joumard, I., C. Andre, C. Nicq, and O. Chatal, 2008, "Health Status Determinants: Lifestyle, Environment, Health Care Resources and Efficiency," OECD Economics Department Working Papers, No. 627 (Paris: Organization for Economic Cooperation and Development).

Joumard, I., C. Andre, and C. Nicq, 2010, "Health Care Systems: Efficiency and Institutions," Economics Department Working Paper No. 769 (Paris: Organization for Economic Cooperation and Development).

Lu, J.-F., and W. C. Hsiao, 2003, "Does Universal Health Insurance Make Health Care Unaffordable? Lessons From Taiwan," *Health Affairs*, Vol, 22, No. 3, pp. 77–88.

Mattina, T., and V. Gunnarsson, 2007, "Budget Rigidity and Expenditure Efficiency in Slovenia," IMF Working Paper No. 07/131 (Washington: International Monetary Fund).

Musgrove, P., 1996, "Public and Private Roles in Health: Theory and Financing Patterns," HNP Discussion Paper (Washington: World Bank).

Newhouse, J., and the Insurance Experiment Group, 1993, *Free for All? Lessons from the RAND Health Insurance Experiment* (Cambridge, Massachusetts: MIT Press).

Nyman, John A., 1999, "The Value of Health Insurance: The Access Motive," *Journal of Health Economics*, Vol. 18, No. 2, pp. 141–52.

Okunade, A.A., M.C. Karakus, and C. Okeke, "Determinants of Health Expenditure Growth of the OECD Countries: Jackknife Resampling Plan Estimates," *Health Care Management Science*, Vol. 7, No. 3, pp. 173–83.

Organization of Economic Cooperation and Development (OECD), 2006, Projecting OECD Health and Long-Term Care Expenditures: What are the Main Drivers?" Economic Department Working Paper No. 477 (Paris).

———, 2009, *Achieving Better Value for Money in Health Care* (Paris).

Or, Z., and U. Hakkinen, 2010, "DRGs and Quality: For Better or Worse," 8th European Conference on Health Economics, Helsinki, July 7–10.

Oxley, H., and M. MacFarlan, 1995, Health Care Reform: Controlling Spending and Increasing Efficiency, OECD Economic Studies No. 24 (Paris: Organization for Economic Cooperation and Development).

O'Connell, J.M., 1996, "The Relationship between Health Expenditures and the Age Structure of the Population in OECD Countries," *Journal of Health Economics*, Vol. 5.

Paris, V., M. Devaux, and L. Wei, 2010, "Health Systems Institutional Characteristics: A Survey of 29 OECD Countries," OECD Health Working Paper No. 50 (Paris: Organization for Economic Cooperation and Development).

Pomp, M., and S. Vujic, 2008, "Rising Health Spending, New Medical Technology, and the Baumol Effect," CPB Discussion Paper No. 115 (The Hague: Central Plan Bureau).

Przywara, B., 2010, "Projecting Future Health Care Expenditure at European Level: Drivers, Methodology, and Main Results," European Economy Economic Papers No. 417. (Brussels: European Commission and Economic Policy Committee).

Self, S., and R. Grabowski, 2003, "How Effective is Public Health Expenditure in Improving Overall Health? A Cross-country Analysis," *Applied Economics*, Vol. 7, pp. 835–45.

Sivard, R., 1974–96, various editions, *World Military and Social Expenditures* (Leesburg, VA: WMSE Publications**).**

Smith, S., J. Newhouse, and M. Freeland 2009, "Income, Insurance, and Technology: Why Does Health Spending Outpace Economic Growth?" *Health Affairs*, Vol. 28, No. 5, pp. 1276–84.

Thornton, J., and A. Mati, 2008, "Fiscal Institutions and the Relation between Central and Sub-National Government Fiscal Balances," *Public Finance Review*, Vol. 36, No. 2, pp. 243–54.

United States, Senate, Joint Committee on Taxation, *Tax Expenditures for Health Care: Hearing Before the Senate Committee on Finance*, July 30, 2008 (JCX-66-08) (Washington: Government Printing Office).

Verhoeven, M., V. Gunnarsson, and S. Carcillo, 2007, "Education and Health in G-7 Countries: Achieving Better Outcomes with Less Spending," IMF Working Paper No. 07/263 (Washington: International Monetary Fund).

Wagstaff, A., and others, 2009, "China's Health System and Its Reform: A Review of Recent Studies," *Health Economics*, Vol. 18, pp. S7–S23.

Wen, C. P., S. P. Tsai, and W.-S. I. Chung, 2008, "A 10-Year Experience with Universal Health Insurance in Taiwan: Measuring Changes in Health and Health Disparity," Annals of Internal Medicine, Vol. 148, No. 4, pp. 259–66.

World Bank, 2010, "Population Aging and Fiscal Sustainability in APEC Economies: Simulations of Pension and Health Care Expenditures," Unpublished Report.

World Health Organization, 2000, "*Health Systems: Improving Performance*," The World Health Report (Geneva).