

PUBLIC EXPENDITURE EFFICIENCY IN IRELAND¹

A. Introduction

1. Ireland's successful fiscal consolidation and growth turnaround have created fiscal space in the medium term under the SGP, but more efficient public spending could further increase the "effective" fiscal space. A more efficient delivery of public services could yield better outcomes for a given cost, or the same quality of outcome at a lower cost. It would also provide for contingency in case the assumptions underpinning the existing fiscal space calculations do not materialize and help rechannel fiscal resources toward their most productive use. More efficient public spending can also help support medium-term growth and make the economy more resilient to future shocks.

2. This paper reviews public expenditure efficiency in Ireland with a view to highlight areas for further improvement and suggest policies to this effect. Ireland's nominal public expenditure is analyzed in a cross-country context,² while also taking into account differences in income per capita among countries to reflect the fact that richer countries generally tend to have a higher demand for public services. The structure of the paper is as follows: First, the paper presents recent trends and analysis of public expenditure by economic classification (e.g. current expenditure and capital expenditure), with the focus on infrastructure spending and on key components of the functional budget: social protection, health, and education. Then the paper highlights avenues for improvement in these areas. Finally, analytical measures of potential efficiency gains estimated using the Data Envelopment Approach will provide numerical illustrations of potential "efficiency gains" in two sectors, health and education. Health was chosen because it stands out as the only area where Ireland appears to spend more than the average of its EU peers, and education because of the rich set of indicators available to evaluate the quality of education outcomes (including, but not, only standardized academic tests).

B. Public Expenditure by Economic Classification

3. The overall level of public expenditure places Ireland currently in the low-to-average spender category, depending on the yardstick and peer group used for comparison (Box 1). With a ratio of 35 percent of general government expenditure to GDP in 2015 (Table 1), Ireland is below the OECD countries average. When using GNP this ratio climbs to 42 percent, at about the OECD average but still below key European comparators. Ireland has recorded one of the largest decreases in expenditure to GDP ratio since the outbreak of the crisis between 2009 and 2014 (with Lithuania, Latvia and Romania) (Figure 1). Comparable countries in terms of income per capita

¹ Prepared by Alexandre Chailloux.

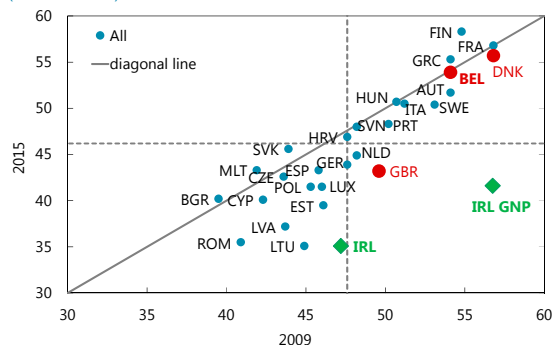
² The paper uses data from the public expenditure database assembled by the IMF's Fiscal Affairs Department and combining Eurostat, OECD, UNESCO and CSO statistical resources. Comparator countries include a peer group comprising 28 European Union countries plus Iceland, Norway and Switzerland, and when relevant, broader set of OECD countries serves as a benchmark.

(Belgium, Denmark) have seen little change in spending or staged moderate decreases (United Kingdom). From a peak of about 45 percent ex-financial sector support measures in the years 2009–2011, total public spending has receded to about 35 percent of GDP in 2015. Expenditure reduction happened through a consolidation program of two thirds of targeted expenditure reductions and one third of revenue measures. The incremental reduction in the primary expenditure ratio to GDP was achieved through GDP growth.

Figure 1. Overall Level of Expenditures, Public Sector Wage Bill and Peer Comparisons

Total Spending, 2009 vs 2015

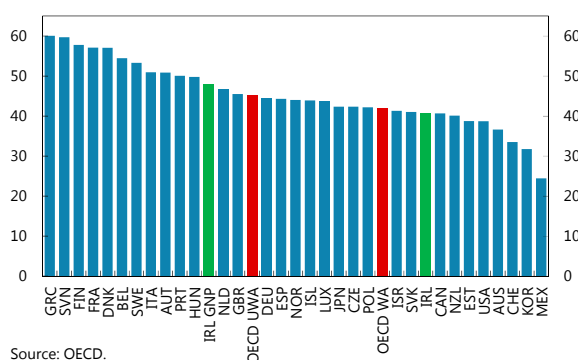
(Percent of GDP)



Source: Eurostat.

General Government Expenditure, 2013

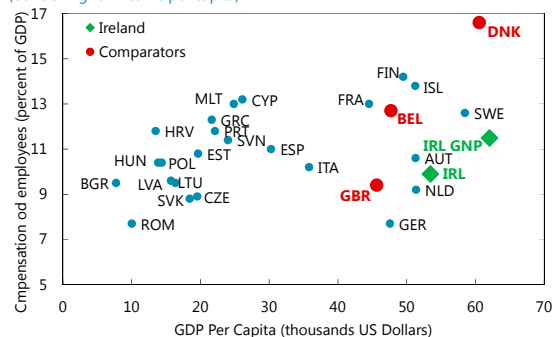
(Percent of GDP)



Source: OECD.

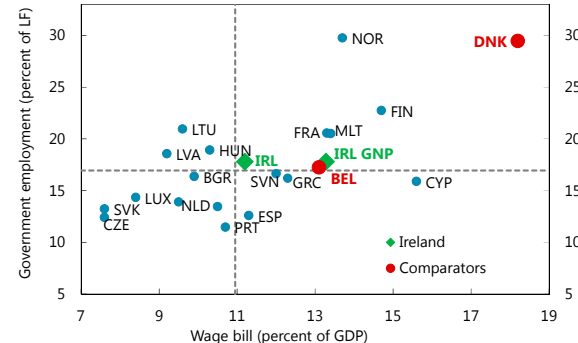
Compensation of Employees, 2014

(Controlling for income per capita)



Sources: Eurostat; and General Government Statistics.

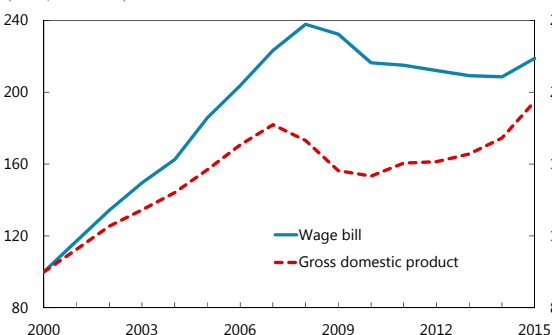
General Government Wages and Employment, 2014



Source: OECD.

Public Sector Wage Bill and Gross Domestic Product

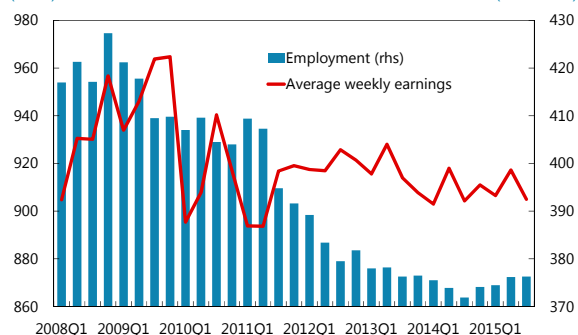
(Index, 2000=100)



Sources: Central Statistics Office; and IMF staff calculations.

Public Sector Employment and Average Weekly Earnings

(Euros)



Source: Central Statistics Office.

Box 1. Benchmarking Expenditures Adequately: What Yardstick to Use?

As pointed out in Abbas (IMF, 2012), the assessment of Ireland's level of public expenditure can be ambiguous depending on whether public spending is presented as a ratio to Gross Domestic Product (GDP) or to Gross National Product (GNP). In particular, ratios to GDP may misrepresent the resources available to finance expenditures on a sustainable basis, at a time when the wedge between GDP and GNP (the income accruing to foreign-owned non-financial corporations) was widening, and strictly domestic sources of tax revenues dwindling. Since then the GDP/GNP wedge has stabilized, thanks notably to the vigorous recovery of domestic demand starting in 2013. In addition, recent trends in terms of revenue collection have also highlighted the dynamic contribution of foreign-owned corporations to corporation tax receipts. For this reason, the following analysis will highlight key metrics both in terms of ratio to GDP and GNP.

Table 1. Ireland: General Government Expenditure by Functional Classification

	2007	2008	2009	2010	2011	2012	2013	2014	2015	Difference (2009-2015)	
	(percent of GDP)									(ppts of GDP)	(share of total exp consolidation)
Total expenditure	35.9	41.9	47.2	65.7	45.5	41.8	39.7	38.6	35.1	-12.1	100.0
Current spending	20.6	23.3	25.5	25.7	24.7	25.1	24.7	23.6	21.0	-4.5	37.2
Compensation of employees	10.1	11.3	12.2	11.6	11.0	10.8	10.4	9.9	9.1	-3.1	25.6
Goods and services	4.9	5.4	5.9	5.4	4.9	4.7	4.6	4.6	4.3	-1.6	13.2
Interest payments	1.0	1.3	2.0	3.0	3.4	4.1	4.3	4.0	3.1	1.1	-9.1
Subsidies	0.9	1.0	1.1	1.1	1.0	1.1	1.0	1.0	0.9	-0.2	1.7
Current transfers	1.6	1.9	1.6	1.6	1.5	1.4	1.6	1.4	1.2	-0.4	3.3
Social benefits	2.1	2.4	2.7	3.0	2.9	3.0	2.8	2.7	2.4	-0.3	2.5
Capital spending	5.6	7.0	7.3	25.6	7.1	2.9	2.4	2.7	3.4	-3.9	32.2
Gross fixed capital formation	4.6	5.3	3.7	3.3	2.4	2.1	1.9	2.1	1.8	-1.9	15.7
Capital transfers	1.0	1.7	3.6	22.3	4.7	0.8	0.5	0.6	1.6	-2.0	16.5

Sources: Eurostat; and IMF staff calculations.

4. The breakdown of functional expenditure show what makes Ireland a low spending country relative to its peers. The wage bill at 9.8 percent of GDP (Table 2) appears at the bottom of countries with comparable income per capita, and largely below some of the comparators (such as Denmark, Belgium, Finland or Sweden). Public investment as a share of GDP also puts Ireland at the bottom of the list, ranking last among a group of 38 OECD countries (Figure 2). Table 2 highlights (in red when spending is 30 percent above the EU-28 average, and in blue when it is below by the same amount) that Ireland spending is markedly above the EU average only for a limited set of expenditure items, namely interest payments (4.4 percent of GDP), some sub-components of the wage bill (health), and social benefits paid by the department of social protection (1.8 percent of GDP). In a functional perspective, three domains contribute the most to this overall difference. Social protection (about one quarter of the difference), education (one fifth of the difference) and health expenditures, that stand at odds with other types of expenditure at about 12 percent above the EU average.

Table 2. Public Spending in Ireland vs. European Union, 2014 1/
(Percent of GDP; economic and functional classification)

	Total expenditure	Current spending	Compensation of employees	Goods and services	Subsidies	Interest payments	Current transfers	Social benefits	Capital spending 2/
Total expenditure	38.3	35.7	9.8	4.6	1.0	4.0	1.4	2.7	2.6
General public services	6.1	5.9	0.6	0.3	0.0	4.0	0.9	0.0	0.2
Defence	0.4	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0
Public order and safety	1.4	1.4	1.0	0.4	0.0	0.0	0.0	0.0	0.0
Economic affairs	3.2	2.0	0.7	0.7	0.4	0.0	0.1	0.0	1.2
Environment protection	0.6	0.5	0.2	0.2	0.1	0.0	0.0	0.0	0.1
Housing and community amenities	0.7	0.4	0.1	0.2	0.0	0.0	0.0	0.0	0.3
Health	7.6	7.4	3.5	1.4	0.2	0.0	0.0	1.6	0.2
Recreation, culture and religion	0.8	0.7	0.2	0.3	0.1	0.0	0.0	0.0	0.1
Education	4.3	4.0	2.6	0.4	0.2	0.0	0.1	0.2	0.3
Social protection	13.2	13.1	0.7	0.6	0.0	0.0	0.2	0.9	0.1

Source: Eurostat; and IMF staff estimates.

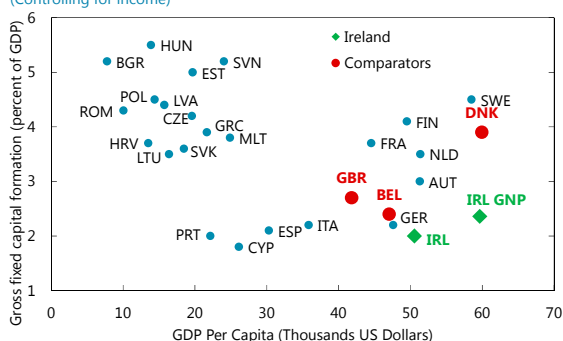
1/ Blue highlighted cells flag expenditure items coming out 30 percent below the EU average, and red highlight those 30 percent higher than the EU average.

2/ Capital spending includes gross capital formation and capital transfers.

Figure 2. Public Investment in International Context

Gross Fixed Capital Formation, 2014

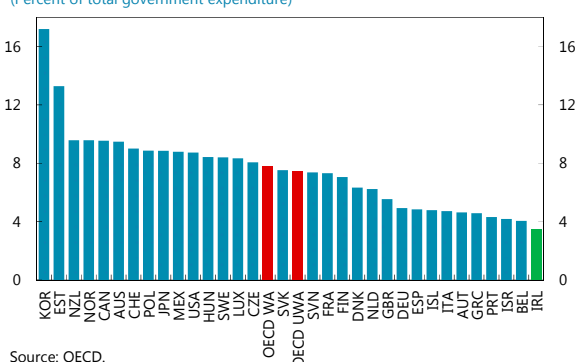
(Controlling for income)



Source: Eurostat (General Government Statistics).

Government Investment, 2014

(Percent of total government expenditure)



Source: OECD.

C. Public Expenditure Efficiency: Functional Spending Versus Key Outcomes

Public investment needs and infrastructure efficiency

5. Years of reduction in capital spending have brought public investment to a low point in Ireland. While the ongoing economic recovery has seen a sharp rebound in private investment from a low base, public investment in infrastructure has remained anemic at less than 2 percent of GDP. Ireland's openness to world trade and leading edge in some dynamic, high-value added segments of world trade creates a need for high quality infrastructure to support trade. Although the stock of public capital is high owing to substantial public investment in pre-crisis decades, calculations by the European Commission show that investment expenditure between 2013 and

2015 hardly sufficed to cover maintenance needs.³ The indicators available to assess the quality of Ireland core infrastructure (transport, telecom, logistical capacity) point to a mixed performance, generally above the EU median, but below comparable countries in terms of income per capita and of trade openness. The National Competitiveness Council, in its 2015 scorecard, flagged Infrastructure quality as a weak spot in Ireland's trade competitiveness. The World Economic Forum (WEF) survey-based quality of infrastructure index places Ireland at the 27th rank out of 146 countries (and 15 among 23 European countries), and the 2016 "Review of Infrastructure in Ireland"—published by [Engineers Ireland](#)—gave a C rating⁴ (on a A to E scale) to energy, transport, water quality, waste management, and water supply infrastructures.

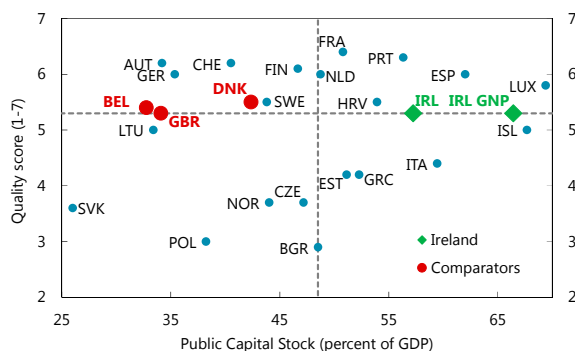
6. Ireland ranks well in terms of the quality of road network, but below average for quality of other core types of infrastructures. The power grid shows the 7th largest distribution losses in the EU. The need to restore water infrastructure is widely acknowledged and the investment plan developed by the new water utility Irish Waters will increase spending from €0.5 billion in 2016 to €0.8 billion in 2021. Trade supporting infrastructure (see port infrastructure quality and logistics index,⁵ Figure 3) is above EU median levels, but below European peers with a highly opened economy.⁶ Access to IT infrastructure (Internet, broadband) are at about the EU median but below countries with comparable income, at odds with Ireland's status of IT exporting powerhouse, although most of the demand for IT infrastructure appears to be currently in Dublin ("Silicon Docks"), where bottlenecks to future investment plans are less of a concern.

³ Country Report Ireland, European Commission, February 2016, also Kennedy "Public Capital: Investment, Stocks and Depreciation", IFAC, June 2016.

⁴ A C rating stands for "Inadequately maintained, and/or unable to meet peak demand, and requiring significant investment".

⁵ The Quality of port infrastructure measures business executives' perception of their country's port facilities. Data are from the World Economic Forum's Executive Opinion Survey, conducted for 30 years in collaboration with 150 partner institutes. Quality of port infrastructure index ranges from 1=extremely underdeveloped to 7=well developed and efficient by international standards. The Logistics Performance Index is based on surveys conducted by the World Bank in partnership with academic and international institutions and private companies and individuals engaged in international logistics. Quality of trade and transport-related infrastructure is ranked from 1=low to 5=high.

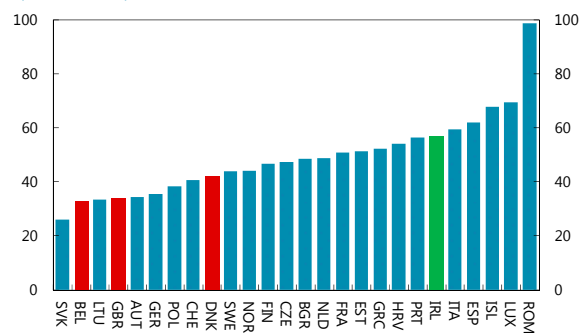
⁶ The somewhat weaker port quality relative to peers may be linked to a lower demand for port infrastructure as the pharma-chemical industry, that dominates goods exports, produces relatively light-weight items, while computer/financial services make up 30 percent of Irish exports.

Figure 3. Core Infrastructure Quality Outcomes**Public Capital Stock and Quality of Roads, 2012**

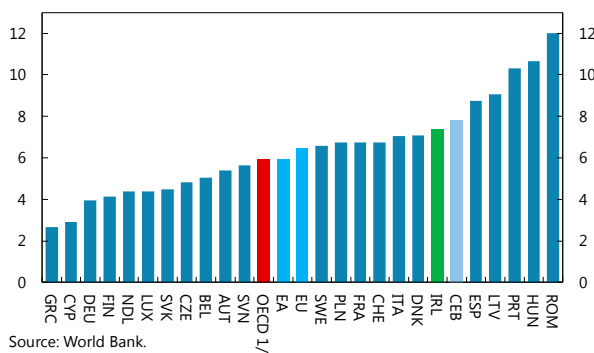
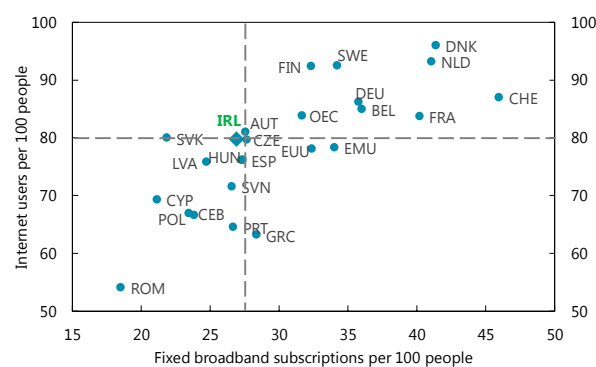
Sources: Global Competitiveness Report; and IMF staff calculations.

Public Capital Stock, 2012

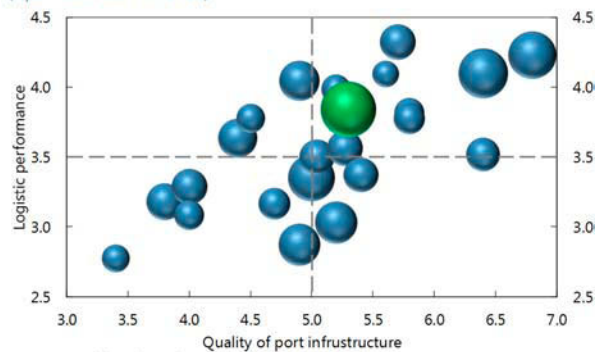
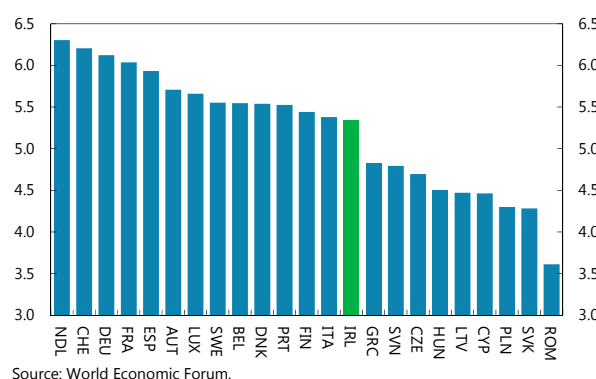
(Percent of GDP)

**Electric Power Transmission and Distribution of Losses, 2014**

(Percent of output)

**Internet and Broadband Usage, 2014****Port Infrastructure, Logistic Performance and Openness, 2015**

(Openness index=bubble size)

**Infrastructure Quality Index, 2015**

7. A broad consensus exists among stakeholders to raise infrastructure spending. The National Economic Dialogue in July 2015 (see also IBEC,⁷ National Competitiveness Council 2015) recommended restoring infrastructure spending as key to achieving sustainable growth in the medium-term. At the same time, the capital plan presented with Budget 2016 was generally deemed not sufficient. Questions also arise on whether the framework to set out an adequate long-term strategy is in place. The fall WEO 2014 chapter on public investment found that increased public infrastructure investment can raise output in both the short and long term when investment efficiency is high. Increasing efficiency is thus critical to mitigate the possible trade-off between higher output and higher public-debt-to-GDP ratios for debt financed projects. A key priority should be thus to raise the quality of infrastructure investment through: better project appraisal and selection, proper identification of infrastructure bottlenecks, centralized independent reviews, cost-benefit analysis, risk costing and improved project execution.

8. However, Ireland's public infrastructure investment framework needs to be strengthened. An ESRI study submitted in the context of the review of the public capital programme in 2014⁸ highlighted deficiencies in the public investment planning process in the last decade. It noted that while the 1993-1999 and 2000-2006 National Development plans had been built upon a complete series of targeted micro-economics and cost-benefit analysis, the 2006-2013 plan had been based on more limited evidence, for instance in the area of transport needs, leading to large projects whose value is now put into question (like the Western Rail Corridor, Phase 1). Going forward avoiding such mistakes will require meticulous evaluation and planning. As suggested by a recent ESRI study,¹⁹ a proper starting point to assess properly the stock of capital, detect infrastructure bottlenecks and evaluate maintenance needs would be to set up a centralized register of state assets, for which no central ledger exist. Regarding the regional dimension of infrastructure planning, a revision of National Spatial Strategy set out in 2006 should be undertaken.

Social protection

9. Social protection is the largest functional budget and represents about 40 percent of total expenditures (Figure 3). Social protection spending covering pensions, old age benefits, sickness and disability benefits, and other types of welfare transfers have increased during the crisis both in nominal terms and as a share of GDP, alongside the surge in unemployment and the increase in relative poverty and income inequality. Overall social protection spending in Ireland is lower than in other high-income European countries on both GDP or GNP metrics (Figure 3). This is partly explained by demographic factors: pension expenditures are about one third lower relative to peers because of the relative youth of Ireland's population and the smaller share of pensioners to the overall population.

⁷ IBEC policy brief, November 2015, John Carty and Neil Walker, "Does the Infrastructure and Capital Investment framework for 2016-21 go far enough?"

⁸ Submission to the Department of Public Expenditure and Reform on the review of the Public Capital Programme, Edgar Morgenroth, May 2014.

10. However, the lower level of social spending overall conceals the fact that non-pension benefits are higher than the EU average. For instance, sickness and disability benefits are higher as a share of GDP in Ireland than in the UK, Germany, or Belgium (Table 4), and have more than doubled as a share of GDP between 2000 and 2013 (Figure 4). Non-pension social protection spending is higher than in several peer countries and is at par with France, a high spending country for welfare expenditure. Distributional metrics (Figure 6), such as the share of social benefits going to the lowest and highest quintile in terms of income, suggest that welfare spending are less targeted than for the average of OECD countries.

Table 3. Share of Means-tested Social Benefits per Category for Ireland and Key Peer Countries, 2012 1/
(Percent of GDP)

	Social protection	Social insurance	Social assistance	Disability	Exclusion	Family & child	Health & sickness	Old age	Unemployment
Ireland	26.8	22.0	49.1	53.8	66.7	38.2	13.2	17.2	69.4
Belgium	5.1	0.4	25.5	21.7	75.0	0.0	0.0	1.0	0.0
Denmark	5.4	0.9	16.2	2.4	63.6	2.5	0.0	0.7	0.0
United Kingdom	14.4	6.1	48.2	42.1	50.0	10.5	2.2	7.9	42.9
France	10.9	3.9	39.7	19.0	100.0	19.2	0.0	3.9	5.0
Germany	12.0	3.6	41.3	26.1	100.0	37.5	1.0	0.0	50.0

Sources: Eurostat; and IMF staff calculations.

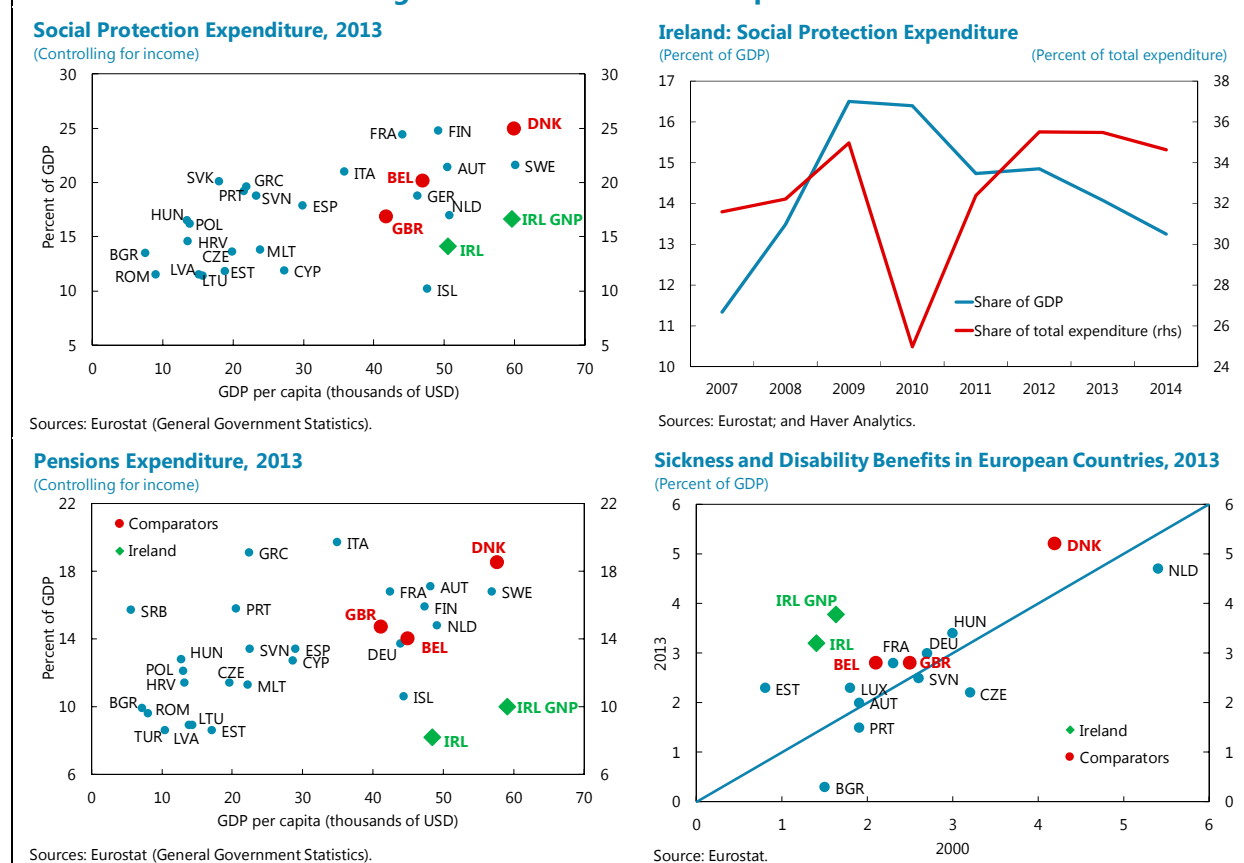
1/ ECA/SPEED only provides means tested benefit data for social assistance spending (which is an aggregate of non-contributory cash transfer programs and in-kind social assistance. Currently, does not include social care/services for most countries. Social assistance benefits include, inter alia: minimum-income programs, social pensions, disability benefits, family, child and birth allowances, heating, utility and housing benefits, war veteran benefits, and so on.)

Table 4. Social Protection Expenditures for Ireland and Key Peer Countries
(Percent of GDP, 2014)

	Social protection	Pensions	Pensions (excl. disability)	Old age benefits	Sickness & disability benefits	Non-pension social protection	Social exclusion
Ireland	15.7	8.4	5.2	4.1	3.2	7.3	0.7
Belgium	19.7	13.5	10.7	8.8	2.8	6.2	1.1
Denmark	25.1	13.5	8.3	8.3	5.2	11.6	1.9
United Kingdom	16.9	11.5	8.7	8.6	2.8	5.4	1.7
France	24.9	17.3	12.8	12.0	4.5	7.6	0.8
Germany	18.9	14.0	11	9.1	3.0	4.9	0.3

Sources: Eurostat; and IMF staff calculations.

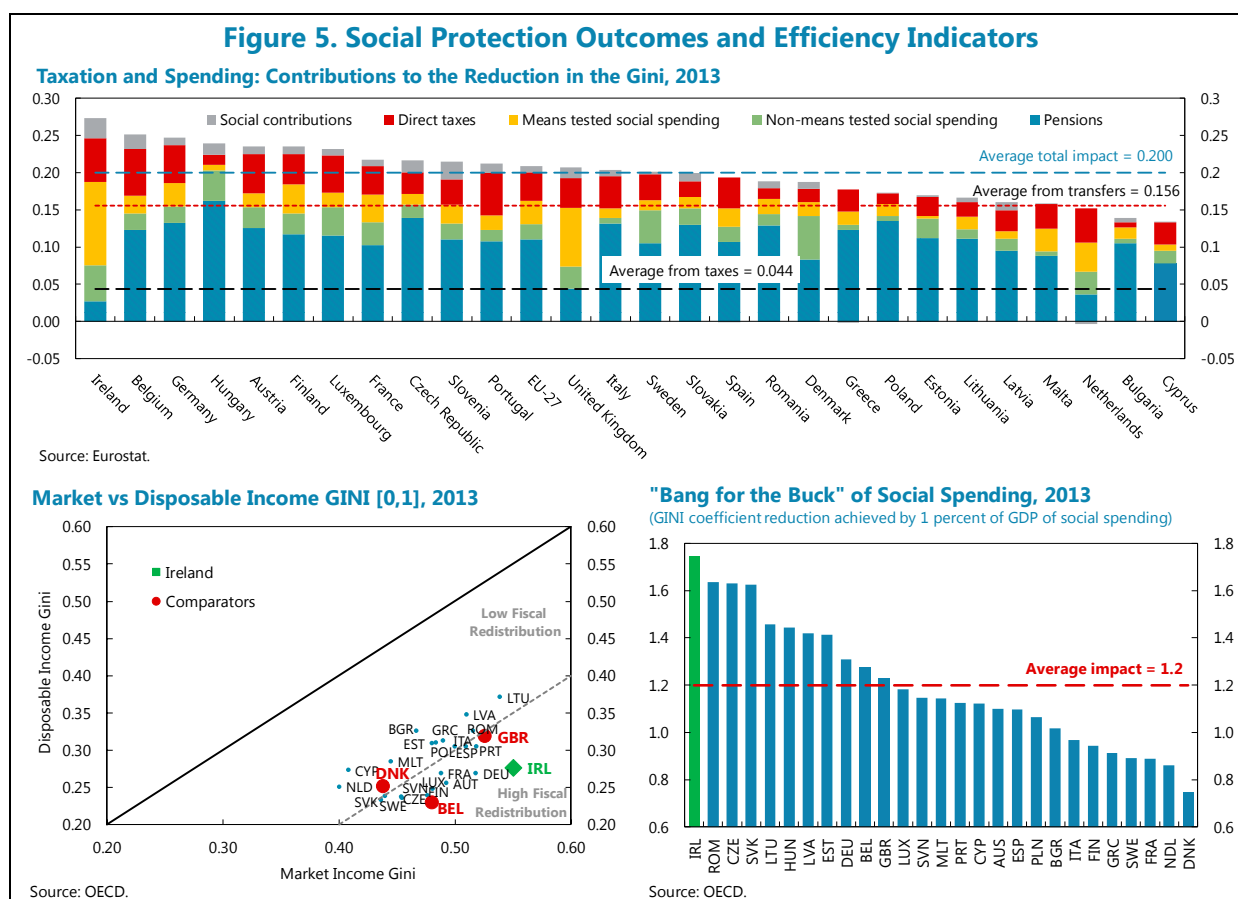
Figure 4. Social Protection Expenditures



11. Standard efficiency metrics suggest a very strong redistributive impact of social spending in Ireland. The Gini index reduction measure of efficiency of social spending⁹ puts Ireland on top of OECD countries for redistribution (Figure 5). The market income Gini index, which measures the concentration of income inequality pre-redistribution (maximum concentration puts the index at 1, absolute equality at zero), is reduced by 0.27 once calculated after social transfer, taxes and pensions. This the largest decrease among EU countries. Means-tested and non-means tested social transfers contribute to about two thirds of this reduction, direct taxes for about ¼, and pensions and social contributions the remainder. Another useful metric is the ratio of the amount of budget resources (as approximated by the ratio of social spending to GDP) used to achieve one unit of inequality reduction. This “bang for the buck” index¹⁰ of the efficiency of social spending suggests that Ireland, best performer among EU countries for this measure, is 45 percent more effective at reducing income inequality than EU countries on average.

⁹ Calculated by Eurostat using EUROMOD.

¹⁰ Calculated as the ratio of the Gini index reduction to the share of social protection expenditure in GDP, i.e. the amount of income inequality reduction achieved by 1 percent of GDP of social spending.



12. Despite a strong redistributive impact, the Irish welfare system has some gaps. In particular, certain cohorts most adversely affected during the crisis seem to benefit less from this redistribution. As a result, the absolute level of income inequality post-welfare transfers still remains high relative to comparator countries and somewhat close to the EU average (Figure 5, Chart 3).¹¹ This is related to the starting point, i.e. the fact that the market income Gini index for Ireland is the highest in the EU. The high efficiency of Ireland's redistribution still results in a level of absolute income inequality that is in the end average within its peer group, and higher than best-in-class comparators.

13. The relative level of poverty across age cohorts shows that some segments of the population are not benefiting as much from the social safety net as others (Figure 6). The targeting of social benefits toward the lowest income cohorts (lower quintile) does not seem to be as effective as for the average of the OECD. Despite a larger recourse to income testing than most continental European peers (Table 4) the amount of social spending channeled to the highest income quintile is larger than the amount transferred to the lowest quintile. The at-risk of poverty rate of the active population and younger cohorts is nearly twice that of pensioners. The relative poverty level of Irish youth has recorded the third largest increase among EU countries during the crisis, while at the same time the relative poverty level of the elderly had diminished by about

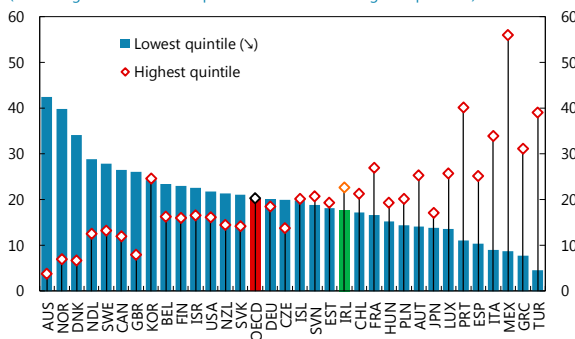
¹¹ The figure shows market income Gini and post-redistribution Gini index (Y axis).

8 percent. Young cohorts in the Irish society seem to bear a disproportionate burden from the crisis: the poverty risk (as measured by Eurostat: At Risk of Poverty index, AROPE) has increased markedly, nearly doubling for the 16 to 24 cohort, while it fell markedly for the elderly.

Figure 6. Targeting, Fairness of Redistribution and Cohort Issues

Social Benefits, 2014

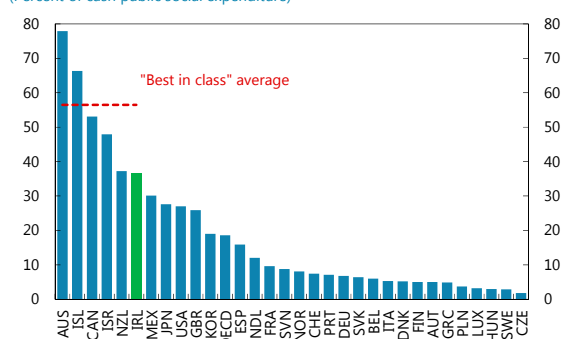
(Percentage of cash benefits paid to the lowest and highest quintiles)



Source: OECD.

Spending on Means or Income-tested Cash Benefits, 2012

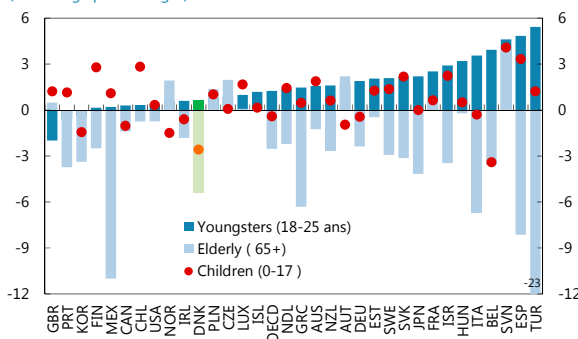
(Percent of cash public social expenditure)



Source: OECD.

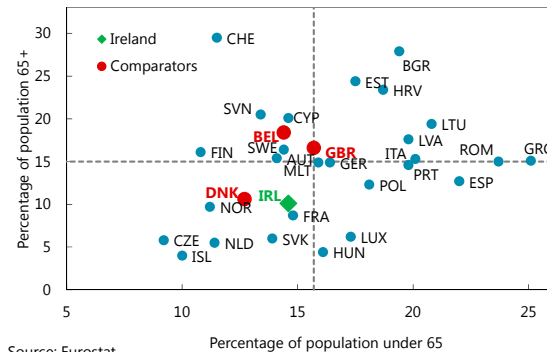
Relative Poverty Rates by Age Group, 2007 vs 2010

(Percentage point changes)



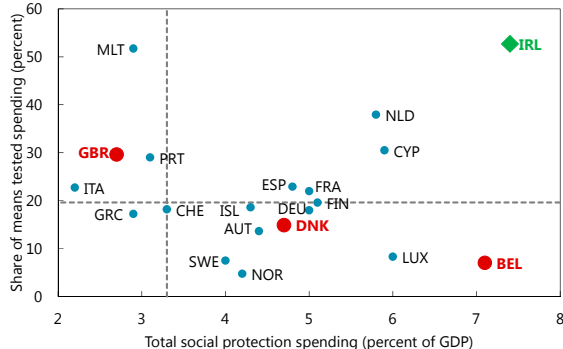
Source: OECD.

Risk of Poverty Rate after Social Transfers and Pensions, 2014



Source: Eurostat.

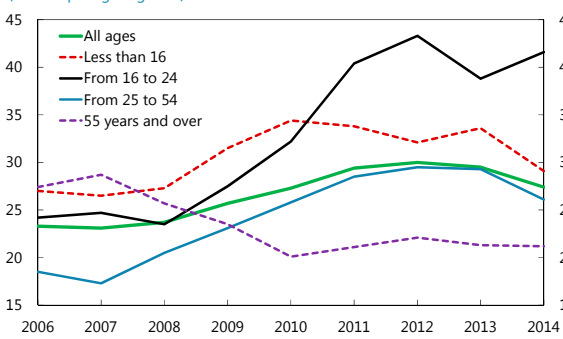
Social Assistance Spending & Mean Tested Spending, 2012



Source:

Ireland: At Risk of Poverty Rate by Age

(Percent per age segment)



Source: Eurostat.

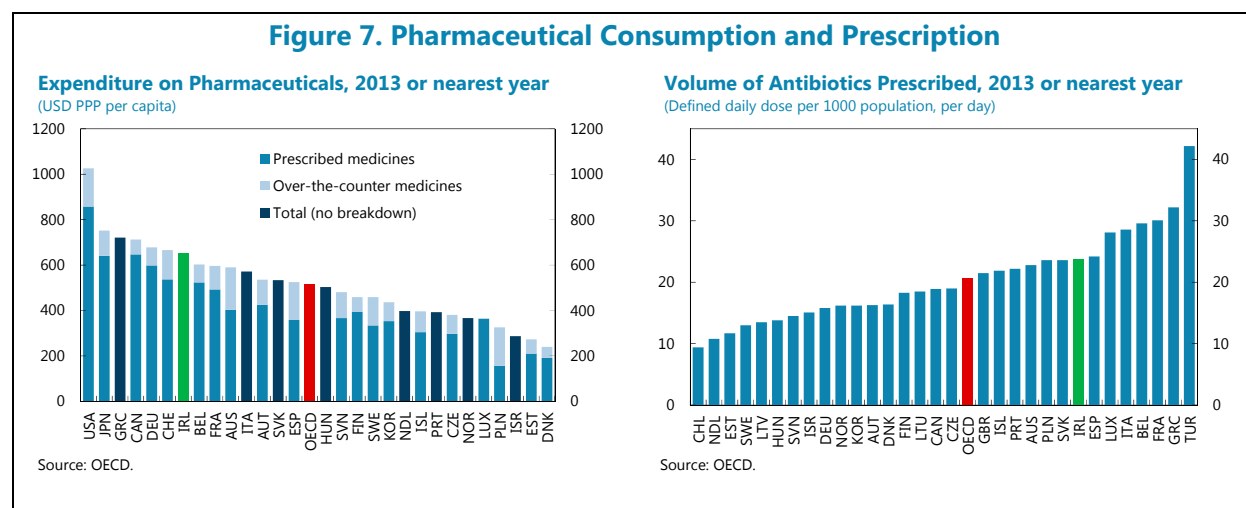
14. While social protection spending in Ireland is effective overall, there is scope to increase its efficiency. This could be achieved by increased targeting of social spending to most vulnerable and reduce transfers to high income households. OECD measures of targeting show that a larger share of cash social benefits go in Ireland to the higher quintile of income households (Figure 6). Furthermore, “best-in-class” OECD countries in terms of means testing (such as Canada, New Zealand, Israel and Iceland) means test about 55 percent of social benefit payments compared

to 35 percent for Ireland.¹² More means testing of exclusion benefits and of family and child benefits (Table 4) could help to even out the outcomes between the elderly and young unemployed, and between vulnerable families and those in high income buckets. More targeted social spending could usefully complement other policy actions aimed at reducing inequalities and making growth more inclusive, such as tax reform to eliminate income-tax related disincentives to work, or the education and training policy.

Health

15. Ireland has a relatively high level of health expenditure (Figure 8, Box 2). Health care spending represents about 7 percent of GDP, a level close to comparable EU high-income countries, despite a substantially more favorable demographic situation. When using GNP as yardstick spending comes out largely above Ireland's peers at about 8.5 percent. Although efforts have been made since 2009 to contain spending pressures, expenditure has grown steadily beyond planned budget envelopes in recent years and demand driven pressures are driving health expenditure steadily higher.

16. Health outcomes are generally in line with the EU average, but in part owing to the age structure of the population that is somewhat biasing the comparisons. In terms of health-adjusted life expectancy (HALE), Ireland at 71 years achieves a more efficient outcome than Germany, the Netherlands and Norway, which for a similar age expectancy spends respectively 30, 33 and 65 percent more than Ireland per capita (PPP adjusted). Conversely, the UK, Greece, Portugal and Malta show a similar age expectancy with lower spending per capita. Yet, Ireland ranks particularly low (bottom third of OECD countries) on pharmaceutical and antibiotics consumption (Figure 7).



¹² Of note Eurostat has a different measure of means-tested social benefit payments for Ireland (26 percent), stemming from a slightly different calculation perimeter.

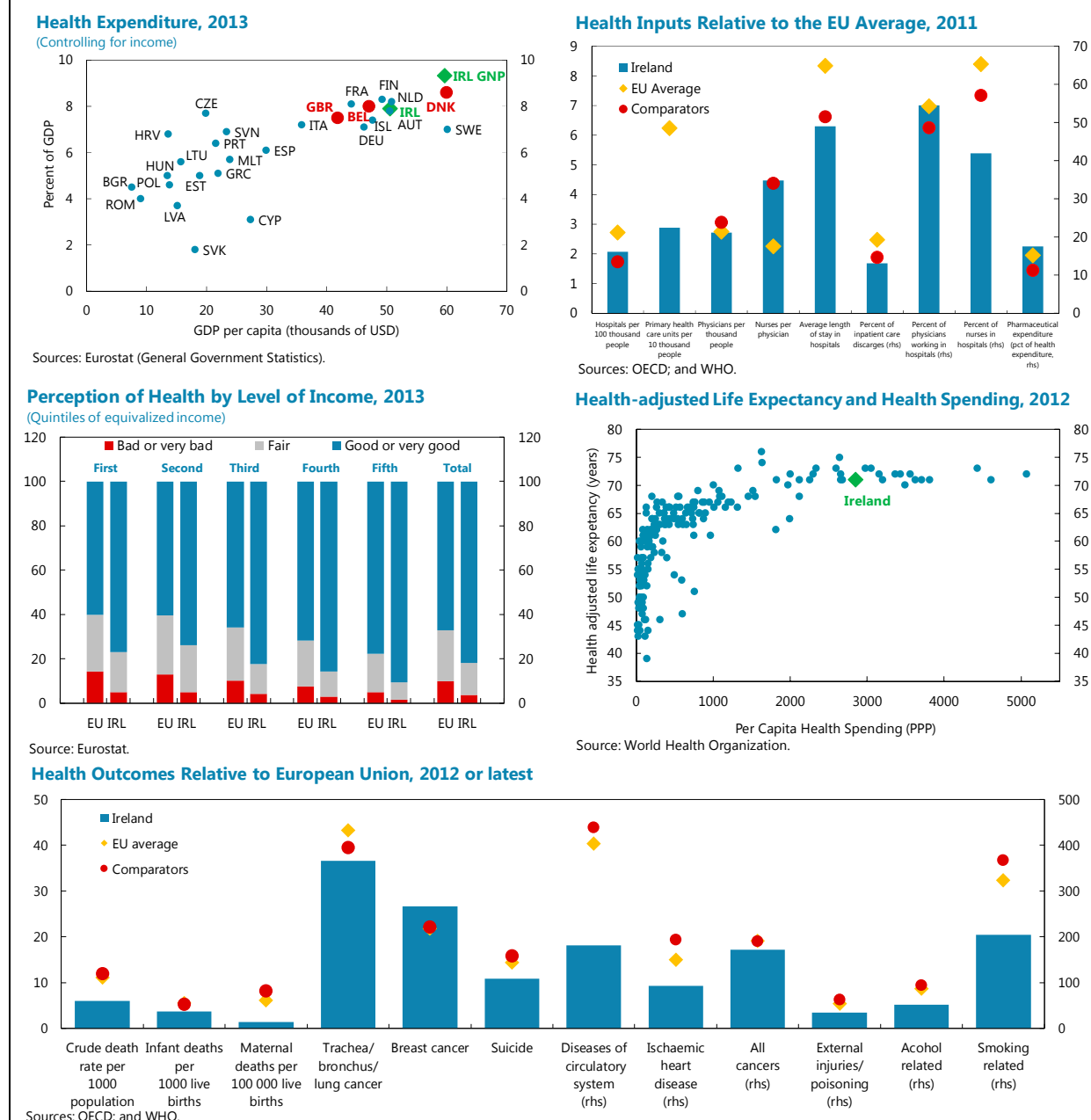
17. Health sector reform stood high on the agenda of structural policies undertaken during the EU program period. Although the commitment to contain the health expenditure drift has recorded mixed results, many key long-term structural reform initiatives have been launched to contain spending pressures and increase the efficiency of health care delivery. These reforms (Annex II) focused on three areas: (i) the building of an effective information system to improve the financial management of the sector and better implement health policy, (ii) the reform of the financing model of hospitals, and (iii) policies to reduce the cost of drugs.¹³

Box 2. Ireland's Health System

Health insurance and the delivery of health care function in Ireland as a two-tier system combining private and public delivery of health care. All users are eligible for a basic set of medical services, including hospital care, but full access to public health coverage is means-tested and restricted to a subset of the population (the "Medical Card" holders). Eligibility rule for different type of coverage by the public sector are complex and depend on age and economic circumstances, hence resulting in complex entitlement rules. In addition, private and public supply of health care sometimes interact, as private doctors can receive private patient visits in public hospital. Another feature is the weakness of primary care structure and the dominance of hospital-supplied health care. The announcement by the government of a gradual transition to Universal Health care, with the key milestone of free access to general practitioners for children under 6 and the elderly (about 40 percent of the population) since April 2015, will probably increase cost pressures going forward.

Health system main input and outcome. The Irish health system exhibits a smaller number of hospital per 100 thousand users than the EU average but more than its peer group. The number of primary health care unit, at 3 per 10,000 people stands at less than half of the EU average, pointing towards a system dominated by hospitals. The number of nurses per physician is about double the EU average, and the share of pharmaceutical expenditure in health spending is close to the EU average, but about 50 percent higher than comparator countries.

¹³ For a full overview of the Health sector reform refer the [8th review of the EFF Staff Report](#) "Box 1. Public Health Spending Over-Run: Sources and Policy Options" and to DoH, 2014, "[Future Health](#): A strategic Framework for Reform of the Health Service 2012-2015".

Figure 8. Health Expenditure and Selected Outcomes

18. This comprehensive set of reforms should make an important contribution to increasing efficiency in the medium-term and contain spending pressures. Yet they are unlikely to have a meaningful impact in the short run, as demand-driven pressures will put pressure on the health budget. Achieving further savings in the area of pharmaceutical expenses would require negotiations with the pharmaceutical industry on on-patent and single supplier medicine and more use of the power afforded to authorities under new health regulations to influence pricing in the sector. The move towards a single-tier universal healthcare system will require further initiatives to increase the provision of primary care, and to relieve hospitals from provision of emergency care that is avoidable through better preventive primary care and screening.

Education

19. Ireland spends less than European peers on education, but outcome indicators point to satisfactory educational attainments (Figure 9). Education expenditure stood at 4.1 percent of GDP in 2014, (at 4.5 percent of GDP over the last decade)—0.6 percent less than the EU average. This lower-than average overall spending is achieved notwithstanding a high level of school enrollment in primary education (95 percent from age 4 and 100 percent) and the largely publicly funded nature of the educational system (81 percent funded from public sources, relative to a 69.7 percent average for OECD countries). Educational attainments are higher than the OECD average and have improved, despite stagnant budget and receding teacher-to-student ratio. 85 percent of people in the 25-34 cohort completed secondary education and 47 percent get tertiary education (one the highest level in the EU). Regarding students' academic performance as measured by the PISA tests,¹⁴ Ireland's students perform well above the EU average overall and favorably relative to peers with similar income per capita, ranking second for reading among EU-21 countries, sixth in science and eight in mathematics.

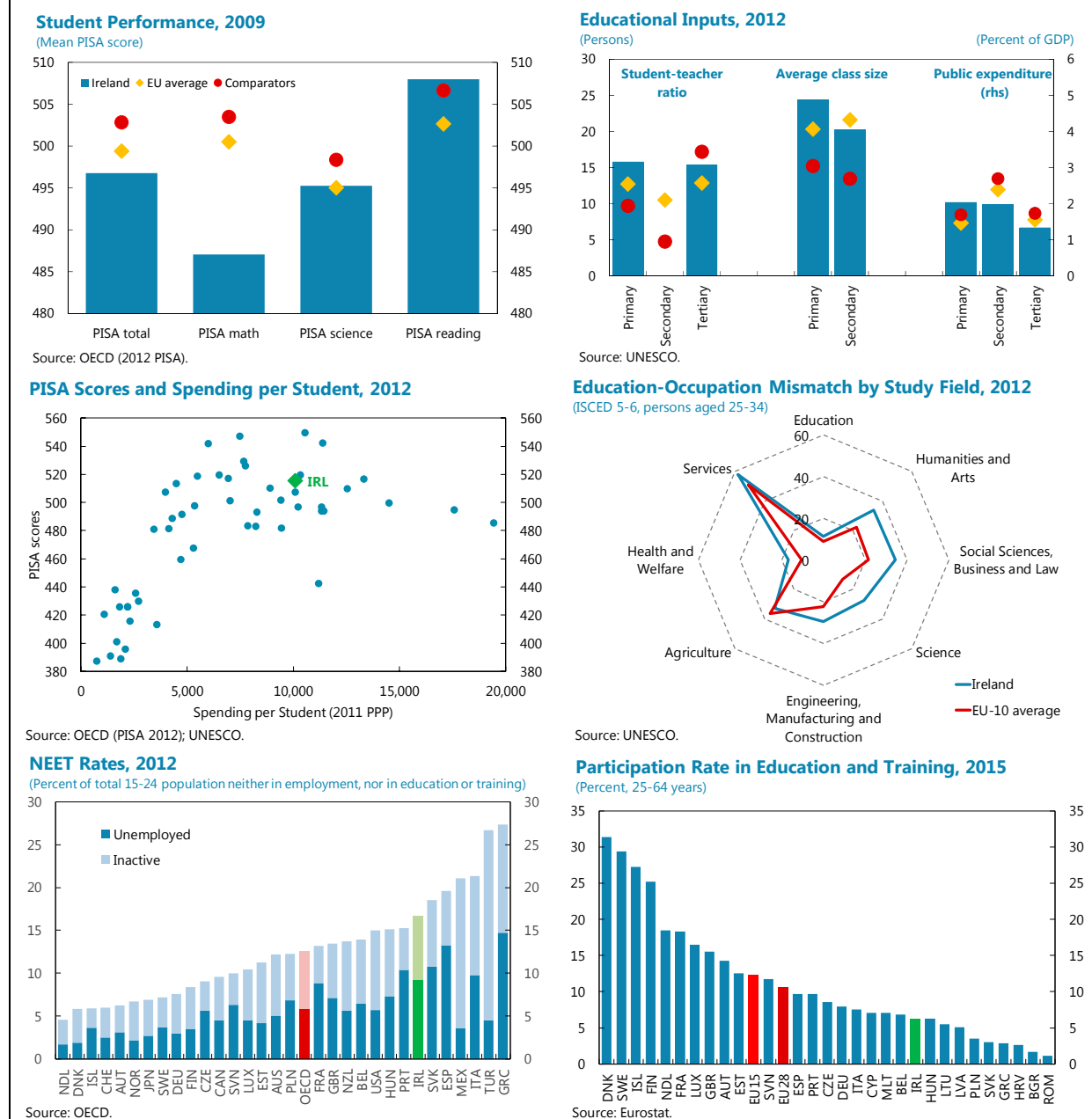
20. While cost effective, the Irish educational system may not be adequately suited to meet the needs of a growing and increasingly sophisticated knowledge-based economy. Positive outcome indicators conceal large skill mismatches in the labor market, pointing to reform needs in the field of numeracy, information technology (IT), and continuing education. Concerns have been expressed about the adequacy of the secondary school leaving certificate (e.g. for which computer science is not an eligible field). A number of indicators point to areas for potential improvement. As highlighted by the OECD,¹⁵ numeracy skills and problem solving skills in an information technology environment of Irish adults are well below the OECD average.¹⁶ Labor market employment-skill mismatches, as measured by the variance of the unemployment rate across sectors and skills are among the highest in the EU.¹⁷ UNESCO measures of skill mismatch per sector highlight broad deficiencies across sectors (Figure 9).

¹⁴ See Education at Glance 2015, OECD.

¹⁵ Ireland Economic Survey, OECD, November 2015.

¹⁶ Ireland is last but one for advanced skills in problem solving in an IT environment based on the OECD PIAAC survey on adult skills.

¹⁷ Ireland has the third highest unemployment rate dispersion across sectors according to EC calculations.

Figure 9. Education Expenditure and Outcomes

21. Reliance on inward migration to attract skilled workers may not always be an optimal solution. One such example is the medical profession. Ireland has the highest share of medical school graduates in the EU, but a below average number of general practitioners per habitant: a very large share of physicians and nurse trained in Ireland are practicing abroad, which could be a concern given the cost of training medical professionals. This pattern of “brain swap” through which Ireland exchanges highly skilled graduates for professionals trained overseas to meet the needs of some high-value added sectors may leave the country vulnerable to a hollowing-out of its skill base if inward flows appear more volatile and outward flows more durable.

22. Education sector reform should not aim to seek further savings, but instead to improve the education outcomes. Priority should be given to match continuing education supply to marketplace needs, increase students' math performance including through an increase in student-teacher ratio, and reform secondary education curriculum to increase numeracy and IT skills.

D. Potential Efficiency Gains in Healthcare and Education

23. A frontier analysis is employed to assess the potential efficiency gains in health and education spending. It is based on Data Envelopment Analysis (DEA).¹⁸ This approach relies on the calculation of a 'best practice' frontier comprising countries which display the optimal combination of inputs and outcomes (e.g. Japan has the highest standardized educational test scores for a comparatively modest amount of budget spending on education). The distance from the frontier provides for all countries an efficiency score that can be used to estimate potential gains by improving efficiency to best-performer levels. DEA calculation outcomes are influenced by sample selection and measurement issues, and outliers can have a substantial impact on efficiency scores.

24. The analysis focused on outcome metrics like health-adjusted expectancy or standardized educational test score to assess health and education spending efficiency. The use of outcomes is generally preferable to the use of outputs as they offer a better yardstick for the effectiveness of the health care and educational systems system in improving the health status and educational outcomes like literacy of quantitative skills. Output indicators can be misleading if the supply of public goods like education or health care gives rise to waste or misallocation of resources, or are not properly designed to achieve the human capital outcomes that are likely to benefit economic growth in the medium term.

25. Efficiency gains towards "best in class" countries could have a magnitude of about 3 percent of GDP. It is important to caution that DEA calculations (Table 5) are sensitive to sample selection rules and to the possible presence of outliers, hence sample selection is critical to ensure that cross-country input-outcome bundles are comparable. The use of an OECD sample helped ensure that the selected countries have somewhat similar institutional and economic

Table 5. Potential Effects as per DEA Analysis based on Different Samples of Comparators 1/

	Spending	Efficiency gains (1-theta) times spending				
	Percent of GDP	Sample 1	Sample 2	Sample 3	Sample 4	Average
Health spending	7.1	4.3	2.4	3.6	2.4	3.2
Education spending	4.1	1.8	0.5	1.7	...	1.3
Total	11.2	6.1	2.9	5.3	...	4.5

Sources: OECD; WHO; and IMF staff calculations.

1/ The first sample covers all countries listed in the World Health Organization HALE survey, and the countries surveyed by the OECD for PISA. The 2nd sample covers countries in this group in the same income quantile as Ireland, based on GNI per capita income data as of 2012 (last vintage available for PISA and WHO HALE data). The 3rd sample excludes countries outside of the EU. The 4th sample is defined as the 3rd with the exclusion of a large life expectancy outlier in the EU, Cyprus.

¹⁸ See Annex I. Approach developed by Farrell (1957), see also Charnes, Cooper, and Rhodes (1978).

features. Yet preliminary calculations showed that large income differences between countries, explaining different propensity to consume non-essential goods, could still bias the results. Consequently *ad hoc* adjustments were made to attenuate the impact of large outliers on the efficiency scores,¹⁹ or to achieve a better overall comparability (for instance by grouping more comparable EU countries): this refinement led to the narrower samples 2, 3 and 4. Different efficiency scores, using variants of these panels, suggest that total efficiency gains of up to 3 percent of GDP could be achieved in health and education (based on sample 2). Most of these gains would come from a more efficient health care provision services (2.4 percent of GDP), as Ireland appears quite close to the efficiency curve for education spending within this sample (only 0.5 percent of GDP potential savings). Potential efficiency savings calculated using cross sample average would be larger, at about 4.5 percent of GDP (3.2 percent of GDP for health, and 1.3 percent of GDP for education), but the magnitude of these potential gains is probably biased upwards by the large heterogeneity of the sample and also the presence of significant outliers.

E. Conclusion and Policy Recommendations

26. Evidence suggests that while Ireland is a low spending country it achieves a generally efficient use of public funds, with some key differences across sectors. While the overall space for budgetary savings appears limited, further spending efficiency could help contain cost pressures coming from the demographic challenge of an ageing population and improve the quality of public services. It could also help rechannel spending toward more productive uses, for instance by increasing public investment relative to current expenditure, and support the competitive position of the Irish economy and its growth potential. The following priorities are identified for key budget spending areas:

- **Social protection** is overall very effective at reducing inequalities, yet more granular indicators suggest that distributional issues and inequalities across age cohorts have become more acute as a result of the crisis. A greater recourse to means-testing and targeted measures to address youth unemployment could help make social protection even more efficient at a limited cost.
- **The health sector** is undergoing substantial reforms to increase spending efficiency, while maintaining high level of health outcomes. These reforms are likely to bear fruit gradually over time, but further savings could be achieved through better pricing arrangements with the pharmaceutical industry on on-patent and single-supplier medicine and through an increased provision of primary care. This would help reduce emergency care provided by hospitals and reap the efficiency benefits of more preventive primary care and screening.
- **For education spending**, efforts should focus on improving the quality and adequacy of the supply of education. This could be achieved through reducing skills mismatches and developing education that provides skills needed by an increasingly sophisticated knowledge-based economy.

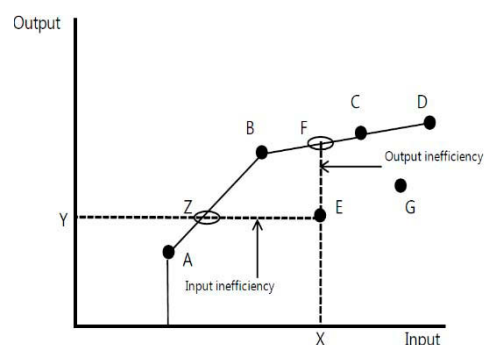
¹⁹ For instance Cyprus population's exceptional longevity may be related to specific idiosyncratic factors rather than to an efficient health system.

- **On infrastructure spending,** improving efficiency of public investment will require a strengthening of Ireland's public infrastructure investment framework. This includes better project appraisal and selection, proper identification of infrastructure bottlenecks, centralized independent reviews, cost-benefit analysis, risk costing, and improved project execution. Setting-up a centralized register of state assets and a revising the National Spatial Strategy set out in 2006 would be key milestones in this process.

Annex I. Data Envelopment Analysis

Data envelopment analysis (DEA) is a non-parametric approach, popularized by Charnes, Cooper and Rhodes (1978) that assesses the relative efficiency of decision making units (DMUs). Based on the assumption of a convex production possibilities set, an efficiency frontier is constructed as the linear combination of efficient or optimal input and outcome combinations in the cross-country sample using linear programming techniques (i.e., without imposing specific functional restrictions). The most efficient countries that lie on the frontier then ‘envelope’ the less efficient ones. The frontier provides a benchmark by which ‘enveloped’ observations can be judged based on their position relative to the frontier. By construction, countries on the frontier will have an efficiency score of one, whereas the ‘enveloped’ ones will have efficiency scores bound between zero and one. Efficiency gains can be defined as the amount by which input could be reduced while holding the level of output constant (input inefficiency), or as the amount by which output could be increased while holding the level of input constant (output inefficiency). Figure 1 illustrates an efficiency frontier that connects points A to D as these countries dominate other input-output pairs, such as countries E and G in the interior. The convexity assumption allows an inefficient input-output pair, such as point E to be assessed relative to a hypothetical position on the efficiency frontier, such as point Z by taking a linear combination of efficient country pairs, such as points A and B. In this manner, an input-based efficiency score that is bound between zero and one can be calculated as the ratio of YZ to YE.

Figure 1: DEA Efficiency Frontier



The score corresponds to the proportional reduction in spending consistent with relatively efficient production of a given outcome. Similarly, an output-based efficiency score for point E can be calculated as the ratio of XF to XE. As a non-parametric approach, the DEA is considered a powerful tool to assess spending efficiency as it does not require assumptions about unknown functional forms or complex distributional properties, which can help avoid some of the econometrics pitfalls. In addition, it is a simple, easy to explain, and allows to benchmark performance between countries. However, the methodology focuses on inputs and outcomes that can be quantified, and thus, it may overlook important factors that are harder to measure and affect outcomes—as such, it considers all deviations from the frontier explained by inefficiency rather than the result of omitted or uncontrollable variables. Further, it assumes that different combinations of the observed input-output bundles are feasible, such that any country could move to the frontier by freely accessing the technology of production and by being unhampered by the country’s own idiosyncratic conditions.

Annex II. Health Sector Reforms

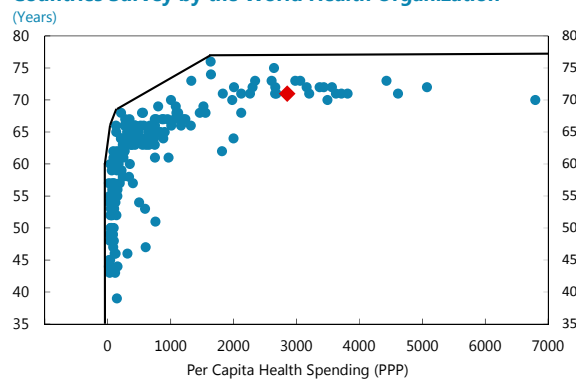
Key ongoing Health sector reforms.

- **The improvement of the information system (eHealth)** is a long-term project whose impact on the efficiency of health care delivery will take some years to materialize. The first milestone in this process, the setting-up of individual health identifiers (IHIs) was completed recently. Individual identifiers have been created for all the population and the rollout for operational use be achieved by end-2016. Once in place this system will allow the analysis of prescription behavior, health records and the supply of care against outcomes across hospitals and other health care units, allowing a better targeting of cost efficiency efforts where needed, allowing also a redeployment of resources where they are most needed and most effective.
- **The financing reform introduces an activity-based funding approach** (or “Money-follow-the-patient”). Hospitals were traditionally financed using a “block-funding” approach in which budgeting was based on top-down calculated envelopes. Together with the introduction of a common chart of account for all hospitals, activity-based funding will over time base budgeting on the actual consumption of health care, allowing better data collection (thanks to individual identifiers), more transparency and resource redeployment when adequate. While not primarily designed to reduce costs, it should support efficiency by identifying better pressure points, facilitating hospital specialization and allowing redeployment. The transition to new financing modalities is a stepwise process that will spread out over a number of years. Initiated on a shadow basis in a number of large hospitals it will be operationally deployed starting with inpatient care, and be later extended to ambulatory care.
- **Reducing expenditure on pharmaceuticals.** The measure introduced in 2013 and 2014 to change doctors’ prescription behavior have successfully increased the penetration of generic in volume terms, but the cost of on-patent drug is continuing to weigh on the overall cost. Generic medicines represent about 55 percent of total drug consumption in volume but only 26 in value (price) terms, and on-patent drugs 46 percent in volume terms but 76 percent of the total in value. Negotiations with the Irish Pharmaceutical Healthcare Association (IPHA) to renew the 3-year pricing agreement that expired in November 2015 to reduce the price of on-patent drugs have not been conclusive.

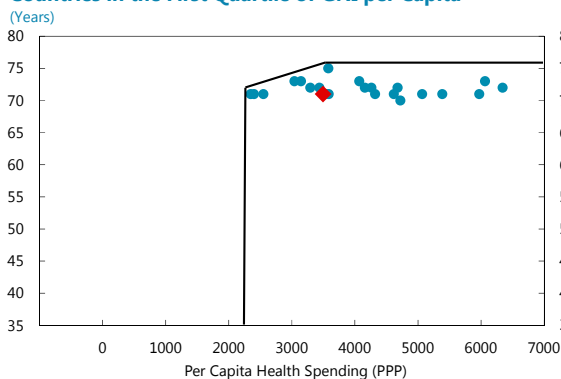
Annex III. Efficiency Frontiers on per Capita PPP Health Expenditures

Health Adjusted Life Expectancy: Efficiency Frontiers on per Capita PPP Health Expenditures

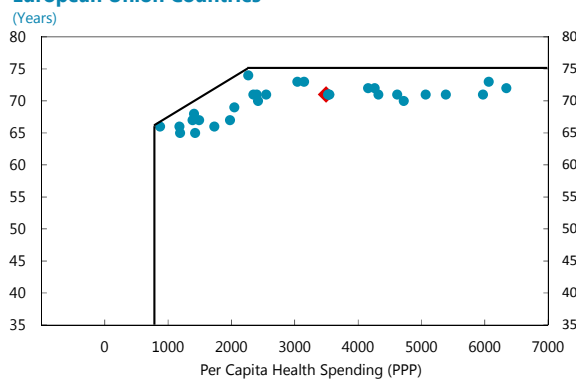
Countries Survey by the World Health Organization



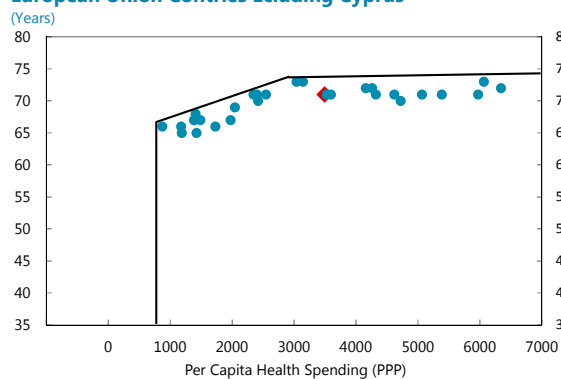
Countries in the First Quartile of GNI per Capita



European Union Countries



European Union Countries Excluding Cyprus



Source: World Health Organization.

Annex IV. Potential Efficiency Gains on Education

	Expenditure per student 1/	PISA score (math+reading) 2/	Theta sample 1 3/	Theta sample 2	Theta sample 3	Efficiency gains sample 1	Efficiency gains sample 2	Efficiency gains sample 3
Australia	92764	1016	0.55	0.87		0.45	0.13	
Austria	123921	995	0.36		0.41	0.64		0.59
Belgium	102615	1024	0.51	0.80	0.53	0.49	0.20	0.47
Canada	83089	1041	0.70	1.00		0.30	0.00	
Chile	45287	864	0.50		0.91	0.50		0.09
Czech Republic	60740	992	0.72		0.82	0.28		0.18
Denmark	103662	996	0.43		0.49	0.57		0.51
Estonia	56686	1037	1.00		1.00	0.00		0.00
Finland	92290	1043	0.63	0.90	1.00	0.37	0.10	0.00
France	86330	1000	0.53	0.92	0.59	0.47	0.08	0.41
Germany	85801	1021	0.61		0.63	0.39		0.37
Hungary	46121	966	0.78		1.00	0.22		0.00
Iceland	102851	975	0.38		0.46	0.62		0.54
Ireland	93967	1025	0.56	0.87	0.58	0.44	0.13	0.42
Israel	63783	952	0.51			0.49		
Italy	85337	975	0.46		0.56	0.54		0.44
Japan	88805	1074	0.76	1.00		0.24	0.00	
Korea	71574	1090	1.00			0.00		
Luxembourg	207841	978	0.19		0.23	0.81		0.77
Mexico	26796	837	0.82			0.18		
netherlands	96619	1034	0.58		0.58	0.42		0.42
New Zealand	83184	1012	0.59		0.64	0.41		0.36
Norway	125519	993	0.35		0.40	0.65		0.60
Poland	61796	1036	0.91		0.91	0.09		0.09
Portugal	69213	975	0.56		0.69	0.44		0.31
Slovakia	52395	944	0.58		0.86	0.42		0.14
Slovenia	97251	982	0.42		0.50	0.58		0.50
Spain	82184	972	0.46		0.57	0.54		0.43
Sweden	101155	962	0.35		0.45	0.65		0.55
Switzerland	139339	1040	0.41			0.59		
Turkey	24218	923	1.00			0.00		
Great Britain	97739	993	0.45	0.81	0.51	0.55	0.19	0.49
United States	115909	979	0.35			0.65		
Brazil	26446	802	0.79			0.21		
Russia	44704	957	0.76			0.24		

Sources: OECD; and IMF staff calculations.

1/ Expenditure per student as calculated by the OECD, PISA 2012, USD PPP.

2/ PISA scores as per the 2012 OECD survey are aggregated for math and reading.

3/ Three samples have been used for efficiency calculations using the DEA approach (see annex 1). The first sample covers all countries listed in the OECD PISA study. The 2nd sample covers countries in this group in the same income quantile as Ireland, based on GNI per capita income data as of 2012. The 3rd sample within the PISA survey excludes countries outside of the EU. Efficiency gains calculations in percentage are calculated as 1-theta. For instance Japan,s calculated Theta in Sample 2 is 1 (that is the country is on teh efficiency curve) so the potential effciency gains are zero (1-theta).

Annex V. Potential Efficiency Gains on Health

	Total health spending per habitant 1/	Health-Adjusted Life Expectancy (HALE) 2/	Theta sample 1 3/	Theta sample 2	Theta sample 3	Theta sample 4	Efficiency gains sample 1	Efficiency gains sample 2	Efficiency gains sample 3	Efficiency gains sample 4
United States	8895	70	0.12	0.26			0.88	0.74		
United Kingdom	3495	71	0.39	0.67	0.50	0.67	0.61	0.33	0.50	0.33
Austria	5065	71	0.27	0.46	0.34	0.46	0.73	0.54	0.66	0.54
Belgium	4320	71	0.32	0.54	0.40	0.54	0.68	0.46	0.60	0.46
Denmark	4720	70	0.23	0.49	0.33	0.43	0.77	0.51	0.67	0.57
France	4260	72	0.39	0.62	0.45	0.63	0.61	0.38	0.55	0.37
Germany	4617	71	0.30	0.51	0.38	0.51	0.70	0.49	0.62	0.49
Italy	3040	73	0.65	0.97	0.69	1.00	0.35	0.03	0.31	0.00
Luxembourg	6341	72	0.26	0.42	0.30	0.42	0.74	0.58	0.70	0.58
Netherlands	5385	71	0.25	0.44	0.32	0.44	0.75	0.56	0.68	0.56
Norway	5970	71	0.23	0.39	0.29	0.39	0.77	0.61	0.71	0.61
Sweden	4158	72	0.40	0.64	0.46	0.65	0.60	0.36	0.54	0.35
Switzerland	6062	73	0.32	0.49	0.35	0.50	0.68	0.51	0.65	0.50
Canada	4676	72	0.36	0.57			0.64	0.43		
Japan	3578	75	0.72	1.00			0.28	0.00		
Finland	3545	71	0.39	0.65	0.49	0.65	0.61	0.35	0.51	0.35
Greece	2346	71	0.59	1.00	0.74	1.00	0.41	0.00	0.26	0.00
Iceland	3436	72	0.49	0.77			0.51	0.23		
Ireland	3529	71	0.39	0.66	0.49	0.66	0.61	0.34	0.51	0.34
Malta	2548	71	0.54	0.92	0.68	0.92	0.46	0.08	0.32	0.08
Portugal	2400	71	0.57	0.98	0.73	0.98	0.43	0.02	0.27	0.02
Spain	3145	73	0.63	0.94	0.67	0.97	0.37	0.06	0.33	0.03
Bulgaria	1177	66	0.20		0.74	0.74	0.80		0.26	0.26
Czech Rep.	2046	69	0.38		0.68	0.84	0.62		0.32	0.16
Slovak Republic	1977	67	0.18		0.53	0.58	0.82		0.47	0.42
Estonia	1385	67	0.26		0.76	0.82	0.74		0.24	0.18
Latvia	1188	65	0.17		0.72	0.72	0.83		0.28	0.28
Hungary	1729	66	0.14		0.50	0.50	0.86		0.50	0.50
Lithuania	1426	65	0.14		0.60	0.60	0.86		0.40	0.40
Croatia	1410	68	0.34		0.87	1.00	0.66		0.13	0.00
Slovenia	2420	70	0.44		0.65	0.84	0.56		0.35	0.16
The Former Yugoslav Republic of Macedonia	835	66	0.28				0.72			
Bosnia and Herzegovina	928	68	0.52				0.48			
Poland	1489	67	0.24		0.70	0.77	0.76		0.30	0.23
Romania	873	66	0.27		1.00	1.00	0.73		0.00	0.00

Sources: OECD; WHO; and IMF staff calculations.

1/ Total health spending per habitant, USD PPP, source OECD.

2/ Health-Adjusted Life Expectancy 2012, WHO .

3/ Four samples have been used for efficiency calculations using the DEA approach (see annex 1). The first sample covers all countries listed in the WHO HALE survey. The 2nd sample covers countries in this group in the same income quantile as Ireland, based on GNI per capita income data as of 2012. The 3rd sample excludes countries outside of the EU. The 4th sample is defined as the 3rd with the exclusion of a large life expectancy outlier in the EU, Cyprus. Efficiency gains calculations in percentage are calculated as 1-theta. For instance Japan,s calculated Theta in Sample 2 is 1 (that is the country is on the efficiency curve) so the potential effiency gains are zero (1-theta).

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