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Pharmaceutical Expenditure And Policies: Past Trends And Future Challenges

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PHARMACEUTICAL EXPENDITURE AND POLICIES: PAST TRENDS AND FUTURE CHALLENGES

Annalisa Belloni, David Morgan, Valérie Paris

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Authorized for publication by Stefano Scarpetta, Director, Directorate for Employment, Labour and Social Affairs

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ABSTRACT

Across OECD countries, pharmaceutical spending reached around USD 800 billion in 2013, accounting for about 20% of total health spending on average when pharmaceutical consumption in hospital is added to the purchase of pharmaceutical drugs in the retail sector. This paper looks at recent trends in pharmaceutical spending across OECD countries. It examines the drivers of recent spending trends, highlighting differences across therapeutic classes. While the consumption of medicines continues to increase and to push pharmaceutical spending up, cost-containment policies and patent expiries of a number of top-selling products have exerted downward pressure on pharmaceutical expenditures in recent years. This resulted in a slower pace of growth over the past decade.

The paper then looks at emerging challenges for policy makers in the management of pharmaceutical spending. The proliferation of high-cost specialty medicines will be a major driver of health spending growth in the coming years. While some of these medicines bring great benefits to patients, others provide only marginal improvements. This challenges the efficiency of pharmaceutical spending.

RÉSUMÉ

Les dépenses pharmaceutiques ont atteint environ 800 milliards USD en 2013 dans les pays de l'OCDE, soit environ 20 % en moyenne des dépenses de santé totales lorsque l'on ajoute la consommation hospitalière de produits pharmaceutiques à l'achat de médicaments au détail. Ce document examine les tendances récentes en matière de dépenses pharmaceutiques dans les pays de l'OCDE. Il examine les déterminants de l'évolution récente des dépenses, en soulignant les différences entre les classes de médicaments. Alors que la consommation de médicaments continue d'augmenter et de pousser à la hausse les dépenses pharmaceutiques, les politiques de maîtrise des coûts et l'expiration des brevets d'un certain nombre de produits les plus vendus ont exercé une pression à la baisse sur ces dépenses au cours des dernières années. Cela a entraîné un ralentissement de la croissance au cours de la dernière décennie.

Le document se penche ensuite sur les défis émergents pour les décideurs politiques en ce qui concerne la gestion des dépenses pharmaceutiques. La prolifération de médicaments de spécialité à coût élevé sera un moteur important de la croissance des dépenses de santé dans les années à venir. Alors que certains de ces médicaments apportent de grands avantages aux patients, d'autres ne fournissent que des améliorations marginales. Cela remet en question l'efficacité des dépenses pharmaceutiques.

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PHARMACEUTICAL EXPENDITURE AND POLICIES: PAST TRENDS AND FUTURE CHALLENGES

Executive Summary

1. Pharmaceuticals account for a significant share of overall health care spending across OECD countries. On average, when hospital use is included, one out of every five health dollars goes on purchasing pharmaceuticals. As such, trends in pharmaceutical spending contribute largely in determining overall health spending patterns.

2. From the 1980s onwards, the growth in the use of new drugs resulted in rapidly increasing pharmaceutical spending. This helped to drive the share of health spending in the economy from less than 7% in the 1980s to more than 9% in the early 2000s, as health spending growth outpaced economic growth in many OECD countries. However, since the mid-2000s, the pace of pharmaceutical spending has generally slowed compared with other areas of health care expenditure, such as in the hospital and outpatient sectors. The global financial and economic crisis, which led to widespread reductions in public spending and the introduction of cost-containment policies, coinciding with patent losses of several top selling drugs put further downward pressures on pharmaceutical spending. While the extent of the slowdown varies widely across OECD countries, nearly all have seen a reduction in pharmaceutical spending growth since the onset of the crisis, and a number of European countries have seen more dramatic reductions. At the same time, the majority of OECD countries have seen private spending account for a bigger share of total pharmaceutical expenditure over the last decade.

3. Trends in pharmaceutical spending result from a combination of changes in the prices of existing drugs; changes in the volume consumed; and changes in the therapeutic mix of medicines used. In turn, these components are driven by a range of factors related to demographic and epidemiologic trends, pharmaceutical markets' own dynamics (entry of new medicines and patent expiries), changes in medical practice and pharmaceutical policies. All these factors can interact differently across countries and across therapeutic areas.

4. The analysis of pharmaceutical spending patterns (including detailed therapeutic classes), in conjunction with a study of the development of high-cost speciality drugs, has led to the following key findings:

- Retail pharmaceutical spending (excluding hospital consumption) accounts for 15% of health spending on average across OECD countries, equivalent to more than USD 500 per capita in 2013. To get a full picture, spending on pharmaceuticals in hospitals can add another USD 50-100 per head, depending on the country.

- While retail pharmaceutical spending grew at a slower pace or even declined since the onset of the recent crisis, hospital pharmaceutical spending has tended to expand in a number of countries.

- Over the past few years, the *consumption* of pharmaceuticals has increased dramatically due to population ageing, the growing prevalence of chronic diseases and changes in clinical practices.

- The *prices of existing* drugs have been stable or even declining in a number of OECD countries – but not all- due to regulation and generic competition.

- *Changes in the therapeutic mix* have been an important driver of spending growth, driving treatment costs upward, especially in therapeutic classes where new and more expensive products have entered the market (e.g. antidiabetics). In other classes, such as cholesterol-lowering products and anti-hypertensive drugs, treatment costs have remained stable or declined in the recent period due to patent expiries of important products.

- The patterns of pharmaceutical spending growth (components of growth and underlying drivers) differ widely across therapeutic classes and across countries and the respective roles of individual factors in overall spending drugs are not easy to disentangle. However, the most important determinants of spending in recent years seem to be: increase in demand for pharmaceuticals; patent expiries of very important products; and cost-containment policies in many OECD countries.

- Expensive speciality drugs, mainly in oncologic and immuno-modulating, now account for one third of retail pharmaceutical spending, at least in the United States, and their share in spending is expected to increase. They are expected to account for half of future spending growth in North America between 2013 and 2018 and to explain the totality of growth in European countries over the same period.

- The number of biologics and other speciality drugs is increasing, providing treatment to a growing number of patients. The prices of these drugs are skyrocketing in some therapeutic areas, such as oncology, multiple sclerosis and rare diseases.

- Reviewed evidence suggests that such high prices may not always be proportionate to the benefits for patients, as measured in terms of additional years of life. This questions the value of these drugs for health systems.

- Finally, predicted trends raise questions in terms of efficiency of pharmaceutical spending, i.e. do we get the highest possible value for the money we spend today?

- These trends also raise questions in terms of affordability and access for all patients who need these treatments.

INTRODUCTION

5. Spending on pharmaceuticals is a major component of health care expenditure. The importance of the sector means that the amount of resources allocated to purchasing pharmaceuticals can have a significant impact on overall growth trends. For a long period, the rapid increase in pharmaceutical spending had been one of the major contributors to overall growth in health expenditure and consequently the growing importance of health in the economy. In more recent years, pharmaceutical spending growth has tended to lag behind other spending areas such as in the hospital and outpatient sectors. Furthermore, since the onset of the global economic crisis in 2008, many OECD countries have seen spending on pharmaceuticals drop in real terms.

6. The level and trend in pharmaceutical spending is influenced by a whole range of drivers affecting both the supply and demand for medicines. In addition to the demographic factors, such as the overall size and ageing of the population - that is, pharmaceutical use increases with age - changes affecting the volume, structure of consumption and pricing of pharmaceuticals can have a greater effect.

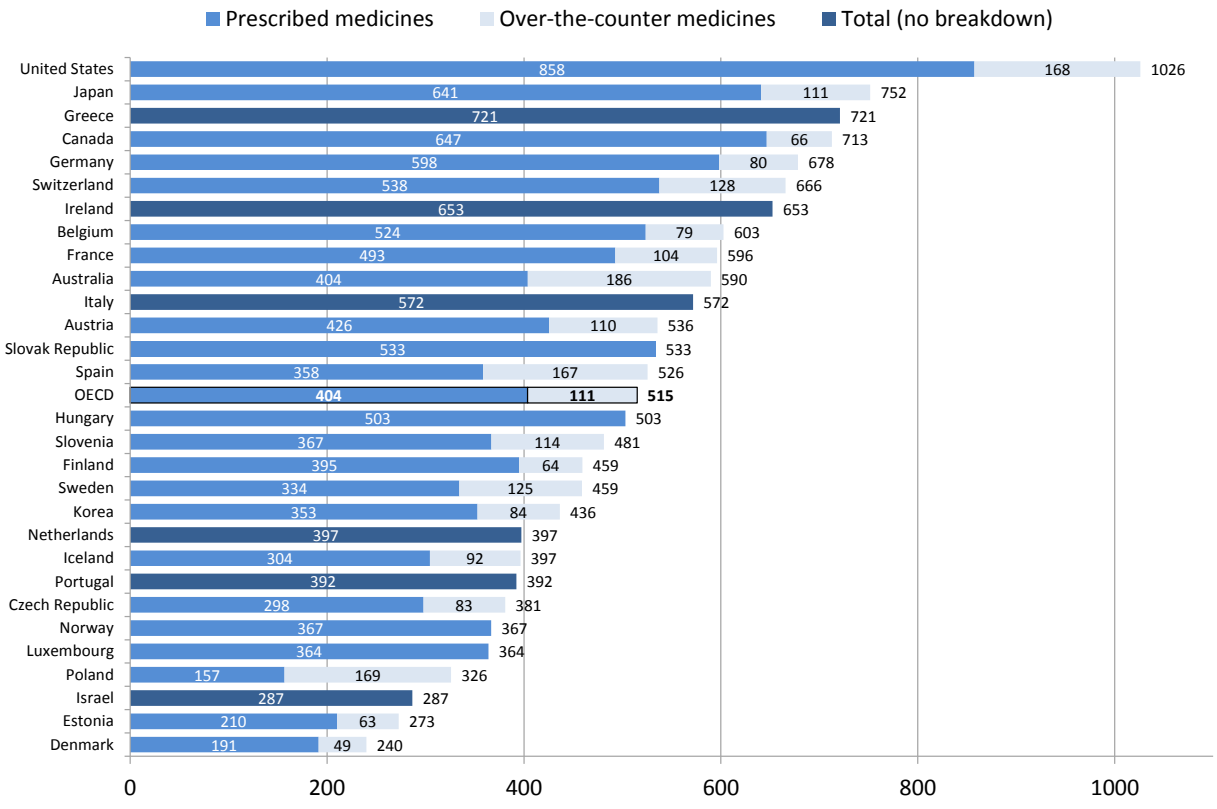
7. This paper first examines the current levels and recent trends in pharmaceutical spending across OECD countries broken down by type of pharmaceutical products and by financing at an aggregate level. It then analyses the determinants of pharmaceutical spending growth over recent years, looking at: the components of growth (volumes, prices and "quality") as well at drivers of growth, such as increasing demand for pharmaceutical, pharmaceutical markets dynamic and pharmaceutical policies implemented. Finally, the challenges countries are facing due to the increasing use and availability of high-cost drugs are discussed.

LEVELS AND TRENDS IN PHARMACEUTICAL EXPENDITURE

One in every five health dollars is spent on pharmaceuticals across OECD countries

8. Latest comparative figures show that average retail pharmaceutical spending, that is excluding hospital use, across OECD countries amounted to over 500 USD per capita in 2013.[1] This equates to an average of around 15% of current health spending. Compared with overall health expenditure there tends to be less variation in pharmaceutical spending with more than two-thirds of OECD countries spending within 30% of the OECD average. That said, the United States still stands out as the highest spending country at 1 026 USD per capita - twice the OECD average – with the next highest spending countries being Japan, Greece and Canada at over 700 USD. By contrast, Denmark spent less than half the OECD average on retail pharmaceuticals in 2013.

Figure 1. Per capita spending on retail pharmaceuticals in USD PPP, 2013



Note: Greece, Ireland, Italy, Netherlands, Portugal and Slovak Republic include non-durable medical goods.

Source: OECD Health Statistics 2015

1 Expenditures are converted to dollars using Purchasing Power Parities (PPPs) to take account of exchange rates and differences in general price levels between countries (See Box1).

9. Figure 1 also shows the split between spending on prescribed medicines and over-the-counter (OTC) medicines (See Box 1 for definitions). Spending on prescribed medicines, at around 400 USD on average, is typically around 4 times that of OTC medicines. There is a high degree of variation between countries: Spain, Australia and Poland report a high share of OTC in the overall total of pharmaceutical spending, while Canada, Germany and Belgium report a much lower proportion. This can be explained to an extent by differences in the boundaries applied to OTC goods. Some countries may include a number of non-health goods, which are difficult to separate out from the sales of health goods. On the other hand, OTC expenditures may be underestimated if, for example, all pharmaceutical sales channels (e.g. supermarkets, online pharmacies, etc.) are not sufficiently covered.

Box 1. Pharmaceuticals: understanding the terms

Pharmaceuticals (and other non-durable medical goods) form part of the International Classification of Health Accounts of Health Care Functions (ICHA-HC) which defines health care goods and services. This is subdivided into **Prescribed medicines**, **Over the counter (OTC) medicines** and **Other non-durables**.

Prescribed medicines are medicines supplied only in licensed pharmacies on the presentation of signed prescriptions issued by a licensed and registered medical practitioner, licensed and/or registered dentist (for dental treatment only) and the supply and dispensing of these medicines must be carried out by a pharmacist or under the supervision of a pharmacist. **Over-the-counter (OTC) drugs** may be dispensed without a prescription. In some countries they are available via self-service in pharmacies and/or other retail outlets (e.g. drugstores or supermarkets). This separation is different from reimbursed versus non-reimbursed medicines. **Reimbursed drugs** are medicines whose cost is covered by a third party payer (e.g. Social Health Insurance/National Health Service) However, the overlap can be substantial and some countries may report figures according to the reimbursement rather than the prescribing criterion. Selected OTC medicines may also be reimbursed for certain indications in some countries. Finally, **other non-durable goods** include bandages, plasters, syringes, etc. but account for only a minor share of the overall pharmaceutical and non-durable medical goods total – typically around 5-10%.

The categories of pharmaceuticals above refer to **retail pharmaceuticals,** delivered to patients via pharmacies and other retail outlets. Pharmaceuticals are also consumed in other care settings – primarily the **hospital inpatient** sector – where by convention the pharmaceuticals used are considered as an input to the overall service treatment and not separately accounted. That said, health accounts do allow for an additional reporting item to report a **total pharmaceutical** spending estimate covering all modes of provision. Currently only a handful of countries are able to submit such figures.

For international comparisons, **Purchasing Power Parities** (PPPs) are spatial deflators and currency converters that take into account and eliminate the effect of different price levels thus allowing comparisons of spending in a common currency - in this case US dollars. To measure temporal changes in volume, relevant **price indices** are used to deflate national spending. Both measure the changes in price for a basket of comparable and representative goods either over time or between countries.

A further set of definitions are provided for various groups of pharmaceuticals:

Generic drugs are pharmaceutical products which have the same qualitative and quantitative composition in active substances and the same pharmaceutical form as a reference medicinal product, and whose bioequivalence with the reference medicinal product has been demonstrated by appropriate bioavailability studies. The different salts, esters, ethers, isomers, mixtures of isomers, complexes or derivatives of an active substance shall be considered to be the same active substance, unless they differ significantly in properties with regard to safety and/or efficacy. In such cases, additional information providing proof of the safety and/or efficacy of the various salts, esters or derivatives of an authorised active substance must be supplied by the applicant. Generics can be further classified into **branded** generics (generics with a specific trade name) and **unbranded** generics (which use the international non-proprietary name and the name of the company).

The above definition refers to European legislation. However, it should be noted that there is a variety of different, sometimes overlapping, definitions of the term 'generics' due to differences in the requirements for registration of generics between countries, especially related to the degree and proof of therapeutic equivalence and the fact that they can be sold under brand (branded generics) or International Nonproprietary Name (unbranded generics). The World Health Organization (WHO) defines generics as multi-source pharmaceutical products that are therapeutically equivalent are interchangeable, not taking into consideration of whether or not the 'originator' molecule is, or was, under **patent** protection.

Biological medicines are medicines that are made by or derived from a biological source, such as a bacterium or yeast. They can consist of relatively small molecules, such as human insulin or erythropoietin, or complex molecules, such as monoclonal

antibodies. A **biosimilar** is a biological medicine that is similar to another biological medicine that has already been authorized for use.

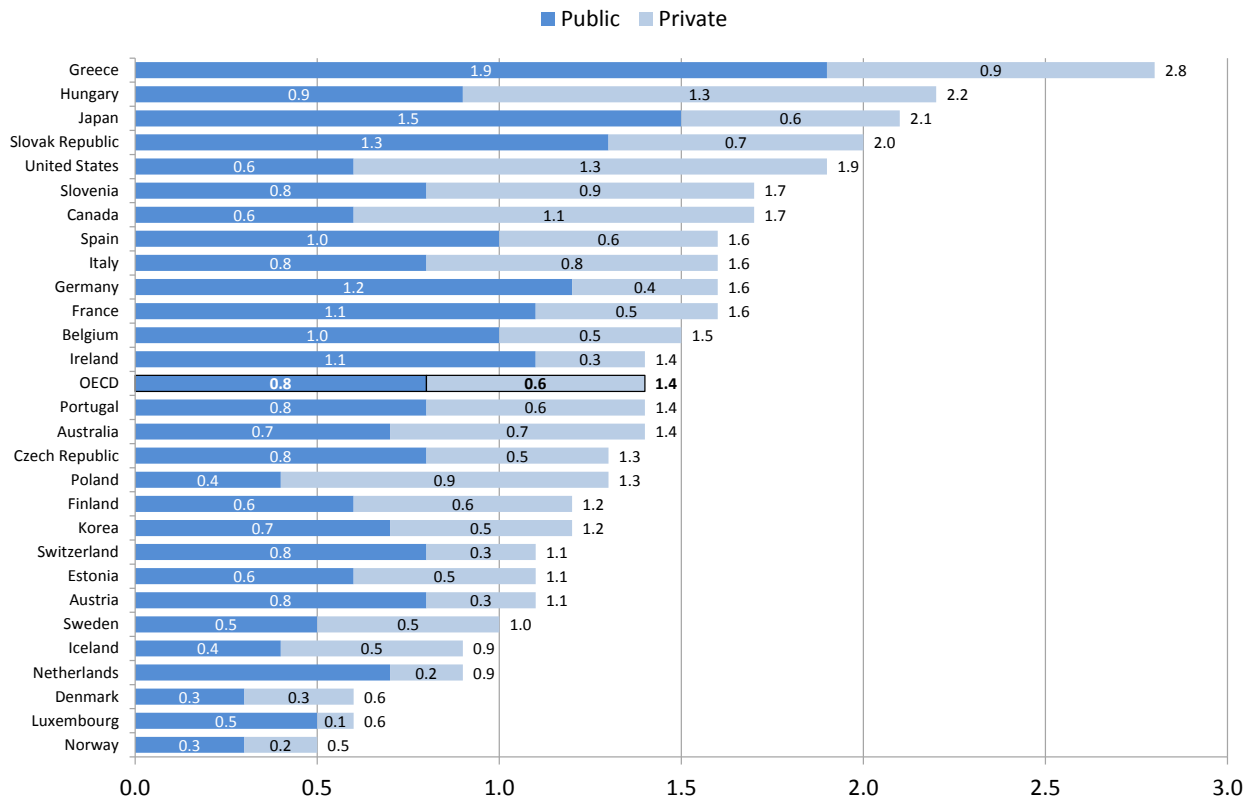
S**pecialty medicines** do not have a unique definition. They usually include injectable and biologic agents used to treat complex conditions such as rheumatoid arthritis, multiple sclerosis and cancer and often require special handling or delivery mechanisms.

Orphan drugs refer to medicines developed for rare conditions. Countries use different thresholds to consider that a disease is rare: "rare conditions" are those which affect less than one in 1 500 people in the United States, less than one in 2 000 people in the European Union and less than one in 2 500 people in Japan. The United States and the European Union have implemented policies to encourage private investments in R&D for rare diseases (e.g. increased market exclusivity) and have consequently defined criteria to be met by a medicine to be granted an "orphan drug status". In the European Union, those criteria are: the severity of the disease; the fact that it serves an unmet need; and either prevalence below one in 2 000 or a negative expected return on investment.

Sources: OECD health Statistics, Source and methods; PPRI glossary

10. In terms of share of GDP, OECD countries spent, on average, around 1.4% of GDP in 2013 on retail pharmaceuticals (Figure 2). Again, there is considerable variation with Greece spending twice that level as a share of GDP, whereas Denmark and Norway spent less than half.

Figure 2. Spending on retail pharmaceuticals as a share of GDP, 2013



Note: Greece, Ireland, Italy, Netherlands, Portugal and Slovak Republic include non-durable medical goods.

Source: OECD Health Statistics 2015

11. Figure 2 also shows the financing split of retail pharmaceutical expenditure. Public financing includes government programmes or spending covered by public health insurance, whereas the private component is primarily the share of pharmaceutical spending covered by private health insurance as well

as households' direct out of pocket spending.[2] In the case of reimbursed (or rather part-reimbursed) medicines under public coverage, the part under cost-sharing arrangements – whether fixed co-payments, deductions or co-insurance – should be allocated and accounted under the private component.

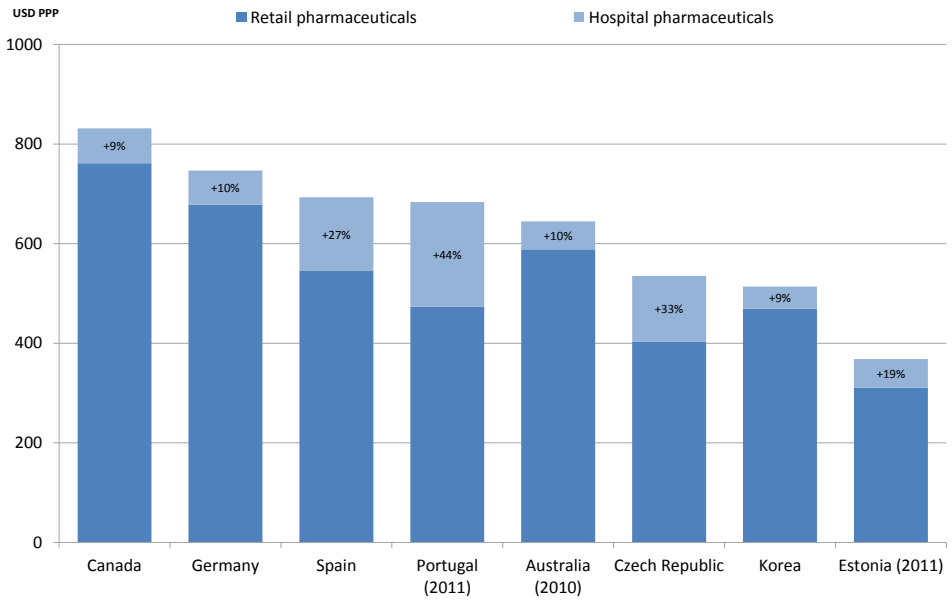
12. Less than 60% of pharmaceutical spending is covered by public sources on average in OECD countries. This compares with an average of around 75% for *all* health spending. This lower share reflects the greater degree to which various cost-sharing arrangements apply to pharmaceutical spending in comparison to the inpatient and outpatient health care sector. In addition, self-diagnosis and auto-medication, which helps define OTC goods, is more extensive in the pharmaceutical sector.

13. Germany and the Netherlands report a public share of pharmaceutical spending at 75% or more of the total pharmaceutical spending whereas the United States and Canada (both countries where private health insurance plays a large role in financing pharmaceutical spending), as well as Poland and Hungary where less than 40% of the pharmaceutical bill is covered by public funds.

Hospital spending on pharmaceuticals should be added to get a full picture

14. The discussion above focuses on retail drug expenditures. However, pharmaceuticals can also be distributed to inpatients in hospitals and other institutions. The additional pharmaceutical expenditure in the hospital sector (see Figure 3) ranges from less than 10% on top of retail spending in Canada and Korea to more than 40% in Portugal. On average, this raises the overall pharmaceutical bill by around 20%, resulting in more than one health dollar in five going towards purchasing pharmaceuticals.

Figure 3. Total (retail and hospital) pharmaceutical spending, per capita USD PPP, 2013 or latest year available



Note: Secretariat calculations for Portugal exclude some other medical products and agents from reported hospital spending.

Source: OECD Health Statistics 2015

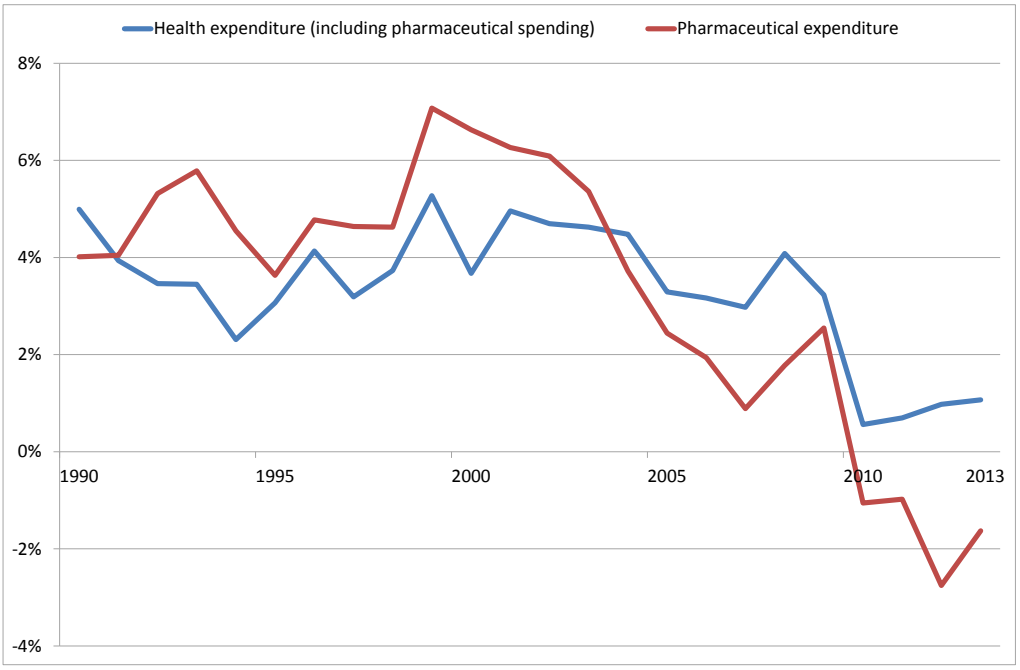
[2] It also may include other drug programmes such as those funded by NGOs, charities and private corporations. These typically cover only a small proportion of the total.

Pharmaceutical spending has been increasing at a slower pace since the mid-2000s

15. Prior to 2000, increased spending on retail pharmaceuticals acted a major contributor in driving up overall health expenditure and, as a consequence, the health sector share of GDP. Particularly during the 1990s and early 2000s, average real annual growth in pharmaceutical spending outpaced overall health spending growth - more than 5% on average each year between 1990 and 2004, compared with average health spending growth of less than 4% per year (Figure 4). However, during the 2000s there was a notable shift with a significant drop in average pharmaceutical growth during the second half of the decade which intensified through the global economic crisis.

16. Focusing on the most recent period, retail pharmaceutical spending across the OECD has, on average, grown more slowly than overall health spending. Over the period from 2005 to 2013, annual average growth in pharmaceutical expenditure was 0.7% on average (in real terms) compared with 2.4% for health care expenditure growth. Up until 2009, pharmaceutical spending growth was around 1½ percentage points lower than overall growth in health spending. From 2010, in the face of reduced spending in many OECD countries, pharmaceutical expenditure turned negative with an average 2.5% drop in 2012. By contrast, overall health spending saw a return to low positive growth after seeing near zero growth in 2010.

Figure 4. Average annual growth in health and retail pharmaceutical expenditure, OECD average, 1990-2013



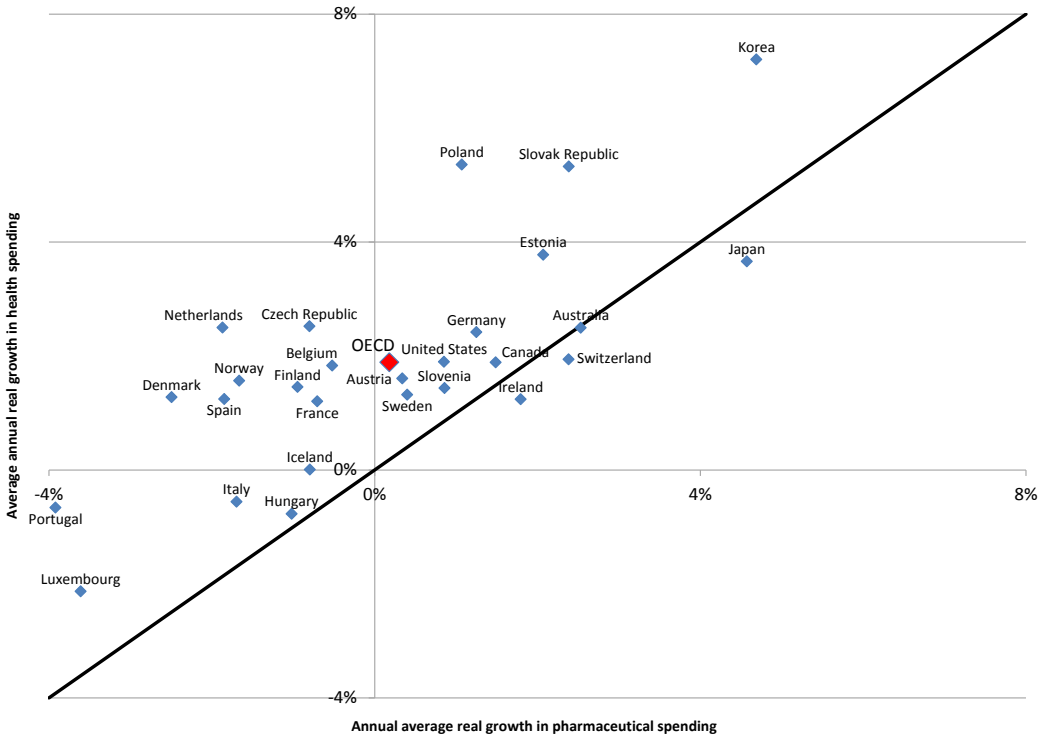
Note: Excludes Greece, Israel, Mexico, New Zealand, Turkey and United Kingdom.

Source: OECD Health Statistics 2015

17. The majority of countries saw retail pharmaceutical expenditure growing on average more slowly than that of health expenditure since 2005 (on the upper side of the 45° line in Figure 5). Even countries where spending on health grew strongly over the period, such as some central European countries and Korea, pharmaceutical spending did not grow at the same pace as other health spending categories, such as in the hospital or outpatient sectors[3].

[3] Annex 1 shows real per capita pharmaceutical expenditure growth, 2005-2013 in OECD countries.

Figure 5. Annual real growth in retail pharmaceutical and health spending, 2005-2013

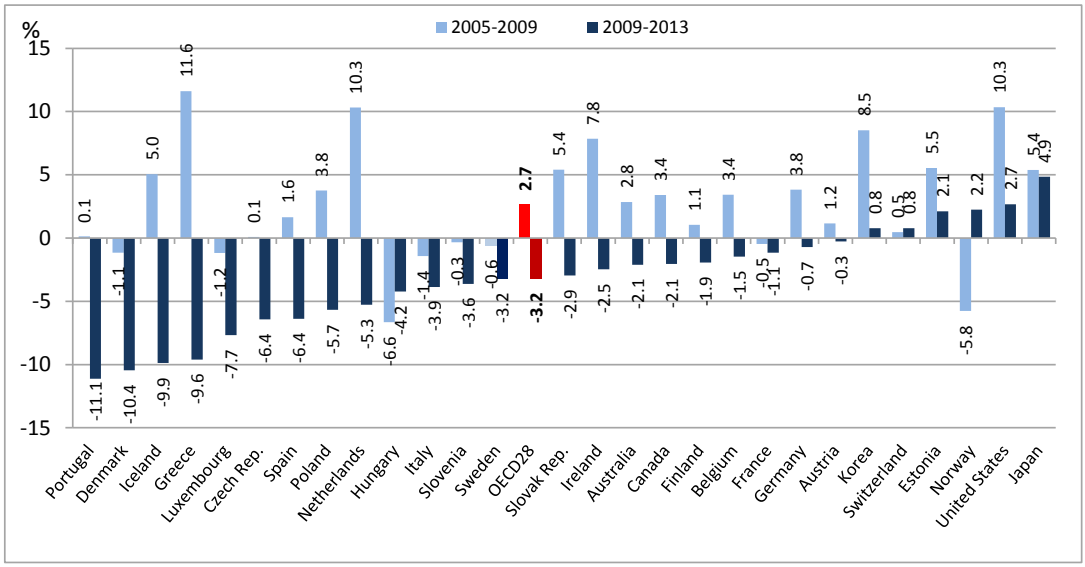


Source: OECD Health Statistics 2015

18. The economic crisis had a significant effect on pharmaceutical spending in many OECD countries. A number of European countries, in particular, experienced a dramatic reversal in pharmaceutical spending trends pre- and post-crisis (Figure 6). In Greece, pharmaceutical expenditure per capita decreased by close to 10% per year since 2009. This compares with growth of over 11% each year between the period 2005 and 2008. In Ireland, the exceptional annual growth in pharmaceutical spending prior to the economic crisis was only partially offset by cuts in spending growth in the subsequent years.

19. Other countries reporting large reversals in pharmaceutical spending growth post-2009 include Portugal, Denmark and Iceland.

Figure 6. Retail pharmaceutical spending growth before and after 2009 (real terms)



Note: Data refer to prescription +OTC spending except for Greece, Ireland, Italy, Netherlands, Portugal and Slovak Republic for which medical non-durable are included. Data for Luxembourg refers to prescription medicines only.

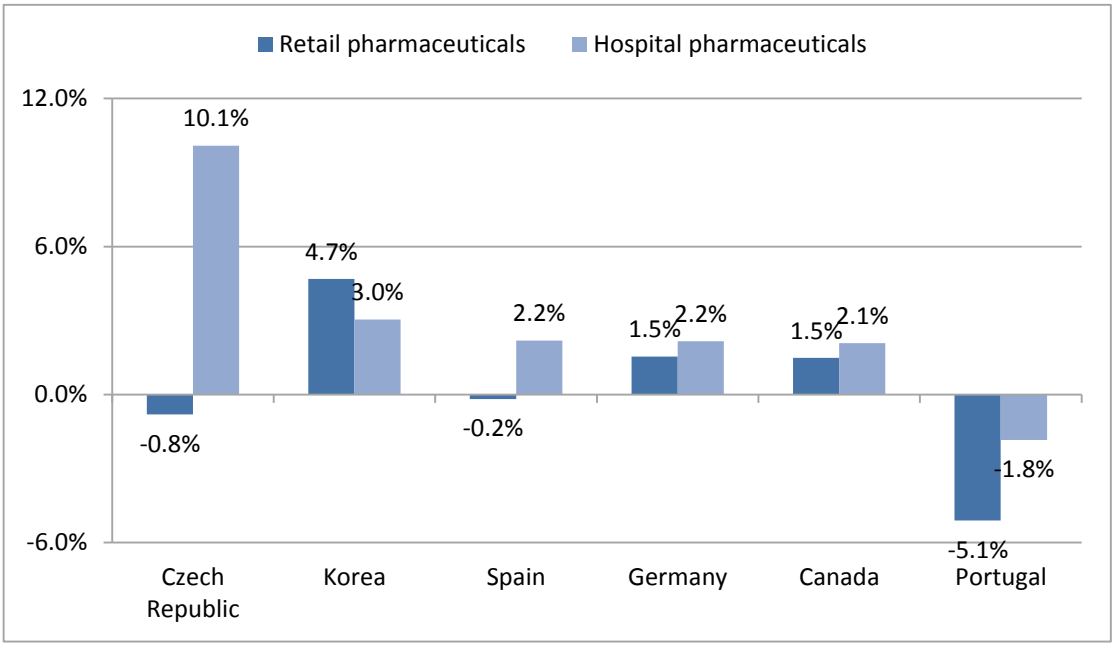
Source: OECD Health Statistics 2015

Pharmaceutical spending in hospitals has increased over time

20. The share of the overall pharmaceutical bill accounted for by hospitals has seen a rising trend in many countries (Figure 7). This is partly explained by the proliferation of specialty drugs, which are often delivered in a hospital setting (including in an outpatient department) rather than dispensed via pharmacies (Hirsch et al., 2014). In the Netherlands, for instance, costs related to immuno-suppressants, which includes the TNF-α inhibitors used to treat rheumatoid-arthritis and bowel diseases, were transferred to the hospital budget and away from the pharmacy budget from 2012 onwards. Since this group alone was accounting for more than 6% of the total pharmaceutical budget, the shift had an important effect on overall spending patterns.

21. Another explanation for the growing share of hospital drugs in total pharmaceutical spending is that in some countries cost-containment measures in the post-crisis period tended to focus on the retail pharmaceutical sector, whereas hospital pharmaceutical spending remained more stable or continued to rise (Barros, 2012).

Figure 7. Pharmaceutical expenditure in hospitals as a share of total pharmaceutical expenditure (retail+hospital), 2005 and 2013



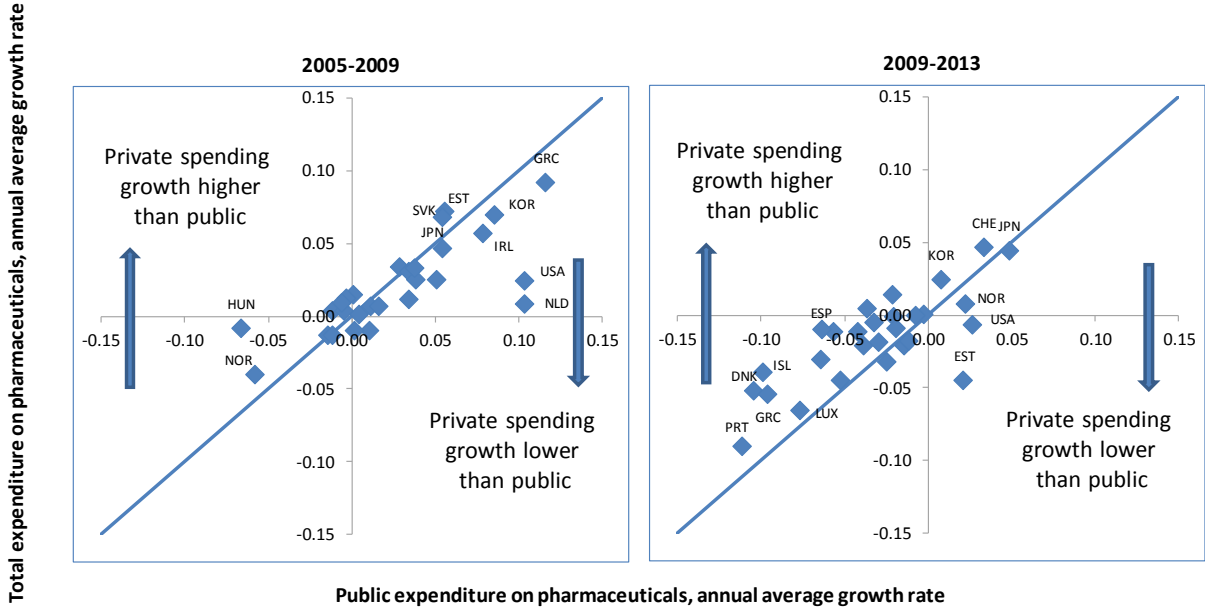
Source: OECD Health Statistics 2015

Private spending has not been subject to the same falls as public spending in recent years

22. In a majority of OECD countries, growth in private spending on pharmaceuticals has remained higher than public spending over the last decade (Figure 8). In particular, since 2008, private spending did not experience the same drops as public spending on pharmaceuticals. As a result, in some countries (e.g. Czech Republic, Hungary and Poland) overall growth in public spending on pharmaceuticals has been low (less than around 2% per year) or negative as some of the cost-burden has shifted to households. The opposite is observed when public spending remained high; public spending has driven overall pharmaceutical spending and private spending growth has generally seen slower growth (e.g. Japan and Korea).

23. These trends are partly explained by a range of policy measures adopted by countries to contain pharmaceutical costs, such as increases in cost-sharing (see Table 2 in Annex 3). Another reason for the growth in private spending is the increasing use of OTC drugs (usually not reimbursed) compared with prescription drugs (usually reimbursed) in several countries. In Slovenia, Iceland, Poland and Denmark there have been significant increases in the OTC share of pharmaceutical spending while the opposite has been observed in Korea and Estonia.

Figure 8. Annual growth in public and total retail pharmaceutical spending, OECD countries, 2005-2013



Source: OECD Health Statistics 2015

CHANGES IN HEALTH NEEDS, MARKET DYNAMICS, AND COST-CONTAINMENT POLICIES DRIVE SPENDING GROWTH

Pharmaceutical spending growth results from changes in prices, quantity and therapeutic mix

24. Pharmaceutical spending growth can be decomposed into three components: changes in prices (by which we usually refer to changes in the price of existing drugs), changes in quantity and changes in the therapeutic mix. The latter corresponds to changes in the types of drugs used for a given condition (often within the same therapeutic class). These components, in turn, are influenced by a range of factors, which can be classified into three categories: the demand for health care and medicines (e.g. due to demographic and epidemiologic changes or to changes in medical practice); pharmaceutical markets' own dynamics (new drugs and patent expiries), and pharmaceutical policies (Table 1). The sections below describe recent trends in prices, quantities and therapeutic mix and analyse the contributions of each driver on observed trends. They show that market dynamics have a great impact on spending growth in a context of ever-growing demand and consumption, and that policies have a role to play in containing or exploiting these dynamics.

Table1. The drivers of health spending growth and their impact on each component of growth

	Quantity	Prices (of existing drugs)	Therapeutic mix (and treatment costs)
Demand for pharmaceuticals *(Changes in health needs and clinical practice)*	Population size and demographic composition ⇧		Changes in practice guidelines and/or physicians' practices ⇧
	Emergence of new diseases ⇧		
	Disease prevalence and severity ⇧		
	Changes in practice guidelines and/or physicians' practices ⇧		
Pharmaceutical market dynamics	Introduction of new drugs ⇧	Introduction of new drugs ⇩ -if price competition	Introduction of new drugs ⇧
		Patent expiries, generic competition ⇩	Patent expiries ⇩ -if shift of prescription to other off-patent products
Pharmaceutical policies	Coverage expansion ⇧	Price cuts, changes in distribution mark-ups, in VAT ⇩	Promotion of appropriate use ⇩
		Reference price policies ⇩	

Note: ⇧ upward pressure on pharmaceutical spending; ⇩ downward pressure on pharmaceutical spending

Source: compilation by authors

25. Disentangling the respective effects of all the factors on pharmaceutical spending growth is challenging. Modelling can be used to estimate the effect of a number of parameters, such as time to entry for a new medication, the impact of generic entry depending on entry price, volumes, generic penetration (see for instance Toumi and Remuzat, 2012) or the effect of one-off reductions. These techniques are indeed used for pharmaceutical spending projections. A review of these approaches is beyond the scope of this report.

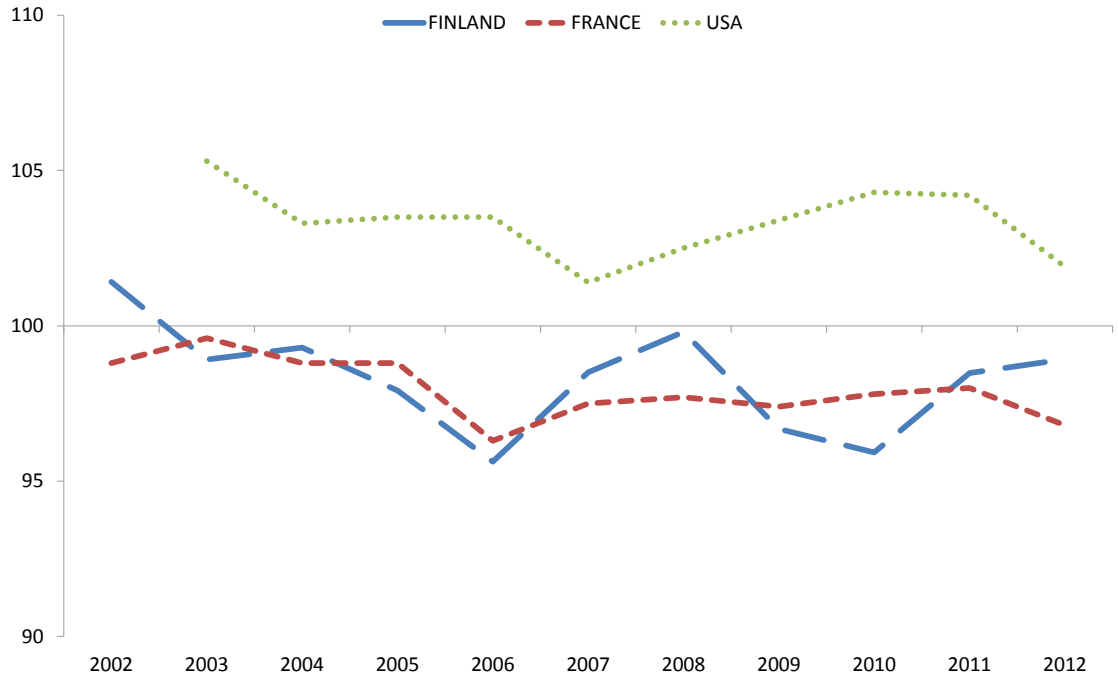
26. Only a few countries, such as Australia, Canada, Italy and Germany, regularly monitor the components of growth in pharmaceutical spending. This monitoring process is very useful at the national level to understand how money allocated to pharmaceuticals is being spent. However, they use different methodologies to decompose growth and measure the impact of each component, which makes international comparisons difficult. Therefore, the sections below describe in a more "qualitative way" the trends observed in OECD countries for each component of growth.

The prices of medicines most often remain stable or decline after market entry

27. Changes in drug prices refer to changes in the prices of existing drugs. They are measured by constructing price indices to track the price change of a given basket of drugs over a certain period of time. Different methods are used for the calculation of those indexes; the most common ones being the Laspeyres price index and the Paasche price index. Only a handful of countries regularly publish specific pharmaceutical price indices using a chained-Laspeyres index to regularly update the basket. By definition, these indexes do not take into account changes in the mix of drugs used ("quality" or "therapeutic effect"). Though the basket of drugs is regularly updated to include new drugs, the measurement of variations in drug prices from one year to the next only takes into account changes in the prices of drugs which are included in the basket in both years.

28. In many countries, the prices of retail medicines are regulated and, once set, are not allowed to increase except in exceptional circumstances. Therefore, retail pharmaceutical price curves are generally flat and often show a decline in real terms (that is, growth of pharmaceutical prices inferior to that of consumer price indexes). Figure 9 shows the evolution of the pharmaceutical price indexes for a subset of countries. In Finland and France price indexes show a drop in prices year on year, while in the United States, where medicine prices are generally not regulated, the pharmaceutical price index showed an average annual growth rate of around 3% between 2003 and 2013 compared with overall inflation of around 2%.

Figure 9. Pharmaceutical price indices, Finland, France and the United States, 2002-2012 (Preceding year=100)



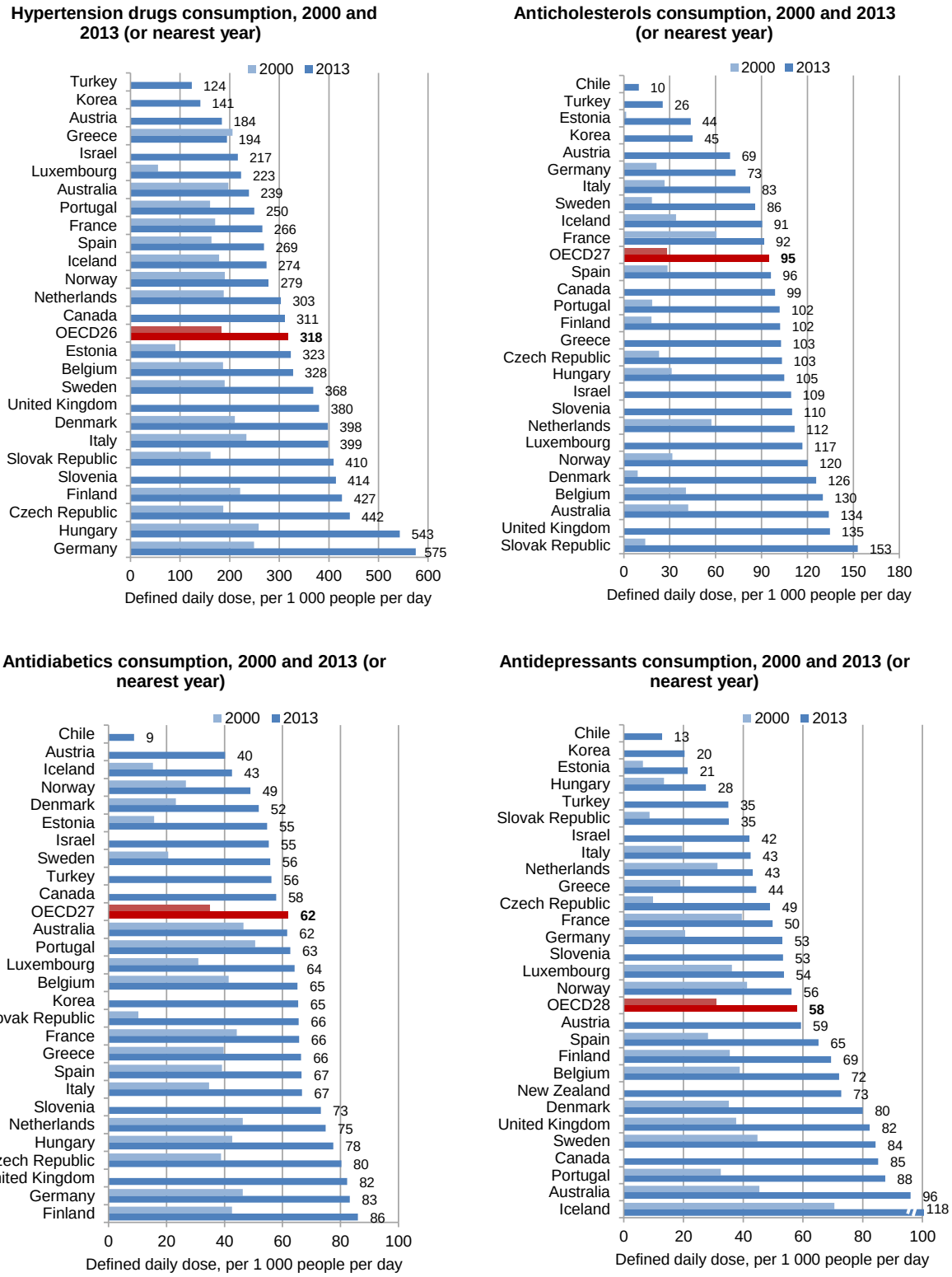
Source: France - Comptes nationaux de la santé 2012, DREES (2013) - retail pharmaceuticals; Finland - Health Expenditure and Financing 2012, THL (2014) - retail pharmaceuticals and other medical non-durables; United States - National Health Expenditure Accounts 2013, CMS (2014) - prescription drugs.

The quantity of drugs used tends to increase

29. Changes in the quantity or volume of drugs consumed are easier to measure. Countries often measure the changes in the number of prescriptions or quantities of drugs used. For international comparison, the preferred unit to measure quantity is the defined daily dose (see Box in Annex 2).

30. The quantity of drugs used tends to increase over time in most therapeutic classes. Between 2000 and 2013, among countries for which data are available, the use of antihypertensive, antidiabetic and anti-depressant medications nearly doubled, while the use of cholesterol-lowering drugs tripled (Figure 10). A range of factors explain the increase in medicine use: population ageing, the rise in the prevalence of chronic diseases such as cancer, diabetes and mental health illness, the availability of new drug treatments for previously unmet needs or changes in the physicians' prescribing practices. Their respective influence is analysed in the following sections.

Figure 10. Trends in pharmaceutical consumption



Note: Excludes hospital consumption in Australia, Belgium, Canada, Chile, Germany, Hungary, Israel, Luxembourg, Netherlands, Portugal, Slovenia, Spain and United Kingdom.

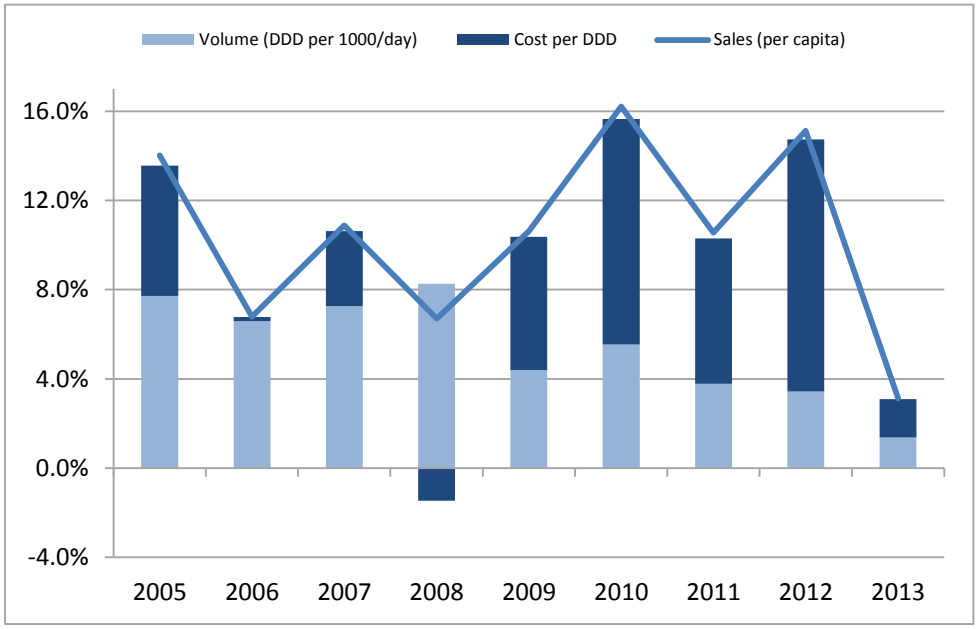
Source: OECD Health Statistics 2013

Changes in the therapeutic mix is a key component of spending growth but varies across therapeutic areas

31. Changes in the therapeutic mix explain the part of spending growth which does not result from changes in quantity or prices. This component is affected by two opposing factors. On one hand, the introduction of new and generally more expensive drugs - including new formulations of existing medicines (e.g. new strengths, forms and presentations of existing drugs), pushes spending up. These medicines are deemed to improve the quality of care and are actively promoted by pharmaceutical companies to physicians – and consumers where possible. On the other hand, the introduction of generics can lead to a switch of prescription from other molecules to one which is off-patent, offering savings. The "therapeutic mix" component measures the net effect of these two opposite effects.

32. In the case of antidiabetic medicines for instance, where use has been steadily increasing due to increasing prevalence of type-2 diabetes, the existence of long-standing treatments with generic versions resulted in a 'cost of treatment' which remained relatively stable over a number of years. However, the arrival of new and more expensive treatments in recent years significantly increased the average daily treatment cost. The shift from existing medications to new drugs has therefore been the main contributor to pharmaceutical spending growth in this therapeutic class in the recent period (as shown in Figure 11 for Denmark). The extent to which the use of these new medicines improves outcomes or avoids the use of more costly health care services is beyond the scope of this report.

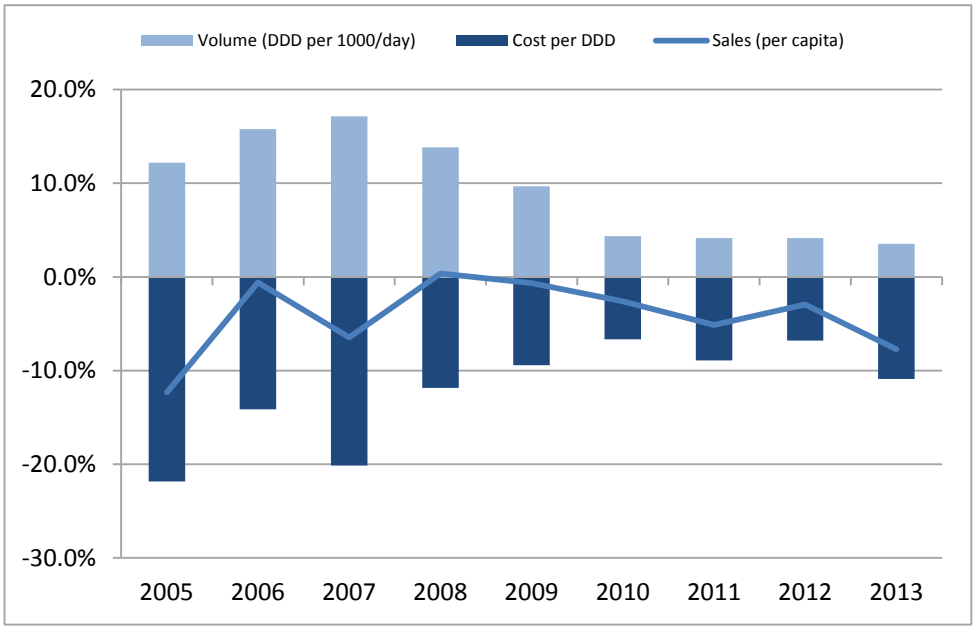
Figure 11. Annual growth in sales and consumption of antidiabetic drugs, Denmark, 2005-2013



Source: OECD Health Statistics 2015

33. By contrast, in the class of lipid-lowering medications, the expiry of the patent for some of the top selling statins in the mid-2000s and the introduction of generics has led to a pattern of decreasing treatment costs in many countries over recent years. For example, costs per defined daily dose (DDD) typically fell by more than 10% each year, on average, since 2005 in countries, such as Germany (Figure 12 and Annex 2).

Figure 12. Annual growth in sales and consumption of lipid-lowering drugs, Germany, 2005-2013



Changes in health needs and clinical practice explain the continuous growth in consumption

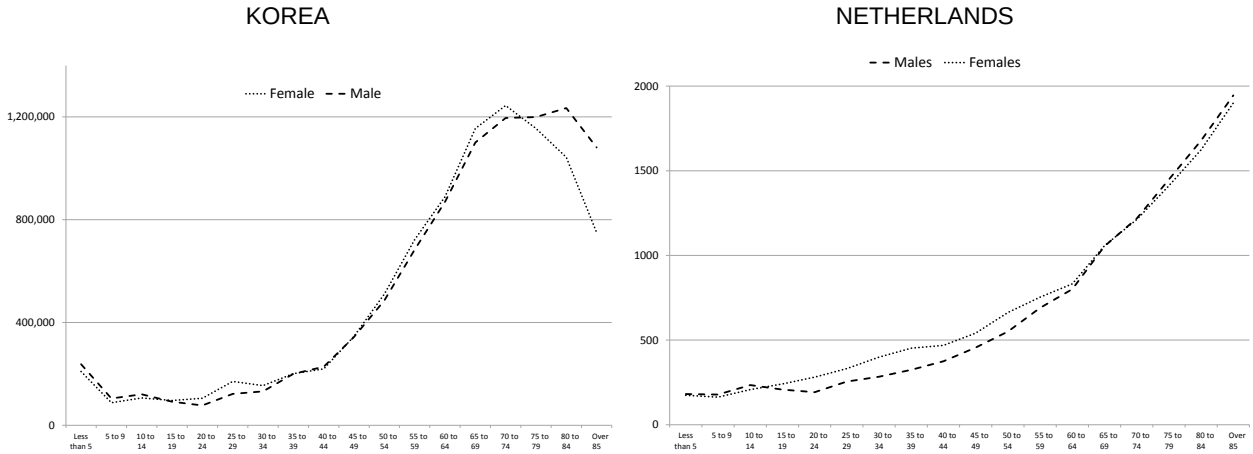
34. Increasing health needs, due to demographic and epidemiologic changes, as well as changes in clinical practices, explain the (sometimes very rapid) increase in drug consumption observed in many countries. This section describes these trends in more detail.

Demographic and epidemiologic changes tend to increase pharmaceutical consumption

35. While population ageing *per se* has a more limited effect on overall health spending than is commonly realised (Astolfi et al. 2012), there is nevertheless some effect. With age, the tendency to develop health conditions which require some kind of medication increases. As shown in Figure 13 for Korea and the Netherlands per capita spending on pharmaceuticals increases rapidly with age.

36. The rise in the prevalence of chronic diseases such as cancer, diabetes and mental health illness can also lead to an increase in the number of prescriptions and treatments overall. Improvements in diagnosis, leading to earlier recognition of conditions and earlier treatment with medicines as well as the development of more medicines (both prescribed and OTC) to treat common conditions can also act to increase the consumption of medicines.

Figure 13. Per capita spending on retail pharmaceuticals by age, Korea (won) and the Netherlands (euros), 2011



Source: OECD Database on Expenditure by Disease, Age and Gender (unpublished).

Changes in practice guidelines affect volumes consumed

37. Clinical practice guidelines are continuously updated according to new scientific findings and changes in the pattern of diseases. In several instances, changes in guidelines have recommended earlier treatments, higher dosages or longer treatment durations, leading to increases in the volume consumed.

38. This is the case, for example, for guidelines for prescribing cholesterol-lowering drugs (e.g. statins), one of the fastest-growing therapeutic classes of prescription drugs all over the world. Guidelines have been updated several times since the end of the 1990s, recommending wider screening and lower lipid level targets as an indication for prescription. In Canada, for instance, guidelines were updated in 2000, 2003, 2006 and 2009 (Fodor et al., 2000, Genest et al 2003, Manuel, et al., 2005; McPherson et al 2006, Genest et al, 2009) explaining part of the spending growth on cholesterol-lowering drugs (CIHI, 2012). In the United States and in the United Kingdom, the American Heart Association (2013) and the National Institute for Health and Care Excellence (NICE) (2014) have also issued new guidelines recommending treatment for a wider range of patients (ACC/AHA 2014; NICE, 2014).

39. Some analysts have questioned the influence of the pharmaceutical industry on the expansion and appropriateness of clinical guidelines. For example, according to Moynihan et al, some treatment guidelines published in recent years are widening the disease definitions through the creation of new categories of pre-diseases (e.g. hyper-tension and dementia/Alzheimer's disease); the lowering of diagnostic thresholds (e.g. in cholesterol, Attention Deficit and Hyper-activity Disorder, depression or gastro-oesophageal reflux disease) and the promotion of earlier diagnosis or different diagnosis methods (e.g. Rheumatoid arthritis, multiple sclerosis or myocardial infarction, cholesterol) (Moynihan et al., 2013).

Pharmaceutical market dynamics mainly affect prices and therapeutic mix

40. Pharmaceutical markets have their own dynamics, shaped by companies' strategies and environment, R&D opportunities, and a number of policies (e.g. patent rights, health policies). With regard to spending growth, this dynamic can be summarised in two opposing factors: the entry of new and innovative medicines and patent expiries, which lead respectively to an increase and a decrease in spending growth. The reality is actually more complex. For instance, new drugs entering the market with no added therapeutic value for the patient are deemed to (and sometimes do) foster price competition. However, more recently, these two main factors have explained most of the pharmaceutical spending trends.

New and innovative drugs expand treatment options and increase treatment costs

41. Dozens of new medicines or new indications for existing medicines are approved each year. New drugs can be new chemical entities or new formulations of existing drugs. Both categories may increase treatment options, for instance, for previously unmet needs or for new population targets (e.g. children) or increase competition in existing market segments. While the latter has the potential to generate savings through increased price competition, new drugs offering notable therapeutic advantages for patients are more often priced higher than their competitors and contribute to pharmaceutical spending growth.

42. In recent years, the proliferation of specialty pharmaceuticals has played an increasing role in pharmaceutical spending growth. Specialty medicines include most injectable and biologic agents used to treat complex conditions such as rheumatoid arthritis, multiple sclerosis and cancer and often require special handling or delivery mechanisms. While many of these drugs offer considerable therapeutic value to patients and represent significant improvements over alternative treatment options, they usually have a much higher price than traditional drugs.

43. According to Express Scripts[4] analyses, in the United States, specialty drugs represented just 1% of total prescriptions but accounted for 25% of total prescription drug spending in 2012. This share increased by almost 7 points between 2012 and 2014, reaching 31.8% and it is expected to grow further in the coming years (Express Scripts, 2015). For Medicare beneficiaries (people aged 65 and older as well as disabled), the cost of specialty drug spending per user increased almost 3.5 times between 2007 and 2011, to reach USD 8 976 (Trish et al., 2014). Oral cancer agents and immuno-modulators account for a considerable portion of the increase in specialty drug spending (Trish et al., 2014).

Patent losses have contributed to the slower pace of growth

44. Price reductions, driven by the introduction of generics and biosimilars following a large number of blockbuster drugs losing patent protection, have been a major driver of cost savings in recent years. Generic entry drives down the costs of existing drugs through two mechanisms: price competition, which reduces the prices of existing drugs, and increased uptake of generic drugs.

45. The recent decline in overall drug spending is largely attributable to the so-called "patent cliff", i.e. a large number of blockbuster drugs that lost patent protection. While pharmaceutical drugs sales up to 2000 were largely driven by the introduction of blockbusters, several products worth more than USD 30 billion a year in US sales lost their patents in 2011-2012, among which Plavix® (antiplatelet agent), Lipitor® (anti-cholesterol) and Actos® (diabetes), which accounted together for nearly USD 15 billion in sales (Managed Care, 2011).

46. Patent expiries offer huge opportunities to make savings without affecting the quality of care. In the United States, for instance, where the generic market is very dynamic, the price of a generic drug is on average 80 to 85 % lower than that of the brand name product and in 2012, 84% of all prescriptions filled in the US were for generic drugs (IMS, 2013). This generates big savings, estimated at USD 158 billion in

[4] Express Scripts is the largest pharmacy benefit management organization in the United States. The figures provided only refer to pharmacy benefits and are thus underestimated. Roughly half of specialty medication drug costs are included in the *medical benefit* –e.g. medicines dispensed by doctors in their setting.

2010 (FDA website)[5]. However, these potential savings can only materialise when market conditions and regulation allow as shown in the following section.

Pharmaceutical policies have recently focused on cost containment

47. Pharmaceutical policies have the potential to influence spending trends, and even more importantly, the efficiency of pharmaceutical and overall health spending (see table below and WHO, 2015). In recent years, while a few countries expanded pharmaceutical coverage (e.g. the United States), many countries have implemented or strengthened a number of cost-containment policies, especially after the economic crisis.

48. While some of the cost-containment policies had no intention other than reducing government deficits and could only be "one-off measures", (e.g. across-the board price reductions), others increased the efficiency of pharmaceutical spending (e.g. those fostering generic use). The discussion below provides an overview and some examples of these policies, and more detailed information in available in Annex 3.

Table 2. Pharmaceutical cost-containment policies introduced since 2008 in a selection of OECD countries

Policies	Examples	Extent of implementation
Pricing policies	One-off cut in ex-factory prices of on-patent medicines	AUS, AUT, BEL, CZE, FRA, DEU, GRC, IRL, ITA, PRT, ESP, CHE, GRB
	Implementation of external price referencing or change in the method or basket of countries	GRC, PRT, SVK, ESP, CHE
	- Change of value-added tax (VAT) rates (+/-)	AUT(-), CZE(-), GRE (-), EST (+), PRT(+)
	Reduction of mark-ups for distributors	AUS, CAN, CZE, EST, GRC, HUN, IRE, ITA, PRT, ESP
	Increase of rebates paid by manufacturers or distributors	GER
	Extra-ordinary price reviews	GRC, IRL, PRT, SVK,ESP, CHE
	Pressure on prices of branded medicines (e.g. group purchasing or negotiation)	CAN
Reimbursement policies	Change in the reference price system (max. reimbursement price by cluster)	EST, GRC, IRL, PRT, SVK, ESP
	Delisting of products	CZE, GRC, IRL, PRT, ESP
	Increase in cost-sharing	AUT, CZE, EST, FRA, GRC, IRE, ITA, PRT, SVN, SVK, ESP, SWE
	Introduction of health-technology assessment (HTA) to inform coverage/pricing decisions	DEU
	Entry Management agreement	BEL, GBR, ITA
Policies to exploit the potential of off-patent medicines	Implementation of voluntary or mandatory International Non-proprietary Name (INN) prescribing	EST, FRA, ITA, LUX, PRT, SVK, ESP
	Incentives for physicians to prescribe generics	BEL, FRA, GRC, HUN, JPN
	Incentives for pharmacists to dispense generics	BEL, FRA, IRE, JPN
	Incentives and information for patients to purchase generics	AUT, EST, FRA, ICE, IRL, LUX, PRT, ESP
	Pressure on generic prices (e.g. tendering, price cuts)	CAN, FRA, GRC, PRT

Source: Authors' compilation

5 http://www.fda.gov/drugs/resourcesforyou/consumers/buyingusingmedicinesafely/understandinggenericdrugs/ucm167991.htm

Price cuts have been very common

49. At least one third of OECD countries implemented measures to reduce regulated prices of pharmaceuticals since 2008.

- They most often imposed cuts on ex-factory prices. For instance, in Ireland, the government negotiated with companies a 40% price reduction on 300 largely prescribed drugs (i.e. to selling drugs). In Spain, the price of generics was reduced by 25% and a 7.5% rebate was imposed on all drugs covered by the NHS for outpatient and inpatient care. In Greece, medicine prices were cut twice (by 21.5% in 2010 and by 10.2% in 2011) while prices of generics at market entry were gradually reduced from 80% to 40% of the originator's price (Paris, 2014; Leopold et al., 2014).

- Some countries reduced distribution margins (e.g. Greece, Ireland, and Portugal) at least for some categories of medicines. In Ireland, for instance, since 2009, the prescription fees paid to pharmacists dropped by 24 to 34 %, depending on the price of the product.

- A few countries introduced or increased mandatory rebates or discounts imposed on pharmaceutical companies or distributors. For instance, Germany temporarily increased the mandatory rebate to sickness funds imposed on manufacturers for patented drugs not included in reference price clusters from 6% to 16% between 2010 and 2013. In April 2014, the mandatory rebate was set at 7% for all medicines except generics.

- In Canada, several provinces and territories entered into joint price negotiations for brand-name drugs covered by public plans.

- Five countries changed VAT rates imposed on medicine, either to reduce pharmaceutical spending (e.g. Austria, Czech Republic and Greece) or to increase public revenues (e.g. Estonia, Portugal) with the result being increasing spending.

- Greece, Portugal, Ireland, the Slovak Republic, Spain and Switzerland reformed their external reference price system, expanding or reducing the basket of countries used for international benchmarking or the method for setting prices. For example, the Slovak Republic included Greece in the basket of benchmarked countries in 2010.

Cost-sharing requirements led to a shift from public to private spending

50. A range of policy measures have aimed at shifting some of the burden of pharmaceutical spending away from the public purse to private payers (households or complementary private insurance arrangements). These rarely took the form of delisting products (i.e. excluding them from reimbursement), with the notable exceptions of Greece, where 49 medicines were delisted after a price review in 2011, Czech Republic, Ireland, Portugal and Spain (see Table 2 in Annex 3).

51. At least a dozen of countries introduced or increased user charges for retail prescription drugs, including Austria, the Czech Republic, Estonia, France, Greece, Ireland, Italy, Portugal, Slovak Republic, Slovenia, Spain and Sweden (see Thomson et al., 2014,Table 2 and in Annex 3). These policies affect pharmaceutical spending in three ways:

- The most obvious impact is a shift in the balance of total expenditure from public to private spending;

- Such policies can reduce per patient total spending on pharmaceuticals through a decrease in use. The decrease in use in turn may be made up of desirable changes (patients may become less likely to ask for antibiotics even in cases where they are likely to be ineffective if they have to bear a greater part of the costs) but also less desirable change (lower adherence to treatment protocols, for instance) (Austvoll-Dahlgren, 2008);

- They give a greater incentive to choose lower-price medications. An empirical study on the effect of co-payment increases in Korea for instance, found a decrease in per patient drug expenditures, without affecting much utilisation, suggesting a decline in use of some of the more costly therapies (Lee et al, 2012).

HTA and Managed Entry Agreements are increasingly used to inform coverage decisions

52. A few countries have decided to give a greater role to health technology assessment in their reimbursement and/or pricing process. In Germany, for instance, the AMNOG law, which took effect on January 2011, introduced a systematic and formal assessment of the "added therapeutic benefit" of new medicines after market entry to allow negotiation of a reimbursement price where needed. Expected savings for health insurance funds are up to several million Euros for some individual products (Henschke, 2013).

53. In parallel, many OECD countries have introduced or expanded the use of managed entry agreements (MEAs), which are arrangements between the manufacturer and the payer that allow coverage of drugs subject to defined conditions. Managed-entry agreements cover a wide range of contractual arrangements, which can be just financial or performance-based (i.e. reimbursement and pricing conditions are linked to observed performance of a product in real life). They take the form of price-volume agreements, coverage with evidence development, performance-based outcome guarantees, patient access schemes, etc. Their implementation varies across countries. The United Kingdom, Italy, Germany and Poland have taken the lead in using these arrangements (Ferrario and Kanavos 2013). In Italy, the amounts recouped by the government from manufacturers through performance-based arrangements are modest and represent 5% of total expenditure for the relevant indications. This is due, at least partly, to high administrative and management costs of the scheme (Garattini et al., 2015, Navarria et al., 2015, van de Vooren et al., 2014). Their impact in other jurisdictions has not yet been evaluated.

Strengthened generic policies have reduced prices

54. Many OECD countries do not fully exploit the potential of generics (see Figure 14). In 2013, generics accounted for more than three-quarters of the volume of pharmaceuticals covered by basic health coverage in the United Kingdom, Germany and New Zealand, while they represented less than one-quarter of the market in Greece, Luxembourg, Italy, and Switzerland. Some of these differences can be explained by market structures, notably the number of off-patent medicines, and by doctors' prescribing practices, but generic take-up also very much depends on policies implemented by countries (OECD, 2013; Vogler, 2012).

55. Since the onset of the economic crisis, several countries have strengthened their generic policies, through different strategies, including through increased incentives and obligations for physicians, pharmacists and patients:

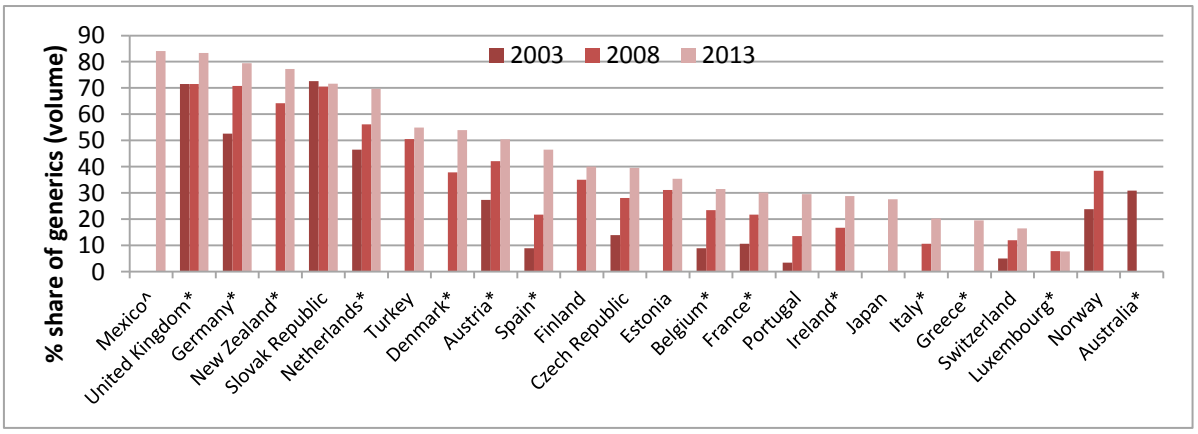
- Three countries allowed physicians to prescribe in INN –already allowed in two-thirds of OECD member countries-: Italy in 2012, Slovak Republic; and four countries made INN prescribing mandatory: Estonia in 2010, Portugal and Spain in 2011, and France from January 2015.

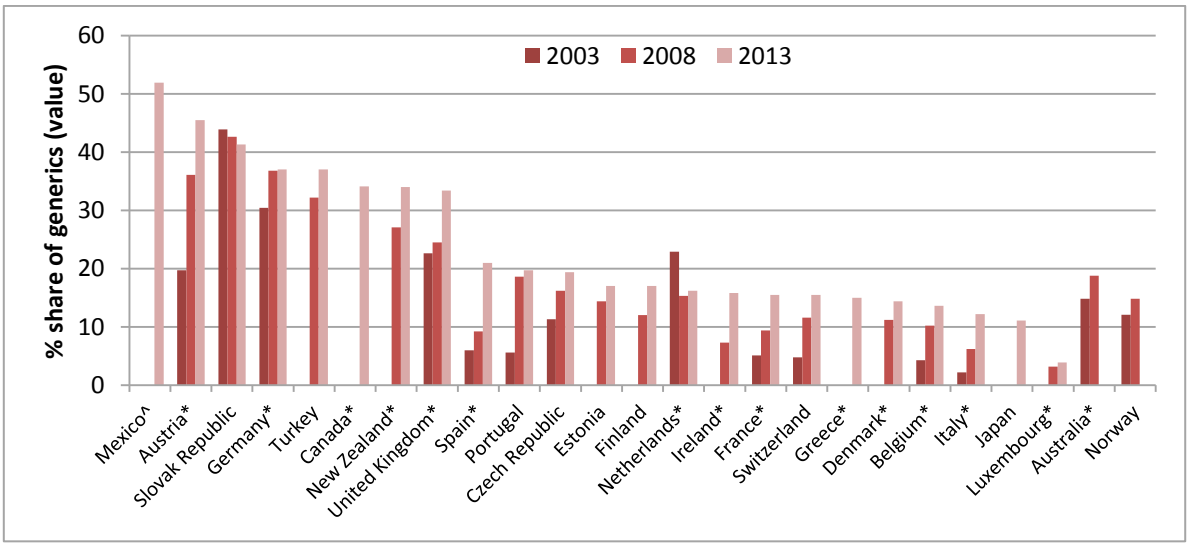
- Italy mandated pharmacists to substitute the medicine prescribed by the cheapest generic in 2012, joining the handful of OECD countries where substitution with a low-price drug is mandatory (e.g. Denmark, Finland, Spain and Sweden).

- France (in 2009, 2012) introduced incentives for GPs to prescribe generics through a pay-for-performance scheme while Japan (in 2012) increased the targets to be achieved (share of generics in prescribing) by prescribers to earn the associated bonus.

- Patients have a financial interest to choose cheaper drugs when their co-payment is lower for generic drugs than for their equivalent. This is generally the case in all systems using reference prices (or fixed reimbursement amount) for clusters of products. Greece and France introduced incentives for patients. In Greece, patients now pay the difference between the originator and the generic price where available. In France, since 2010, patients have to pay in advance for their drugs and be reimbursed later when they refuse a generic substitution. Although there is no formal evaluation of this measure, its implementation coincided with a remarkable increase in the generic market share.

Figure 14.Trends in generic market shares in volume and in value in OECD countries between 2003 and 2013





Notes: * Data refer only to reimbursed pharmaceutical market, ^ data provided by COFEPRIS
Source: OECD Health Data 2015

56. Another group of measures aimed to foster price competition or accentuate the pressure on regulated prices, for instance:

- Spain introduced measures to accelerate generic entry and make its reference price system more responsive.

- Countries using generic price linkage increased the gap between the originator's and the generic price. For example, France and Greece decreased the price of generics at market entry to respectively 40% and 60% of the originator's price, with a further 7% reduction after 18 months in France. In Canada, since 2010, several provinces implemented or reduced the reimbursement prices of generics included in public plans' formularies. As a result, generic price caps ranged from18% to 35% of brand name products in most provinces (PMPRB, 2015). A study on the impact of the Ontario reform estimated that generic drug expenditure dropped by between $362 and $388 million in one year (Law et al., 2011). In 2013, Canadian provinces and territories further capped the prices of six widely prescribed generic drugs at 18% of the originator's price.

57. While no formal evaluation is available, these policies - associated with the "patent cliff[6]"- have certainly contributed to the significant increase in generic market share observed over the past decade in most countries. In Portugal, for instance, the generic market grew from less than 6% in 2003 to 30% in volume in 2012. In Spain, the generic market share reached 47% in volume and 21% in value in 2013, up from 9% and 6% respectively in 2000 (figure 14).

Coverage expansion contributed to spending growth only in a few countries

58. Since the early 2000's, several countries have increased health coverage for a part of their population and/or the coverage of medicines with a consequent increase in spending.

- For example, in 2006, the United States introduced Medicare Part D, a voluntary drug benefit programme which provides outpatient prescription drug insurance to seniors and to people under age 65 with certain disabilities. Part D beneficiaries increased from 24.5 million in 2006 to more than 37 million in 2014 (Hoadley et al., 2014), and the share of prescription drug expenditure financed by Medicare increased from 1.9% in 2005 to 27.5% in 2013, whereas the share financed by Medicaid decreased from 17.7% to 7.8% during the same period (CMS website[7]). The Affordable Care Act is expected to further expand medicine coverage.

- In Korea, with the establishment of the National Health Insurance (NHI) in 1989 and successive steps in coverage expansion, pharmaceutical spending increased dramatically – at a rate of more than 10% each year on average between 2000 and 2004 (Yang et al, 2008).

6 Namely, a large number of blockbuster drugs that lost patent protection.

7 http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/NationalHealthAccountsHistorical.html

FUTURE SPENDING TRENDS AND KEY POLICY CHALLENGES

59. Changes in the pharmaceutical market, with the increased availability of high-cost medicines, suggest that future pharmaceutical spending growth may pick up again, instead of continuing its recent path, at least in some countries. The IMS Institute for Healthcare Informatics forecasts worldwide pharmaceutical sales[8] to be 30% higher in 2018 than in 2013 (IMS, 2014) (Figure 15). The average annual growth rate is slightly higher than in previous years as the number of drugs going off-patent decreases and the number of new specialty drugs coming to the market are increasing compared to previous years. Emerging markets, as well as the United States, are expected to contribute the most to this growth, while other more mature markets will contribute more modestly.

Figure 15. Trend in global drug sales and growth, 2009-2018



Source: IMS, 2014

8 IMS data report market sales at ex-manufacturer prices and do not reflect off-invoice discounts and rebates (IMS, 2014). By contrast, pharmaceutical spending, as reported in the System of Health Accounts are estimated at retail prices (including VAT) and are in principle net of off-invoice discounts and rebates. Both sets of data are not directly comparable but are expected to describe and prescribe more or less consistent trends.

Pharmaceutical spending is expected to grow in some countries but growth in European markets is expected to be slower[9]

60. The United States is the largest pharmaceutical market, accounting for one third of global sales, and is expected to continue to grow. IMS Institute for Healthcare Informatics predicted peaks on US spending growth of 14% in 2014 and of 8% in 2015, followed by annual growth rates of 4-5% until 2018. According to CMS projections, prescription drug spending is expected to grow at an average annual rate of around 6.0% between 2016 and 2024 (Keehan et al., 2015). Growth in this period will be driven by a number of factors including coverage expansions from the Affordable Care Act, increasing use due to economic growth and population aging, as well as increase in medical prices (Keehan et al., 2015). Differences between these predictions are likely due to differences in baseline data and hypotheses, as well as differences in the scope of data.

61. European countries with mature markets are predicted to experience lower levels of growth. According to IMS Institute for Healthcare Informatics, the 5 top European markets (Germany, France, the United Kingdom, Italy and Spain) will see annual growth rates of between 1 and 4% during the period 2014 to 2018. Pharmaceutical spending in the United Kingdom and Germany should experience the highest growth, while France and Spain will have zero to negative growth (IMS, 2014). In an earlier study, Urbinati et al. (2014) had predicted a decrease in pharmaceutical spending in all countries studied except Poland between 2012 and 2016. In this study, only the United Kingdom was predicted to show a rebound of pharmaceutical spending growth in 2016.

62. Drivers of growth will differ from country to country. In the United States, the implementation of the Affordable Care Act, the ageing of the population and price increases will be the main drivers of growth, while in the main European countries, growth is expected to be flat as countries recover from the recession, but at the same time have policies in place that help reduce prices and increase the use of generics.

The number of high-cost drugs and their prices will continue to grow

63. Specialty drugs will continue to be a major contributor to pharmaceutical spending growth. In North America, spending on specialty drugs is projected to account for 53% of total growth between 2013 and 2018, while in Europe it is forecast to be 94% over the same period (IMS 2014). The huge contribution of specialty medicines to pharmaceutical growth is explained by the fact that there will be more of them, priced at very high levels, with more patients needing them.

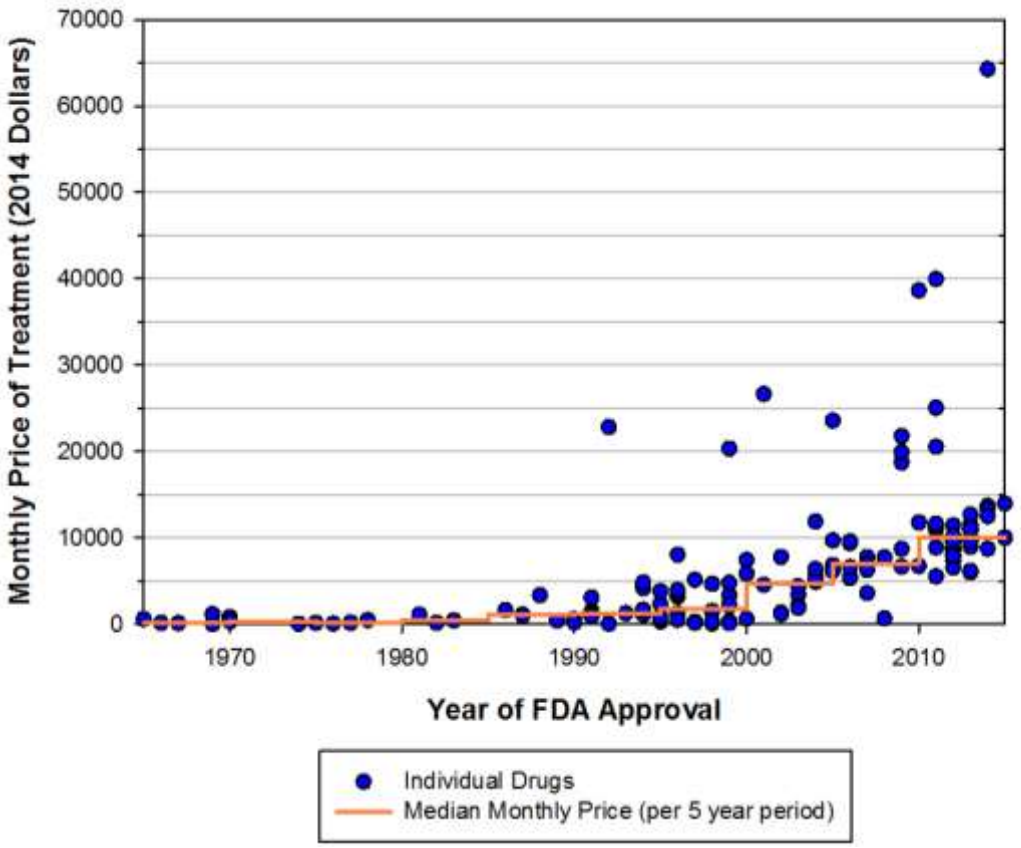
64. New specialty drugs are increasingly available and used. Since 2010, one out of two FDA approvals is for a specialty drug and, as the population ages, the number of patients eligible for specialty drugs such as drugs for rheumatoid arthritis and cancer is increasing (Lotvin et al 2014). In Canada, between 2007 and 2013, two of the top 3 drug classes that contributed the most to the growth of drug spending were high-priced biologics (i.e. anti-TNF drugs and anti-neovascular agents). In 2012, spending on high cost biologics grew by 10.4% and spending on high cost oncology drugs grew by 12.3% (CIHI, 2012).

65. Moreover, the prices of specialty drugs have considerably increased over the years, specifically in oncology. According to Bach (2009), in the United States, the median monthly price of **cancer**

[9] Studies forecasting pharmaceutical spending use very different methods, going from "continuing past trends" to more sophisticated methods modelling entry of products which are currently in the pipeline, patent expiries and expected impact of pharmaceutical policies. Annex 4 present details of methods used in projections mentioned in this section.

treatment for Medicare patients has increased from USD 97 in 1965-1969 to USD 7112 in 2005-2009 and increased further over the recent years (Figure 16). In the United States, 12 out of 13 cancer drugs approved in 2012 cost more than USD 100 000 per year (Light and Kantarjian 2013). These price increases are observed everywhere. In Australia for instance, the average reimbursement price per anticancer prescription drug increased by 133% in real terms over the period 1999-2000 to 2011-2012, while the price of all other prescription drugs only increased by 37% in the same period (Karikios et al., 2014). Oncology is the therapeutic area with the highest expected spending growth. Oncology spending is predicted to reach USD 100 billion globally by 2018 given the numbers of new drug approvals and the increasing incidence of cancer worldwide (IMS 2014).

Figure 16. Monthly and median costs of cancer drugs at the time of FDA approval 1965-2015 in the United States



Source: Note: The price of a monthly treatment refers to the treatment of a person who weighs 70 kg or has a body-surface area of 1.7 m2. The red line indicates median prices during a 5-year period. Prices have been adjusted to 2007 dollars and reflect the price for the drug at the time of approval, including both the amount of Medicare reimbursement and the amount paid by the patient or by a secondary payer. Source: Peter B. Bach, Memorial Sloan-Kettering Cancer Center available at:https://www.mskcc.org/research-areas/programs-centers/health-policy-outcomes/cost-drugs

66. High prices are not the prerogative of oncology drugs. Treatment costs for **multiple sclerosis and pulmonary hypertensions** are also very high and increasing (Lotvin et al. 2014). In the case of multiple sclerosis in the United States for instance, the first generation therapies originally costing $8,000 to $11,000 per year in 1993-1996, now cost about $60,000 per year. This increase is 5 to 7 times higher than prescription drug inflation over the period 1993 - 2013. Newer therapies entered the market with a cost 25%–60% higher than existing ones (Hartung et al., 2015). A new gene therapy (Glybera®) entered

the German market in 2014 at a price of USD 1 million a cure (Nature Biotechnology, 2015). Other gene therapies are expected to be priced at very high levels.

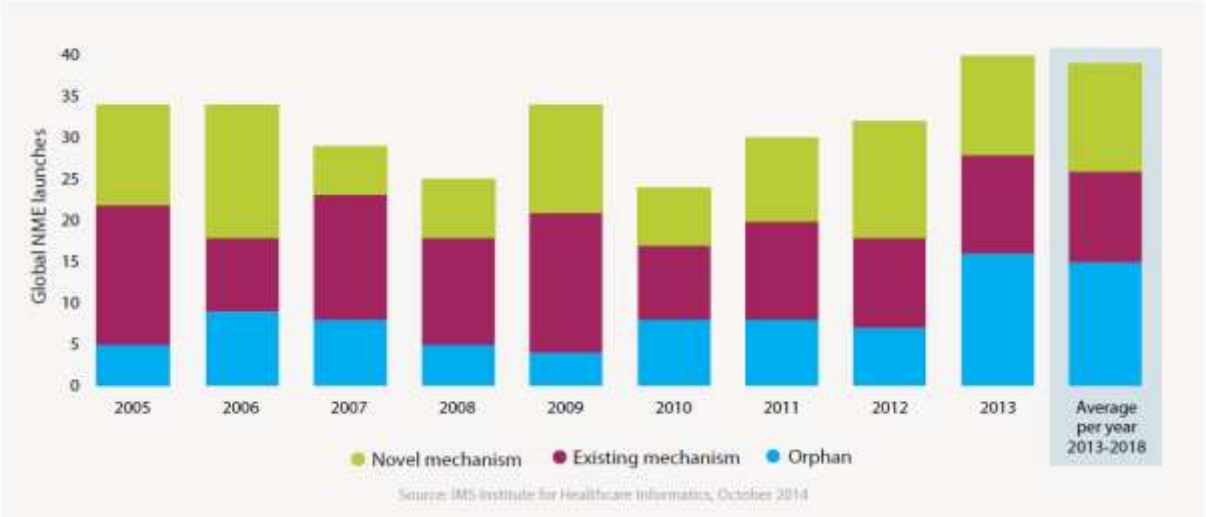
67. Between 2013 and 2014, new treatments for **hepatitis C** became available (Sovaldi®, Olysio® and Harvoni®) posing an unprecedented challenge to many OECD countries. These medicines represent a great medical advancement reaching cure rates of 95% or higher for specific population targets. They are also much better tolerated by patients as interferon-free options. The immediate budget impact of treating the entire population affected proved to be unaffordable for OECD countries, due to high prices and high prevalence of the disease. The problem was particularly acute for countries with a high prevalence of hepatitis C. Worldwide; an estimated 185 million people have been infected with the hepatitis C virus. In the United States, 135 000 patients were treated in 2014 with corresponding sales of more than USD 10 billion (Evaluate Pharma 2014). In Israel, hepatitis C medicines absorbed one third of the budget allocated to all new benefits included in the health benefit basket in 2015. In the United Kingdom, NICE recommended Sovaldi® for some people with chronic hepatitis C and estimated the cost of implementing this guidance at GBP 106 million for about 28,600 people per year. This cost includes savings generated from onward transmissions avoided (GBP 10 million) and resources released from reduced treatment periods (GBP 10 million) (NICE 2015). Global spending on hepatitis C virus is also expected to increase and to exceed USD 100 billion during the period 2014-18 globally (IMS, 2014).

68. **Orphan drugs**[10] – some of which are included in the group of "specialty drugs"- also typically have high prices. The median cost per patient and per year is 19.1 times higher for an orphan drug than for a non-orphan drug. The premium for ultra-rare indications is very high. Soliris® for instance, costs more than USD 700 000 in the United States. According to a study on prices of 59 orphan drugs in Belgium, the Netherlands, Czech Republic, France, Italy and the United Kingdom, prices do not seem to be affected by national pricing and reimbursement policies. Instead, they are likely to be higher when orphan medicines have multiple indications, when no alternative treatment is available, when they target chronic disease and when an improvement in survival of quality of life has been demonstrated (Picavet et al. 2014).

69. The number of newly approved molecular entities classified as orphans has been increasing since the implementation of policies designed to encourage their development and medicines with orphan designation now account for one-third of new chemical entities approved by the FDA and is predicted to stay stable for the period 2013-2018 (see Figure 17 from IMS 2014). In a study published in 2011, the budget impact of orphan drugs in Europe was predicted to increase from 3.3% of total pharmaceutical market in 2010 to a peak of 4.6% in 2016, before steadying-off at a level between 4% and 5% until 2020 (Schey et al., 2011) A more recent study in France and Sweden (Hutchings et al., 2014) predicted that by 2020, 152 orphan drugs will have marketing authorization in Europe. The share of orphan drugs in total drug expenditure is projected to grow from 2.7% in Sweden and 3.2% in France in 2013 to 4.1% and 4.9% respectively by 2020. These predictions however are based on the hypothesis of a slow-down of success rates of orphan drugs in development, judged to be plausible. If success rates were to be maintained at levels observed between 2000 and 2005, the share of orphan drugs could reach 9% of total pharmaceutical spending in France and 11% in Sweden. Another study estimated that the share of orphan drugs in the worldwide pharmaceutical market for non-generic prescription drugs is expected to increase from 14.3% in 2014 to 19.1% in 2020 (EvaluatePharma, 2014).

[10] Many OECD countries have adopted legislation to encourage the development and marketing of medicines to treat patients with orphan diseases[10] between 1983 (United States) and 2000 (European Union). Over 5000 rare diseases are identified to date, from which 80% are genetically based. They collectively affect some 25 million North Americans and 30 million European Union residents (Davies et al., 2012).

Figure 17. Global launches of new molecular entities



Source: IMS, 2014

High prices are an important barrier to access

70. The high price of drugs is one of the most important obstacles to access, and this not only concerns developing countries. The results of a recent survey conducted among policy makers (reported in WHO 2015) show that developed countries consider the high price of drugs the main challenge to providing access to new medicines given the budgetary restraints they have. As a result, many drugs, including drugs providing important benefits, are not available at all, or not accessible to all patients who need them.

71. For examples, a lot of countries do not reimburse the new high-cost drugs for Hepatitis C (e.g. Poland) or have limited the access to treatment only to the patients with the highest need, which is a very small proportion of the total population infected with the virus.

High prices are not always justified by high benefits

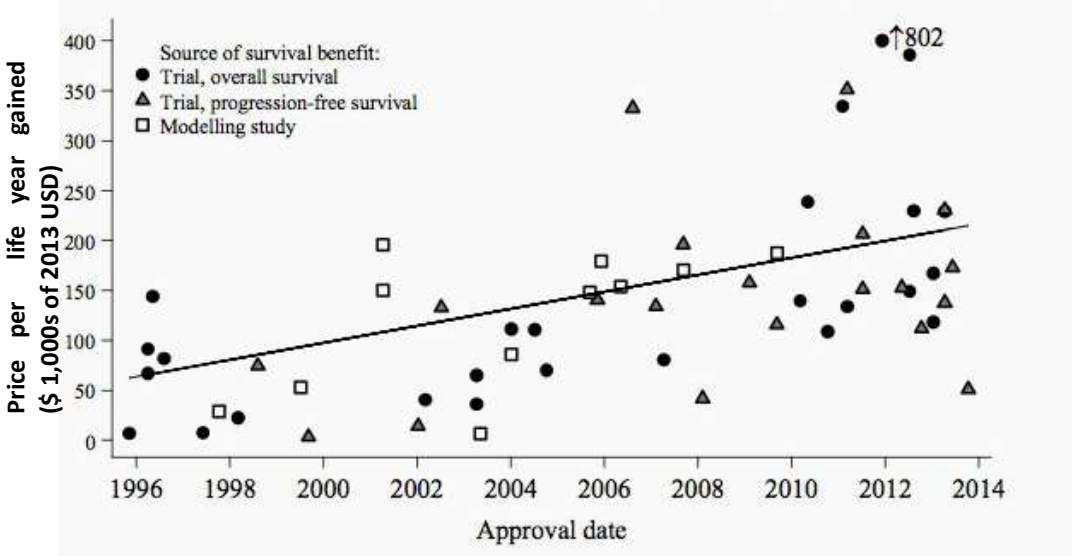
72. High prices of new medicines are not always associated with high benefits (Howard et al 2015; Light and Kantarjian 2013). For examples many new cancer drugs provide limited additional benefits over existing ones. Among the 12 new anticancer drugs approved by the FDA in 2012, only one provides survival gains that exceed two months. Sometimes cancer drugs are used for several indications with varying levels of efficacy, but the price is usually unique (Bach 2014).

73. The cost of new cancer drugs has increased by 10% annually between 1995 and 2013, even when adjusted for inflation (Figure 18). The launch price of 58 cancer drugs approved during this period increased regardless of the drug's impact on survival. "In 1995 patients and their insurers paid USD 54,100 for a year of life. A decade later, in 2005, they paid USD 139,100 for the same benefit. By 2013, they paid USD 207,000." (Howard et al.2015).

74. Many orphan drugs do not pass the test of cost-effectiveness. In the Netherlands, for instance, treatment costs associated with Myozyme used against Pompe's disease ranges between EUR 400.000 and EUR 700.000 a year, while Fabryzyme and Replegal used in the treatment of Fabry-patients cost about EUR 220.000 a year. Yet these drugs do not offer much in the way of added health benefits for patients,

resulting in a cost of several million Euros per QALY gained, which triggered a discussion in the Netherlands about the opportunity to maintain health insurance coverage of these products. Such a decision was ruled out, however, since these medicines are used for severe diseases for which no alternative treatment is available (van den Brink, 2014).

Figure 18. Price per life-year gained and approval date of oncology medicines, United States, 1996-2014



Source: Howard et al.2015

Barriers to biosimilars' uptake delay potential savings

75. Biologics[11] market shares, as well as prices, are growing worldwide. As a number of biologic agents will lose patent protection in the next years, the expected market for biosimilars[12] is large.

76. Biosimilars can lead to significant savings, although the potential is perhaps not as high as with generics of small molecules, due to longer and costlier development and production costs. While generic drugs are estimated to cost $1-5 million to develop and take 3-5 years to produce, biosimilars will cost $100-200 million to develop and take 8-10 years to produce (Hirsch et al., 2014). As a result, the prices of biosimilars are not expected to be as low as those of generics. For the time being, they are about 25% lower than the originators on average in the European Union (Megerlin et al., 2013). However, given the high prices of biologics (USD 25 000 - 200 000 a year), biosimilars have the potential to generate substantial savings. In Europe, they are expected to save EUR 11.8 to 33.4 billion (USD 15 to 44 billion) by 2020 (Haustein et al., 2012). A 2014 RAND analysis predicts that biosimilars will reduce US spending on biologics to USD 44.2 billion from 2014 to 2021, generating savings of around 4% in this market segment over the same period (Mulcahy et al, 2014).

77. There are still barriers in uptake and the regulation of biosimilars' market entry varies widely between countries. Europe established a pathway for the approval of biosimilars in 2005, Japan approved biosimilars' regulation in 2009 and South Korea in 2010. The United States approved the legislative

[11] See Box 1 for definition

[12] See Box 1 for definition

framework for licensing follow-on biologic products in 2010, but the FDA only recently approved the first biosimilar in March 2015.

78. In many countries, prescribing by International Non-proprietary Names (INN) is not allowed and automatic substitution of an original biologic by a biosimilars is generally not permitted. National regulations often recommend the use of biosimilars to initiate treatments of naïve patients rather than switching patients from an original biological drug to a biosimilar (European Biopharmaceutical Enterprises, 2015).

CONCLUSIONS AND DISCUSSION

79. Pharmaceutical spending trends are not homogeneous over time and across countries. The analyses reported in this paper have shown that retail pharmaceutical spending has increased at a slower pace or even decreased in recent years (particularly since 2009), while pharmaceutical spending in hospitals has increased in most countries for which data are available. Spending trends are the result of the interaction of several factors which are difficult to isolate and their role in shaping future spending may differ by country.

80. While cost-containment policies and the recent patent cliff have had an impact in the reduction of retail pharmaceuticals spending, spending for hospital pharmaceuticals has increased, pushed by the availability and prices of specialty medicines.

81. New high-cost specialty drugs are coming to the market and are expected to account for 50 to 100% of pharmaceutical spending growth in the near future. Their availability, combined with the aging population, suggests that pharmaceutical expenditure may pick up again after the stagnation or even decline observed in the aftermath of the recent crisis, although it is difficult to predict with certainty how much it will grow.

82. Pharmaceutical spending growth is not necessarily a problem *in itself*. Medicines play an important role in the management of a number of chronic diseases (e.g. diabetes, asthma) and in some circumstances they prevent complications and the use of costly health care services. However, the increasing availability and sky-rocketing prices of new medicines, especially in oncology, hepatitis C, pulmonary hypertension, multiple sclerosis or for rare diseases, have raised a number of questions and challenges.

83. First, in a number of countries, these drugs are not affordable, or not accessible to all patients who really need them.

84. Second, payers, practitioners and the public are increasingly questioning the rationale for such high prices and their legitimacy (see for instance Saltz, 2015; Howard et al. 2015). Although financial incentives are needed to encourage the (costly) development of new products, experts and stakeholders raise questions about the productivity of industry's R&D spending or on the fair level of remuneration for innovators and investors.

85. Third, high-cost medicines do *not always* deliver high health outcomes. Typically, medicines used for very severe conditions and/or diseases where no alternative treatment is available, are assigned high prices, disconnected from the health benefits they bring to patients. Many of these drugs are not cost-effective, according to standard thresholds. This means that societies do not get value "today" from the money they spend for these drugs – the criteria of static efficiency is not met.

86. Fourth, the proliferation of high-cost medicines and their growing share in pharmaceutical and health spending is problematic. Until now, high prices have provided incentives for companies to develop medicines destined for small markets and that was sustainable for a while. However, companies are developing more and more specific therapies to treat fewer numbers of patients, which have high prices in order for companies to recoup their investment (and serve shareholders). As the number of approvals for

drugs with "small population targets" increases, the efficiency problem is becoming more acute and countries will need to consider whether they want to spend an ever-increasing share of their budgets for fewer patients and less "health gains".

87. Fifth, a concurrent question, beyond the scope of this paper, relates to the dynamic efficiency of pharmaceutical spending, i.e. do innovators have the appropriate incentives for pharmaceutical R&D? Here again, we have some indication that some high-priority needs are not covered by R&D investments (WHO, 2013); and that industry's R&D investments are not always very productive (Scannell et al 2012; Pammolli et al 2011, Fojo et al., 2014).

88. The pharmaceutical innovation and pricing system has, in the past, delivered many health gains to the population. However, there is no reason to believe that this will inevitably continue in the future. In particular, the rise in costs for specialty drugs suggests that there is a need for a radical reappraisal of pricing practices for new products in OECD countries.

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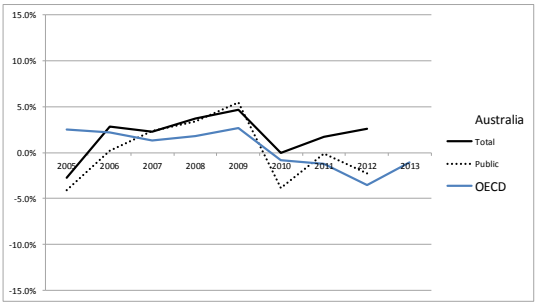
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ANNEX 1: REAL PER CAPITA PHARMACEUTICAL EXPENDITURE GROWTH 2005-2013

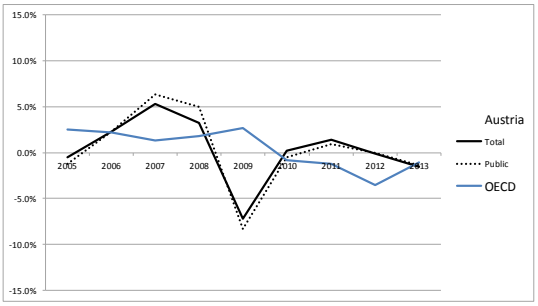
Australia

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	-2.7%	2.9%	2.3%	3.7%	4.7%	0.0%	1.7%	2.6%	
Public	-4.1%	0.2%	2.4%	3.4%	5.5%	-3.9%	-0.1%	-2.3%	
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



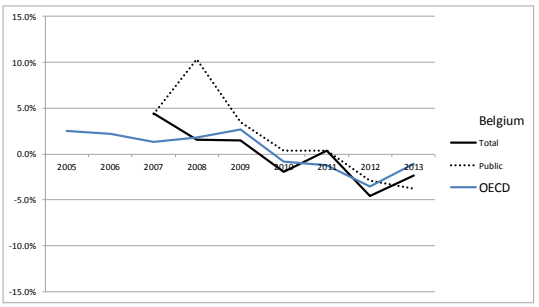
Austria

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	-0.5%	2.3%	5.3%	3.3%	-7.2%	0.2%	1.4%	-0.1%	-1.5%
Public	-1.3%	2.3%	6.3%	5.0%	-8.3%	-0.5%	0.9%	-0.1%	-1.4%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



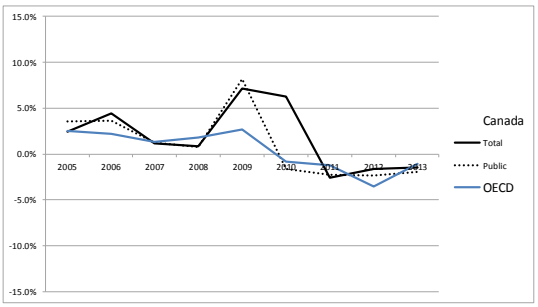
Belgium

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total			4.4%	1.6%	1.5%	-2.0%	0.3%	-4.6%	-2.4%
Public			4.3%	10.3%	3.5%	0.3%	0.4%	-2.9%	-3.8%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



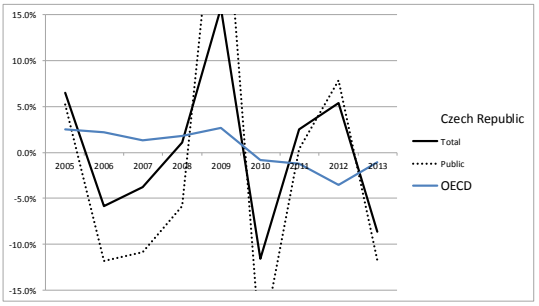
Canada

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	2.4%	4.5%	1.2%	0.8%	7.1%	6.2%	-2.6%	-1.6%	-1.5%
Public	3.5%	3.6%	1.2%	0.8%	8.1%	-1.6%	-2.3%	-2.4%	-1.9%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



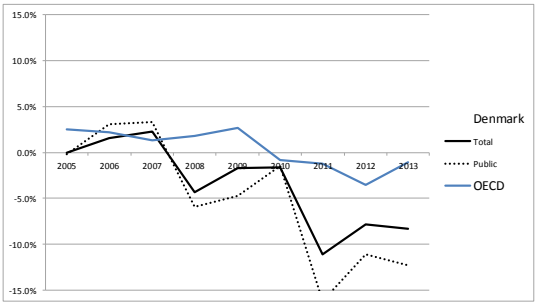
Czech Republic

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	6.5%	-5.9%	-3.8%	1.1%	15.8%	-11.6%	2.5%	5.3%	-8.6%
Public	5.2%	-11.8%	-10.9%	-5.8%	35.2%	-21.7%	0.4%	7.8%	-11.8%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



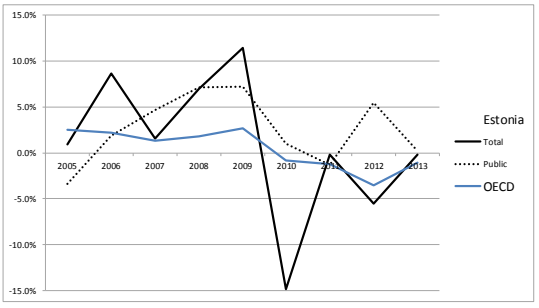
Denmark

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	0.0%	1.6%	2.3%	-4.3%	-1.7%	-1.6%	-11.1%	-7.8%	-8.3%
Public	-0.2%	3.0%	3.3%	-5.9%	-4.7%	-1.5%	-16.2%	-11.1%	-12.3%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



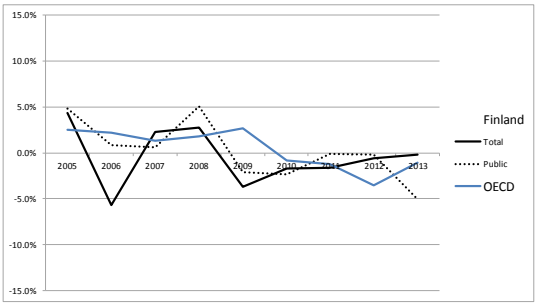
Estonia

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	0.9%	8.6%	1.5%	7.0%	11.4%	-14.9%	-0.2%	-5.5%	-0.2%
Public	-3.4%	1.9%	4.6%	7.1%	7.2%	1.0%	-1.3%	5.4%	0.2%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



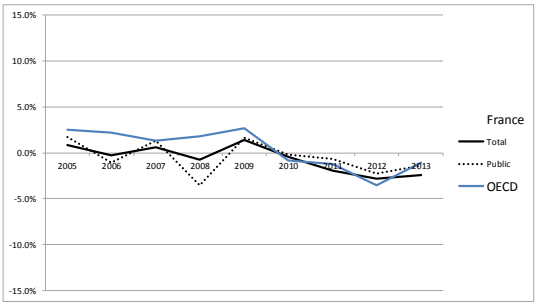
Finland

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	4.4%	-5.7%	2.3%	2.7%	-3.7%	-1.7%	-1.7%	-0.6%	-0.2%
Public	4.8%	0.8%	0.6%	5.1%	-2.1%	-2.3%	-0.1%	-0.2%	-5.1%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



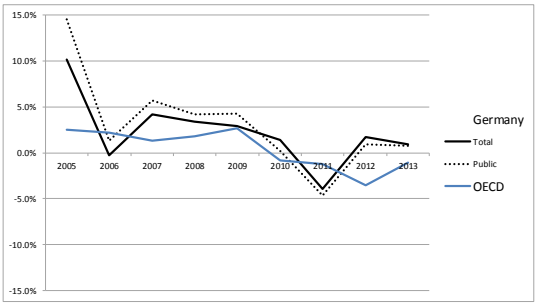
France

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	0.8%	-0.2%	0.6%	-0.8%	1.4%	-0.4%	-1.9%	-2.8%	-2.4%
Public	1.7%	-1.1%	1.3%	-3.6%	1.6%	-0.2%	-0.7%	-2.3%	-1.4%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



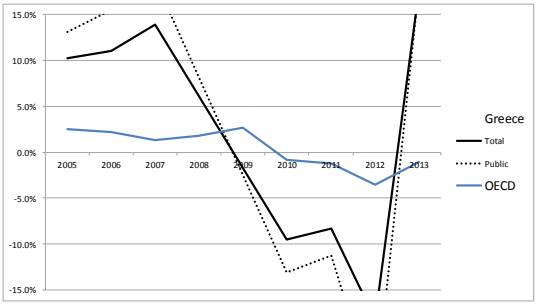
Germany

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	10.1%	-0.3%	4.2%	3.4%	2.9%	1.4%	-3.9%	1.7%	1.0%
Public	14.6%	1.3%	5.7%	4.1%	4.2%	0.2%	-4.6%	1.0%	0.8%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



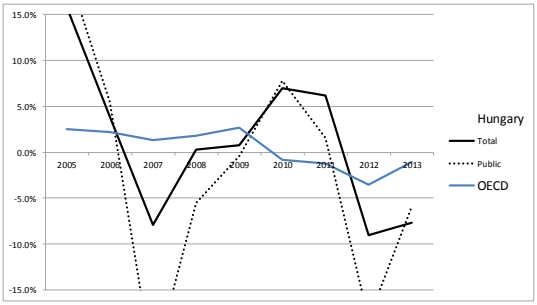
Greece

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	10.2%	11.1%	13.9%			-9.5%	-8.3%	-18.2%	17.7%
Public	13.1%	15.5%	18.8%			-13.1%	-11.3%	-26.6%	18.1%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



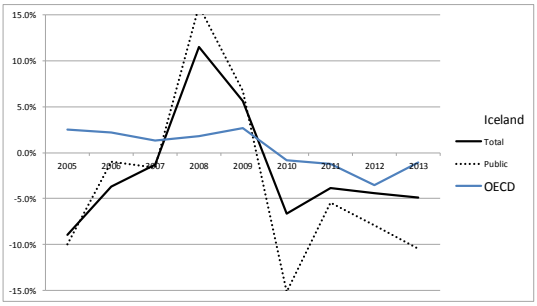
Hungary

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	15.8%	3.9%	-7.9%	0.3%	0.7%	7.0%	6.1%	-9.1%	-7.7%
Public	19.9%	5.5%	-23.4%	-5.6%	-0.4%	7.8%	1.5%	-18.2%	-6.0%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



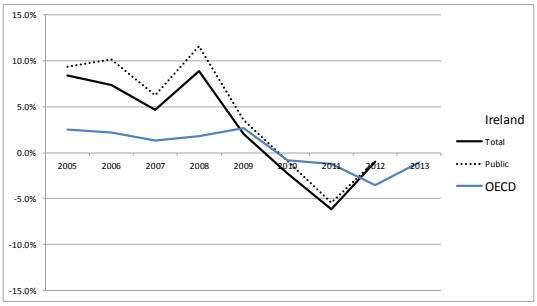
Iceland

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	-9.0%	-3.7%	-1.3%	11.5%	5.6%	-6.7%	-3.9%	-4.4%	-4.9%
Public	-10.0%	-1.0%	-1.6%	16.0%	6.8%	-15.2%	-5.5%	-7.9%	-10.5%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



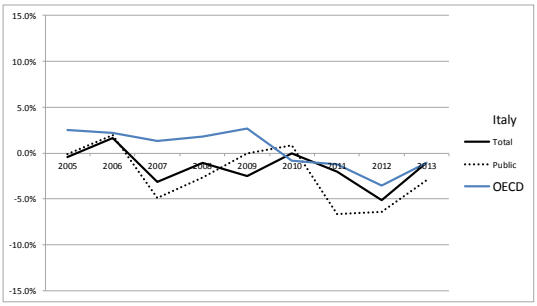
Ireland

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	8.4%	7.4%	4.7%	8.9%	2.0%	-2.3%	-6.2%	-1.0%	
Public	9.4%	10.2%	6.3%	11.6%	3.6%	-0.9%	-5.5%	-0.9%	
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



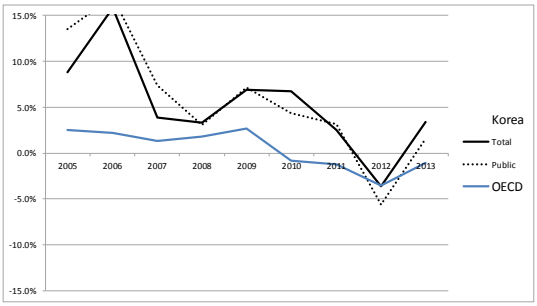
Italy

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	-0.5%	1.6%	-3.2%	-1.1%	-2.5%	0.0%	-2.0%	-5.2%	-1.1%
Public	-0.1%	2.0%	-4.9%	-2.6%	0.0%	0.9%	-6.7%	-6.4%	-3.0%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



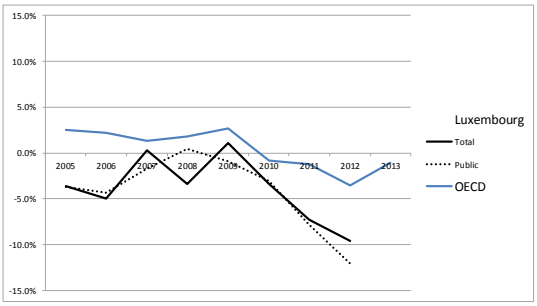
Korea

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	8.8%	15.9%	3.9%	3.3%	6.9%	6.7%	2.5%	-3.7%	3.4%
Public	13.5%	17.0%	7.4%	3.1%	7.1%	4.3%	3.2%	-5.6%	1.6%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



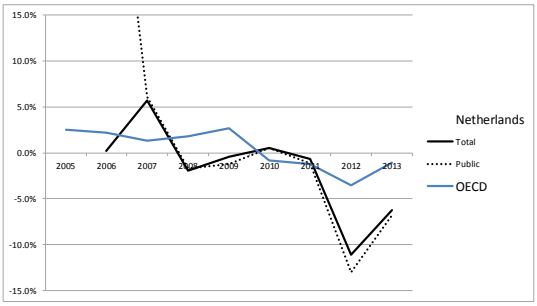
Luxembourg

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	-3.7%	-5.0%	0.3%	-3.4%	1.1%	-3.4%	-7.3%	-9.6%	
Public	-3.7%	-4.4%	-1.7%	0.5%	-0.9%	-3.1%	-7.9%	-12.1%	
OECD	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



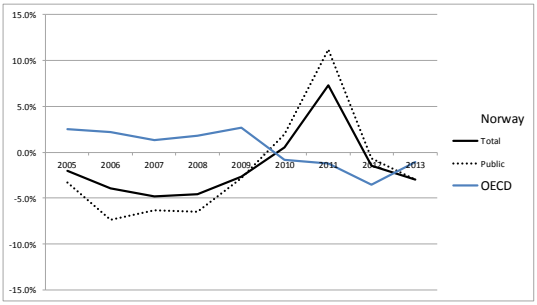
Netherlands

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total		0.2%	5.7%	-1.9%	-0.5%	0.5%	-0.7%	-11.1%	-6.3%
Public		43.9%	6.1%	-1.7%	-1.2%	0.5%	-1.1%	-13.0%	-6.8%
OECD	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



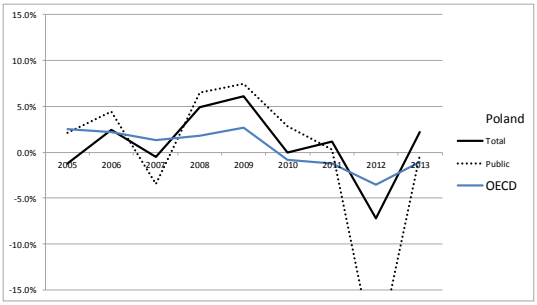
Norway

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	-2.1%	-3.9%	-4.9%	-4.6%	-2.7%	0.5%	7.3%	-1.5%	-3.0%
Public	-3.3%	-7.4%	-6.3%	-6.5%	-2.8%	2.0%	11.2%	-0.7%	-3.0%
OECD	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



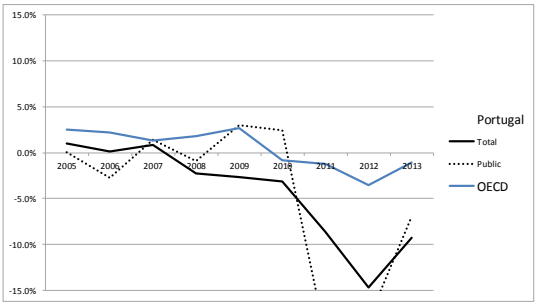
Poland

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	-1.3%	2.4%	-0.6%	4.9%	6.1%	-0.1%	1.2%	-7.2%	2.2%
Public	2.1%	4.4%	-3.5%	6.5%	7.4%	2.8%	0.3%	-22.8%	-0.3%
OECD	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



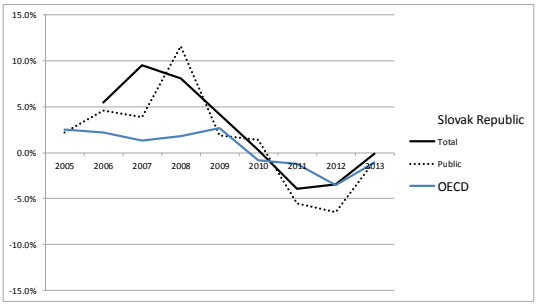
Portugal

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	1.0%	0.1%	0.9%	-2.2%	-2.7%	-3.2%	-8.6%	-14.7%	-9.3%
Public	0.1%	-2.8%	1.4%	-0.9%	3.0%	2.4%	-19.9%	-18.2%	-7.0%
OECD	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



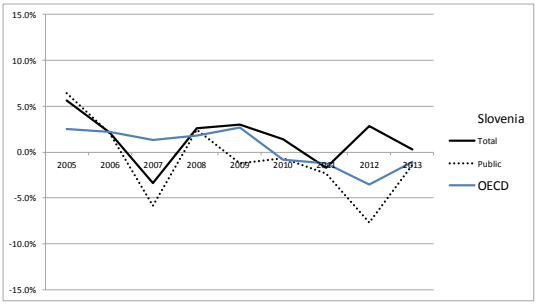
Slovak Republic

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total		5.4%	9.5%	8.1%	4.2%	0.3%	-3.9%	-3.5%	-0.1%
Public	2.2%	4.6%	3.9%	11.6%	1.9%	1.4%	-5.5%	-6.5%	-1.0%
OECD	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



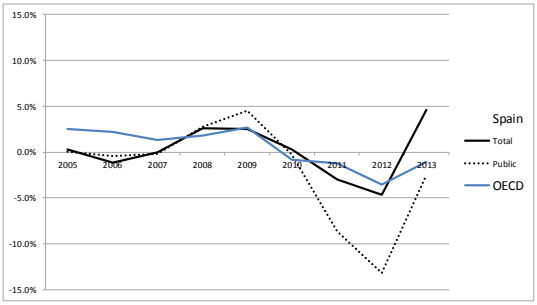
Slovenia

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	5.6%	2.1%	-3.4%	2.6%	3.0%	1.4%	-1.7%	2.8%	0.3%
Public	6.4%	2.0%	-5.9%	2.4%	-1.2%	-0.7%	-2.4%	-7.7%	-1.4%
OECD	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



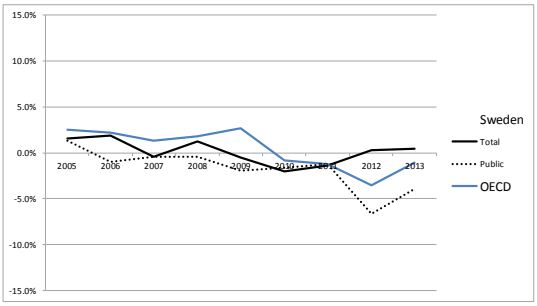
Spain

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	0.3%	-1.2%	-0.1%	2.6%	2.5%	0.2%	-3.0%	-4.6%	4.6%
Public	0.0%	-0.5%	-0.2%	2.7%	4.5%	-0.3%	-8.6%	-13.2%	-2.5%
OECD	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



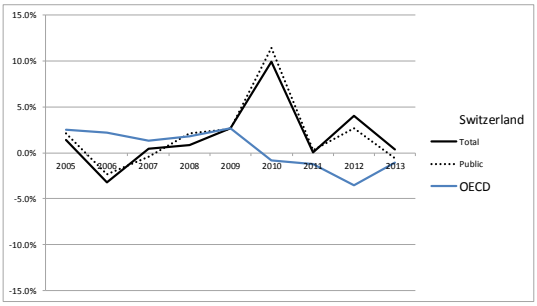
Sweden

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	1.5%	1.9%	-0.4%	1.3%	-0.5%	-2.0%	-1.4%	0.3%	0.4%
Public	1.4%	-1.0%	-0.4%	-0.4%	-1.9%	-1.6%	-1.2%	-6.6%	-3.9%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



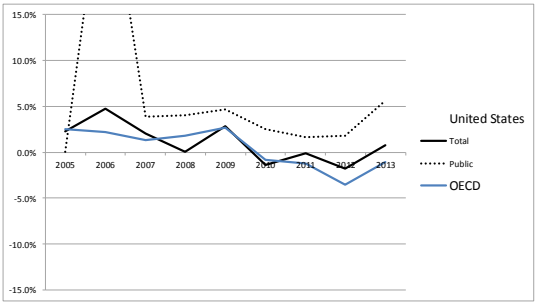
Switzerland

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	1.4%	-3.2%	0.5%	0.8%	2.6%	9.9%	0.0%	4.1%	0.4%
Public	2.1%	-2.4%	-0.4%	2.1%	2.6%	11.4%	0.3%	2.7%	-0.6%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



United States

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total	2.3%	4.7%	2.0%	0.0%	2.8%	-1.4%	-0.1%	-1.8%	0.8%
Public	0.1%	32.3%	3.9%	4.0%	4.7%	2.5%	1.6%	1.8%	5.6%
OECD Total	2.6%	2.2%	1.3%	1.8%	2.7%	-0.8%	-1.2%	-3.5%	-1.1%



ANNEX 2. TRENDS IN CONSUMPTION AND TREATMENT COSTS ACROSS THERAPEUTIC CLASSES

89. The following presents an analysis of trends in terms of quantity and treatment costs, for several therapeutic categories. Data on sales and consumption by therapeutic categories, available for a number of OECD countries show contrasting patterns, illustrating the fact that market dynamics are very different across therapeutic classes (see Box 2).

Box 2. OECD data on sales and consumption by therapeutic classes

OECD collects additional data on pharmaceutical sales and consumption, broken down by main therapeutic category (and a number of subcategories). Data coverage varies – some countries include sales to the hospital sector and the OTC market, while other countries restrict data to, for example, the social health insurance reimbursement market.

In some cases, "sales" are expressed at manufacturers' prices while in others they correspond to expenditures, at retail prices. Therefore, sales data cannot be compared across countries. However, trends can be analysed for each country.

Defined daily doses (DDDs) are used to measure consumption. A DDD is the assumed average maintenance dose per day for a drug used for its main indication in adults. DDDs are assigned to each active ingredient(s) in a given therapeutic class by international expert consensus. For instance, the DDD for oral aspirin equals 3 grams, which is the assumed maintenance daily dose to treat pain in adults. DDDs do not necessarily reflect the average daily dose actually used in a given country. DDDs can be aggregated within and across therapeutic classes of the Anatomic-Therapeutic Classification (ATC). For more detail, see www.whocc.no/atcddd.

Therapeutic categories are defined using the Anatomical Therapeutic Classification (ATC), an internationally recognised classification maintained by WHO. It has five levels of classification with the highest one reflecting the various systems within the human body with which drugs are primarily associated. Of the 14 classes for which both sales and DDD data are available, we selected four therapeutic classes among the three top selling classes (Alimentary tract and metabolism (A), Cardiovascular system (C), and Nervous system (N)) contributing to more than 50% on average of the total retail pharmaceutical sales. For each of these broad classes we selected the main active ingredients for the international comparison: drugs to treat diabetes (A10); drugs to treat cardiovascular diseases (C02, C03, C07, C08, C09 and C10) and drugs for nervous disorders (N06A antidepressants). In addition, the trends in the use of antibiotics (J01) are examined. The selected groups of drugs accounted for 20% of total sales (including hospital sales) on average in 2013 and around 30% (when only retail drugs are considered).

While those drugs have shown a declining share of total sales over the past 10 years, they have experienced growth in the volumes of consumption which may indicate a general decrease in the cost per DDD over the past 10 years.

Source : OECD Health Statistics 2015

Changes in market structure by therapeutic class

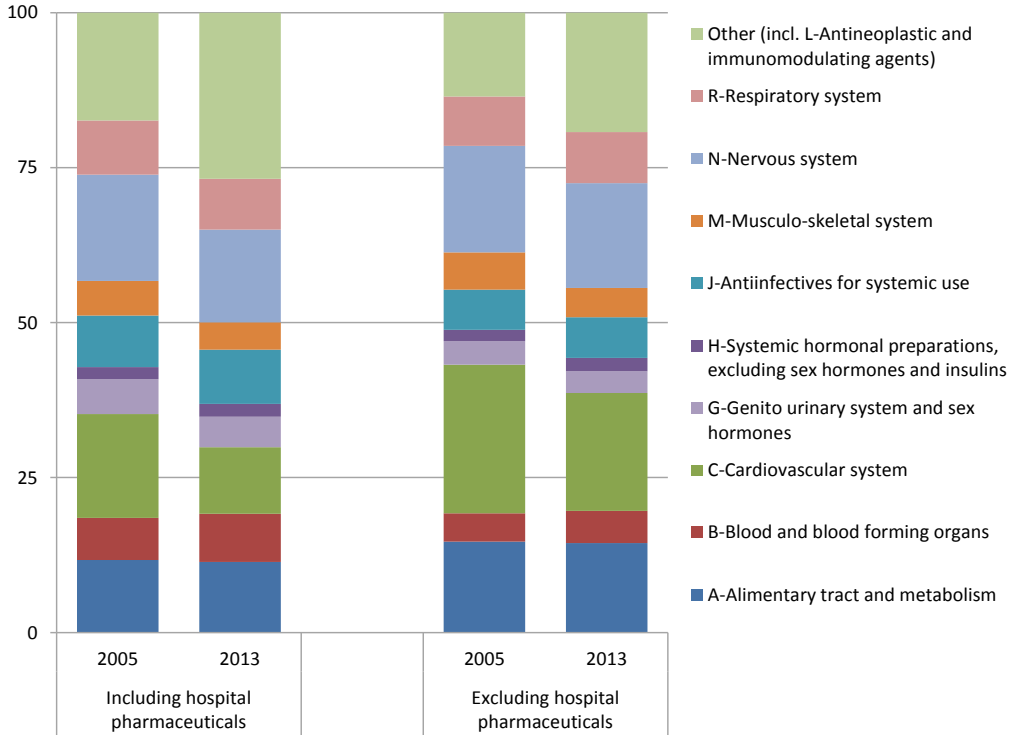
90. In the retail sector, drugs used to prevent and treat cardiovascular diseases (e.g. anti-hypertensive and lipid-lowering drugs) are still the leading therapeutic class in 2013, accounting for 19% of total sales,

though their share of the total has been declining. Drugs used in the nervous system (analgesics and drugs used to treat psychiatric disorders) come just after with 17% of the total, relatively stable over the period.

91. When both retail and hospital sectors are considered, cancer drugs and immuno-modulating agents account for more than a quarter of total sales in 2013. The proportion of anti-infectives (which includes antibiotics and antivirals) and drugs to treat blood disorders (including drugs to reduce bleeding and aid clotting) are also much higher (respectively 8.7% and 7.8%).

92. Otherwise, in terms of changes between 2005 and 2013, both sets (i.e. including and excluding hospital sales) show a decrease in the share of sales value for drugs treating circulatory diseases, particularly when hospital sales are included. There is also an increase in the value of drugs to treat nervous disorders (analgesics, antidepressants, etc.) in the retail sector. The following section looks at some of these therapeutics categories in more detail in some countries by decomposing sales into price and volume effects.

Figure A1. Composition of pharmaceutical sales by ATC group, 2005 and 2013



Note: This figure presents separately averages for countries whose data include hospital sales and countries whose data are limited to retail sector sales of pharmaceuticals. Including hospital sales: Czech Republic, Denmark, Estonia, Finland, Italy, Norway, Slovak Republic and Sweden. Excluding hospital sales: Australia, Germany, Luxembourg, Netherlands and Portugal. Average shares of each therapeutic classes in total sales are computed as an unweighted averages of national shares.

Source: OECD Health Statistics 2015

Antidiabetic drugs

93. Over 85 million people living in OECD countries were estimated to have had diabetes in 2011. This represents 6.9% of people aged 20-79 years. In Mexico, more than 15% of adults have diabetes. By contrast, less than 5% of adults suffer from diabetes in Belgium, Iceland, Luxembourg, Norway and Sweden (IDF, 2011). The prevalence of diabetes is increasing worldwide. In Sweden, the number of

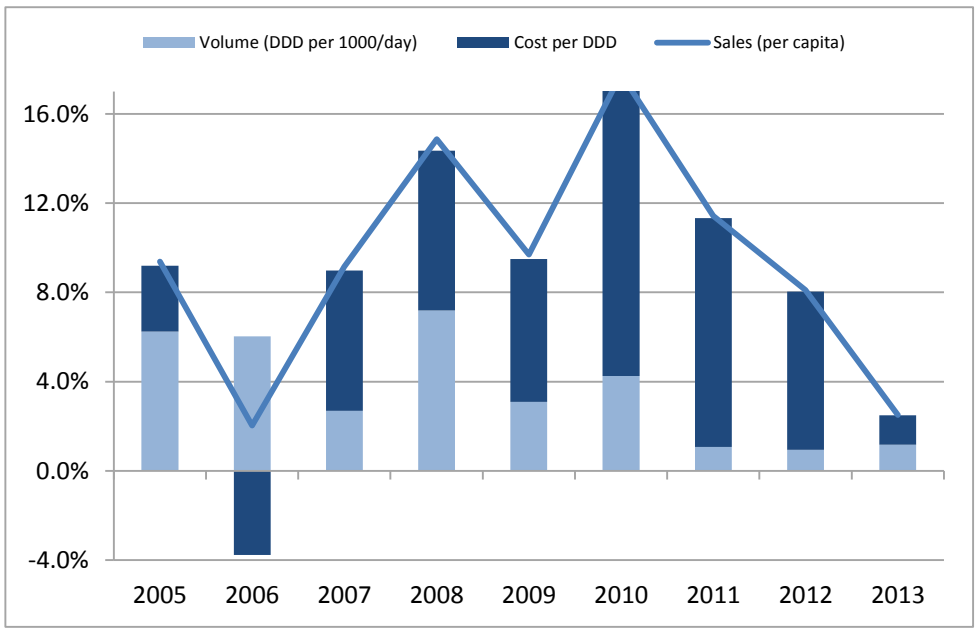
patients on the Swedish National Diabetes Register rose from around 75,000 to nearly 350,000 between 2003 and 2012 (Guðbjörnsdóttir et al, 2012). In England, diabetes prevalence rates reported by the NHS Quality and Outcomes Framework rose from 3.3% to 6% between 2005/6 and 2012/13 (HSCIC, 2014).

94. For those OECD countries with available data, the value of diabetes drugs (ATC A10) sales (including to hospitals) has risen by more than 9% on average per year making drugs used to treat diabetes among the highest value sub-categories of drugs, representing 6.7% of pharmaceutical sales (excluding those to hospitals) and 4.5% (including hospitals). This has risen from 3.8% and 2.9% respectively over the same period.

95. Over the same period, drug consumption measured in terms of DDDs per 1000 population per day rose by almost 5% each year on average. One of the most common and least expensive diabetes drugs to control blood sugar is *Metformin*. *Metformin* has been available for decades in many countries and with the availability of generic forms has meant prices have been held back or fallen while volumes have risen in line with increasing prevalence. However, in recent years a number of new and generally more expensive drugs, such as *Sitagliptin* (approved in 2006-2007), have become available resulting in the average cost per DDD rising by around 3.7% on average across the selected OECD countries. Two other diabetes drugs lost their patent in 2011 and 2012 (*Pioglitazone* and *Rosiglitazone*), offering opportunities for reductions in treatment costs.

96. Figure A2 shows an example of the annual growth in per capita sales and consumption (measured in DDDs per 1000 population per day) from 2005 to 2013 for Finland. Sales, which include the hospital sector, have grown by over 10% each year over the period with the volume of DDDs growing at an average of around 4.3%. The cost per DDD has therefore been the major contributor to the overall increase in expenditure (sales) over the period. Several countries show similar profiles for antidiabetics: increases in sales manly due to increases in quantity until the mid-2000s, and largely due to increases in the costs of treatments from 2007-2008 (e.g. Denmark, Norway). In Australia, Portugal and Spain, sales growth is mainly due to increases in treatment costs for the whole period, except for 2012 in Portugal, where treatment costs dropped. Note that quantity of drug used has been decreasing in Portugal since 2009, which is an unusual and unexpected configuration. In Estonia and Slovak Republic, sales growth is mainly explained by increases in consumption, which has reached 15% in certain years. In the Slovak Republic, in 2012, both quantity and treatment cost declined.

Figure A2. Annual growth in sales and consumption of antidiabetic drugs, Finland, 2005-2013

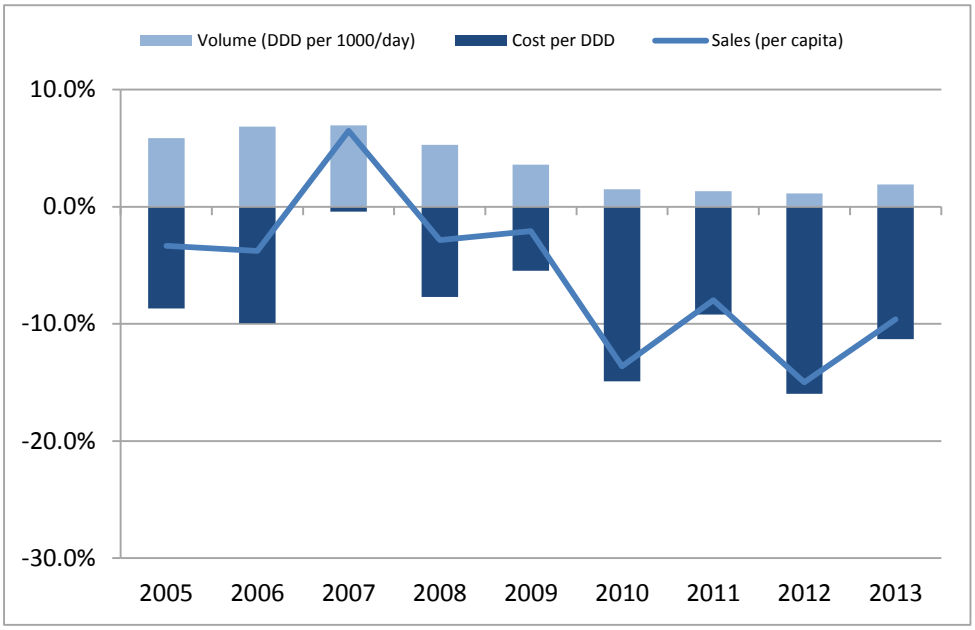


Source: OECD Health Statistics 2015

Hypertension drugs

97. One in three adults worldwide is affected by hypertension and 13% of mortality is associated with high blood pressure (WHO, 2012). Hypertension drugs group together five ATC classes which can all be prescribed against hypertension (antihypertensives, C02; diuretics, C03; beta-blocking agents, C07; calcium channel blockers, C08; and agents acting on the renin-angiotensin system, C09) and account for around 12% on average of prescribed drugs in value terms. The consumption of prescribed hypertension drugs has grown strongly: on average, the number of DDDs per 1000 population per day increased by around 50% between 2005 and 2013. The consumption of the most recent and most expensive category of anti-hypertensives (agents acting on the renin-angiotensin system) more than doubled on average over the same period. Yet, the total value of sales of hypertension drugs has dropped by an average of more than 20% over the same period. Sweden, for example, saw a 47% increase in consumption and a 37% drop in sales value during the whole period (Figure A3).

Figure A3. Annual growth in sales and consumption of hypertension drugs, Sweden, 2003-2012



Source: OECD Health Statistics 2015

98. The end of patents, resulting in increased penetration of generics and the subsequent fall in unit prices appears to have been a significant factor. For example, *Losartan* (brand name Cozaar) - used to treat high blood pressure and heart failure - came off patent in 2010 with generic versions becoming available[13]. Some countries actively encouraged generic prescribing through multiple strategies - such as prescribing targets and switching progammes in Sweden (Moon et al, 2014). Further patent expirations in 2011 and 2012 (e.g. for *Candesartan* and *Irbesartan*) resulted in further switching and lower expenditures, for example in the UK.

Cholesterol-lowering drugs

99. Cholesterol-lowering drugs (C10) have seen an even more dramatic increase in consumption volumes with a more than doubling of DDDs/1000 population/day on average over the ten year period. Growing levels of obesity, as well as increased screening and diagnosis, and lower thresholds to initiate treatments, have been significant factors in increased prescribing patterns. For example, by 2013 lipid-regulating drugs formed the category with the highest number of prescription items in the English NHS (HSCIC, 2014).

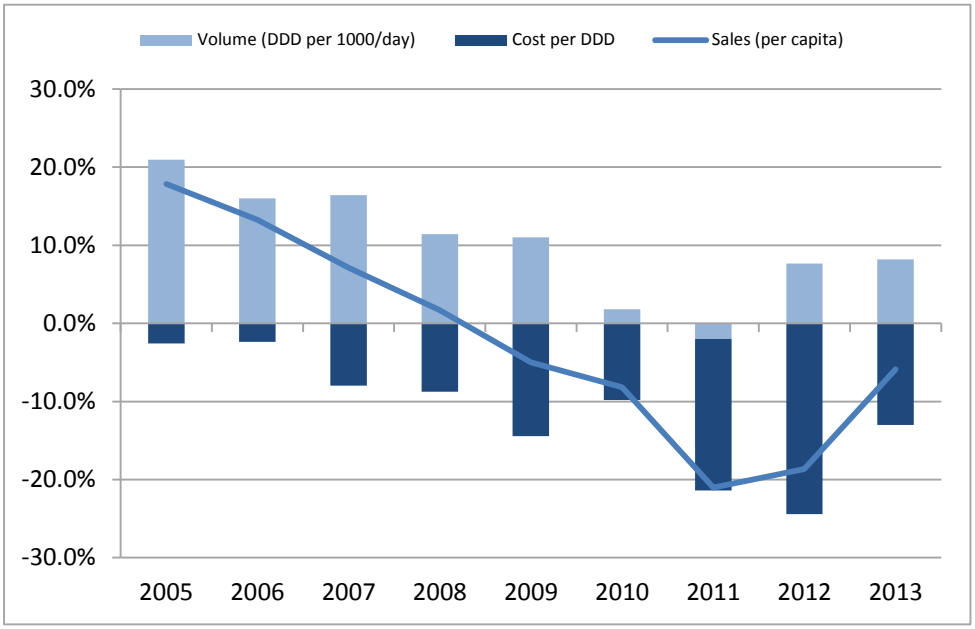
100. Principal within the subgroup are statins, and the expiration of patents and availability of generics has been paramount in driving down the average costs and overall spending in many countries. Among the major statins, *Atorvastatin*, developed under the brand name Lipitor and *Simvastin* (brand name Zocor) were huge blockbuster drugs. The patent for *Simvastin* expired in the mid-2000s and was accompanied by a significant drop in prices – both of the branded and generic versions of the drug. *Atorvastatin*, a later generation statin, became the biggest selling drug of all time in value terms. Its patent expired in 2011, with the subsequent drop in prices and generic availability.

101. In Portugal, for instance, while the volume of consumption (DDD/1000 pop./day) has almost trebled between 2005 and 2013, the total values of sales of cholesterol lowering drugs has remained almost

13 http://www.hscic.gov.uk/catalogue/PUB06941/pres-disp-com-eng-2001-11-rep.pdf

constant at around 160 million euros as unit prices have dropped (Figure A4). Trends observed in Portugal are replicated in a number of countries.

Figure A4. Annual growth in sales and consumption of lipid-lowering drugs, Portugal, 2005-2013



Source: OECD Health Statistics 2015

Antibacterials

102. For many countries, despite growing public health concern regarding increased resistance to antibiotics, consumption has been generally steady although variable over the last ten years. This partly reflects the diverse groups of drugs responding to a variety of different bacterial infections and conditions. In France, prescribed use of antibiotics between 2003 and 2009 was relatively stable, accompanied by a national public health campaign against overuse. In recent years, however, the trend has increased (InVS and ANSM, 2014).

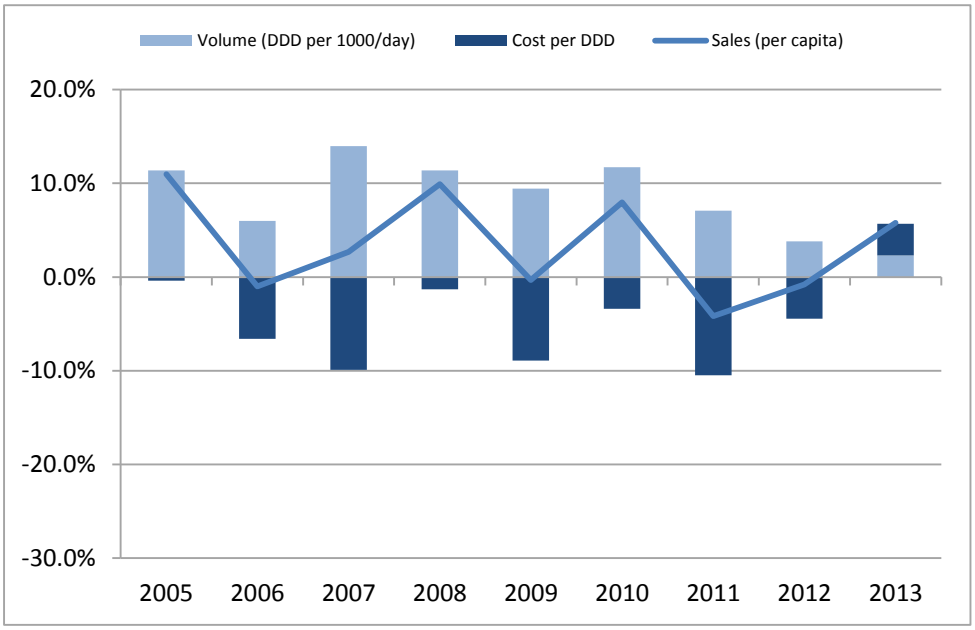
103. Penicillins, such as amoxicillin, are among the most widely used antibiotics, and to which a degree of resistance has built up. Both France and England have seen a gradual increase in use over the ten-year period.

104. While consumption of antibiotics as a whole among most countries has been on a stable or rising trend, unit prices have tended to be on a downward trend in recent years. This is due to the absence of new innovative speciality antibiotics in recent years and to the increasing penetration of generics for existing drugs on the market. For example, in France, almost 95% of the volume of amoxicillin was accounted for by generics in 2012, almost 5% of the whole generic French market (ANSM, 2012).

Antidepressants

105. Drugs related to code ATC N-Nervous system cover a diverse group of pharmaceuticals, including analgesics, sedatives, antidepressants and anti-dementia drugs. Together they account for a large share of prescribed medicines in terms of value at close to 20%. Per capita consumption has increased steadily between 2005 and 2013, driven by stronger increases in analgesics and antidepressants use.

Figure A5. Annual growth in sales and consumption antidepressants, Germany, 2005-2013



Source: OECD Health Statistics 2015

106. Analgesics (N02) comprise some of the most widely used and available OTC drugs such as *Paracetamol* and *Aspirin*, and thus account for a large share of the overall market in volume.

107. Increased spending on antidepressants (N06A) in many OECD countries has been driven primarily by increased prescribing, with greater intensity and duration among the factors explaining the rise. The extended use for milder forms of depression and anxiety has also raised concerns about appropriate prescribing.

108. Germany has seen one of the strongest rises in antidepressant use, with consumption doubling between 2005 and 2013. Over the same period, the total value of antidepressant sales in Germany rose around 25% (Figure A5). The most expensive antidepressants (Selective Serotonin Reuptake Inhibitors - SSRIs) were previously less prescribed in Germany than in other OECD countries, due a preference for older products such as tricyclic and tetracyclic antidepressants (TCA) (Hoffmann et al, 2012). One of the most prescribed antidepressants is *Setraline*, a selective serotonin reuptake inhibitor (SSRI) whose patent expired in 2006, allowing generics to capture large market shares.

ANNEX 3: PHARMACEUTICAL COST CONTAINMENT POLICIES INTRODUCED IN OECD COUNTRIES AFTER 2008

Table A1. Pricing Policies

	Price Cut	External Price Referencing	Distribution Remuneration (I.E. Mark-Ups, Margins And Fees For Service)	VAT On Medicine	Extraordinary Price Review	Others
Australia	2008, 2009, 2010: three annual 2% or a one-off 25% reduction (in 2008), for certain products 2009: first price reductions under price disclosure policy 2010: price disclosure policy expanded to cover all Formulary 2 products 2010/11: price reduction on listing of first new brand (generic listing) increased from 12.5% to 16% 2011: one-off 2% or 5% reduction for all Formulary 2 products 2013/14: increased frequency of assessment for potential price disclosure reductions from 12 months to every 6 months.		2010: 2 year freeze of annual indexation of certain pharmacy fees			
Austria	**2010**: Negotiations with pharma companies to obtain price reductions with expected savings or EUR 132 mln and projected to 222 mln by 2013			**2009:** VAT decreased from 20% to 10%.		
Belgium	**2010**: Introduction of a					

	Price Cut	External Price Referencing	Distribution Remuneration (I.E. Mark-Ups, Margins And Fees For Service)	VAT On Medicine	Extraordinary Price Review	Others
	biannual price reduction for "old" drugs: drugs reimbursed for over 12 years and less than 15 years had their ex-factory price and reimbursement basis reduced by 15%, and drugs reimbursed for over 15 years underwent a 17% reduction.					
Canada			**2008-2013**: some changes were implemented in several public drug plans			**2010**: the pan-Canadian Pharmaceutical Alliance (pCPA) was established to conduct joint provincial/territorial negotiations for brand name drugs in Canada to achieve greater value for publicly funded drug programs and patients. **2010**: PMPRB reformed its Guidelines. The Guidelines provide guidance to patentees and Board Staff on the factors set out in the Act to determine if the price of a patented drug product sold in Canada is excessive
Chile						
Czech Republic	**2009**: Prices and reimbursement reduced by 7% in 2009 for all drugs not affected by revisions that occurred in 2008.		**2015**: Dispensing fee and clinical examination fee cancelled (currently approx. €1.1)	**2015**: Decrease of VAT rate on medicines from 15% to 10%		

	Price Cut	External Price Referencing	Distribution Remuneration (I.E. Mark-Ups, Margins And Fees For Service)	VAT On Medicine	Extraordinary Price Review	Others
Denmark						
Estonia			**2011**: Change in wholesale remuneration.	**2009:** VAT increased from 5% to 9%		
Finland						
France	**2011** and **2012**: price cuts					
Germany	**2010**: Freezing of ex-factory prices with retrospective effect from August 2009 until the end of 2013 **2010:** Manufacturers' rebates on pharmaceutical prices (for drugs not subject to reference prices) were increased from 6% to 16% and prices frozen until December 2013. **2014:** Manufacturers' rebates (for drugs not subject to reference prices) reduced to 7% for patented drugs and 6% for off-patented drugs					
Greece	**2010:** Price cuts up to a maximum of 27% for all reimbursed drugs (except orphan drugs); off-patent drugs cut to 90% of original cost. **2011:** 35% price cut for on-patent medicines before patent expiry and 15% price cut for generics	**2009 and two times in 2011**: Change in price setting method	**2011**: Decrease in wholesale mark-up, abolition of supply chain discounts; change of pharmacy mark-up.	**2011:** VAT decreased from 11% to 6.5%.	**2010:** review of new price lists, taking price cuts into account **2011**:review resulted in a new price list, with an average 10.2% price reduction	
Hungary			**2012:** Wholesale mark-up reduced from 12% to 8% of ex-factory price			

	Price Cut	External Price Referencing	Distribution Remuneration (I.E. Mark-Ups, Margins And Fees For Service)	VAT On Medicine	Extraordinary Price Review	Others
			but pharmacist mark-up slightly increased.			
Iceland						
Ireland	**2010**:40% price cut for off-patent medicines. **2011**:price cuts		**2009**: Change in wholesale remuneration; prescription fees paid to pharmacists dropped by 24 to 34%, depending on the price of the product. **2011**: Change in wholesale remuneration for high-cost drugs (the High-Tech Scheme); wholesale remuneration for the general scheme for low-income patients decreased.	**2010**:VAT increased to 21% for non-oral preparations.	**2008:** review of reimbursed medicines; **2010:** review of brands and parallel imports.	
Israel						
Italy	**2010:** 12.5% reduction in the retail price of generic drugs **2011**: Maximum reimbursement prices for generics set in line with prices in Germany, UK, France and Spain (up to 40% of the list price). An 8% decrease in price is planned for those drugs with a price in line with the comparator countries.		**2009**: reduction of margins for generic medicines for pharmaceutical companies (from 66.65% to 58,65%). **2010**: change of margins of wholesalers and pharmacists for reimbursed medicines (Class A) to 3,0% and 30,35% of retail price respectively . **2012**: discount in charge of pharmacies, (introduced in 2010) increase from 1,82% to 2,25%.			

	Price Cut	External Price Referencing	Distribution Remuneration (I.E. Mark-Ups, Margins And Fees For Service)	VAT On Medicine	Extraordinary Price Review	Others
			2012: increase of the payment due by companies to Regions, (introduced in 2010), from 1,83% to 4,1% of the retail price net of VAT (temporary measure, valid until December 2012)			
Japan						
Korea						
Luxembourg						
Mexico						
Netherlands						
New Zealand						
Norway						
Poland						
Portugal	**2008:** 30% price cut for generics **2009**: 5–12% price cut for generics **2010**:7.5% price cut for biological medicines and HIV products. 2011: Price reduction of 7.5% on biological pharmaceutical drugs.	**2010:** Change in the method for price setting **2011**: Change in the basket of reference countries.	**2010**: Increase in wholesale and pharmacy mark-ups for non-reimbursable medicines. **2011**: Change in wholesale and pharmacy mark-up **2012** Change from linear to regressive remuneration, which was effectively a decrease	**2010:** VAT increased from 5% to 6%	**2010:**review of selected active substances	
Slovak Republic		**2009**: Change in the basket of reference countries. **2010:** reference price system changed to take Greek price cuts			**2010: re**view of reimbursed medicines	

	Price Cut	External Price Referencing	Distribution Remuneration (I.E. Mark-Ups, Margins And Fees For Service)	VAT On Medicine	Extraordinary Price Review	Others
		into account; **2011:** Change in the method for price setting				
Slovenia						
Spain	**2010**:First price cut of up to 30% for generics; second price cut of 7.5% for health-care products, including original medicines, imposed in the form of a discount shared by all actors in the supply chain; in addition, a 4% price cut for orphan drugs and a 20% price cut for incontinence products Price increase of 10–20% for amoxicillin-containing medicines to prevent their withdrawal from the market **2011**: gradual price decreases	**2010**: Calculation method changed	**2010:**pharmacy remuneration changed (i.e. part of the pharmacy remuneration for expensive medicines was increased); **2011:** wholesale remuneration changed; pharmacy remuneration changed	**2011:** VAT increased from 8% to 10% for health-care products	**2010:** price review, taking price cuts into account	
Sweden						
Switzerland	Measures recently implemented include a periodic re-examination of prices every 3 years as well as systematic review of the price of products for which a new indication has been approved.	**2015**: Extension of the basket of reference countries (Belgium, Finland and Sweden are now added to the existing ones – Denmark, Netherlands, Germany, France, UK and Austria) and changes in the calculation			**2009**: extraordinary price review of 2000 drugs. The prices of reimbursed medicines was re-examined to be in line with six comparator countries (Austria, Denmark, France Germany, the Netherlands and the United Kingdom), with a 4% tolerance margin in order to compensate for shifts in currency	

	Price Cut	External Price Referencing	Distribution Remuneration (I.E. Mark-Ups, Margins And Fees For Service)	VAT On Medicine	Extraordinary Price Review	Others
		method: the Swiss price should not exceed the mean price in the reference countries by more than 5%. Margins to compensate for currency changes no more considered.			changes. This change is expected to save about 400 Mio. CHF.	
Turkey						
United Kingdom	The NHS has implemented “patient access schemes” to provide access to drugs not judged cost-effective by NICE. PAS schemes result in effective price reductions (linked to the performance of the product or not). In the meantime, the PPRS imposed price cuts of 3.9% in **2009** and 1.9% in **2010** and measures to increase the use of generics.					
United States						

Sources: Leopold et al, 2014; Thompson et al., 2014; national authorities’ websites.

Table A2: Reimbursement policies

	Reference price system	Out-of-pocket payments	Delisting	Other
Australia				Ongoing: post market

	Reference price system	Out-of-pocket payments	Delisting	Other
				reviews consider the continued cost-effectiveness of certain products.
Austria		**Since 2008:** Prescription fee increased every year		
Belgium				
Canada				
Chile				
Czech Republic		Between **2009 and 2011, r**eimbursement rate of drugs by insurance funds was reduced by 7%**.** This can result in an increase of co-payments by patients if the importer/producer does not reduce the wholesale price.		
Denmark				
Estonia	**2010:** calculation method changed.	**2011:** elimination of co-payment limit.		
Finland			**2009:**Seroquel delisted	
France		**2008:** Introduction of EUR 0.50 co-payment per prescription, not refundable by private voluntary health insurance. **2011**: Reimbursement rate for some pharmaceuticals reduced from 35% to 30%. Reimbursement rate for drugs with insufficient therapeutic value went from 35% to 15%.		
Germany				

	Reference price system	Out-of-pocket payments	Delisting	Other
Greece	**2011:** Pricing changed to be at or below the reference price		**2011:** Introduction of a negative list of non-covered (e.g. contraceptives and lifestyle medicines). **2011:** Exclusion of 49 medicines of coverage after a price review	
Hungary				
Iceland				
Ireland	**2013:** Introduction of the reference price system. Reference prices once set must be reviewed every 12 months but can be reviewed quarterly.	**2010:** Introduction of EUR 0.50 co-payment per prescription medicine up to a maximum of EUR 10 per family per month; Increase of the drugs reimbursement threshold to EUR 120 (from EUR 100 in 2009) a month for the 70% of the population who pay for their own drugs.	**2012:** Delisting of a small number of products	
Israel				
Italy				
Japan				
Korea				
Luxembourg				
Mexico				
Netherlands				
New Zealand				
Norway				
Poland				

	Reference price system	Out-of-pocket payments	Delisting	Other
Portugal	**2010**: The reference price was changed to the average of the five cheapest generics **Since 2011:** The reference price changed to the average of the five cheapest medicines (generic or not). **Since 2013**: New homogeneous groups can be introduced every month, keeping the quarterly dynamic review of existing groups.	**2009:** Reimbursement rate increased from 95% to 100% for generics for low-income pensioners; reimbursement rate increased from 37% to 69% for infertility drugs **2010:** abolition of out-of-pocket payments for organ, tissue and stem cell transplant procedures; **2010:** reimbursement rates changed for all medicines, including antipsychotic and antipsychotics; **2011:** faster reimbursement reviews.	**2011:** delisting of 16 branded non- prescription medicines, including paracetamol, oral omeprazole, contraceptives and antihistamines.	
Slovak Republic	**2009. 2011:** Establishment of new clusters of medicines.	**2011**: cost-sharing agreements implemented. **2011:** limits imposed on certain reimbursement categories; reimbursement list to be published more frequently		
Slovenia				
Spain	**2011**: Maximum reimbursement price aligned to the lowest daily treatment costs as a basis	**2010:** Underprivileged patients in Madrid given free access to products for seven rare diseases; **2011:** Co-payment linked to patient's income	**2011:** Delisting of selected medicines	
Sweden				
Switzerland				
Turkey	**2009:** The maximum reimbursement price is set at 15% of the price of the cheapest medicine available for the same indication reduction (instead of 22%).			
United Kingdom				
United States				

Sources: Leopold et al, 2014; Thompson et al., 2014; national authorities' websites.

Table A3: Policies to boost the use of generics

	Policies targeting physicians /hospitals	Policies targeting pharmacists	Policies targeting patients	Generic price linkage	Other
Australia					
Austria			**2008 :** Information campaign on generics		
Belgium	**Since 2005**, physicians are required to prescribe a certain percentage (in DDD) of "cheap medicines" for medicines that are sold in a community pharmacy. This scheme was revised and updated in 2015. The target percentage of cheap prescription ranges from 16-65% across specialist physicians, with an average of 42%. The target is set at 50% GPs and 75% for dentists. Only physicians that prescribe a minimum of 200 prescription forms (30 for dentists) during a 6 months period are evaluated.	**Since April 2010,** pharmacist margins in Belgium are made up of two components: a fixed lump sum and an economic margin set as a percentage of the price of the medicine. Pharmacists get an additional fee for dispensing medicines that are included on the reimbursement list and prescribed in INN (in 2015 this fee is EUR 1,28)			
Canada				**2010-2014**: Reduction of generic reimbursement caps in several public plans to 18% - 56% of brand name prices in most provinces. **2013**: all provinces and territories (except Quebec) reduced the prices of top selling generics. The prices of the top 10 generics have been reduced to 18% of the brand name price. Similar price reductions scheduled for 4 generics	

	Policies targeting physicians /hospitals	Policies targeting pharmacists	Policies targeting patients	Generic price linkage	Other
				in 2015 and another 4 in 2016. The Pan-Canadian Generic Pricing Framework (2014) introduced a progressive tiered approach to generic price linkage. Generic prices have to be set from 75% to 25 % of the brand-name price, depending on the number of manufacturers.	
Chile					
Czech Republic					Simplified approval process for generic drugs to enter the Czech market introduced in 2010-12
Denmark					
Estonia	**2010** : Change from optional to compulsory generic prescribing		**2010 :** Generic drugs promotion campaign		
Finland					
France	**2009:** introduction of a Pay for Performance scheme for GPs with objectives pertaining to efficiency of prescribing (including the prescription of generics) **2015:** Mandatory INN prescription	**2012:** Introduction of a pay-for-performance scheme for pharmacists. The indicators upon which the remuneration is based include increasing the rate of generic substitution for a list of 30 drugs, with an overall goal of 85%.	**2012:** Introduction of a policy conditioning SHI direct payment the pharmacist to generic dispensing (otherwise patients have to pay and claim reimbursement)	**2013:** At generic entry, generic price set at 40% of the originator price and originator price reduced by 20% - 18 months later, both prices further reduced respectively by 7% and 12,5%	**2014:** Increase of the cap on discounts manufacturers consent to pharmacists from 17% to 50%
Germany					

	Policies targeting physicians /hospitals	Policies targeting pharmacists	Policies targeting patients	Generic price linkage	Other
Greece	Public hospitals required to reach a 50% generic share.			Maximum generic price set at 60% of the price of the branded drugs;	
Hungary	**2010**: Financial rewards introduced for the rational use of drugs. Doctors are rewarded for prescription of cheaper, but therapeutically equivalent substitutes and pharmacies may promote the use of these drugs by altering doctors' prescriptions.				**2011:** Blind bids for generic drugs
Iceland			**2009:** Incentives to comply with prescription guidelines: if generics are not prescribed first –where relevant-, patients must pay the full cost of the drug cost of the drug.		
Ireland		**2013:** Establish list of groups of interchangeable medicines which can be substituted for each other (i,e, generics substitution)	**2013:** patients insisting on a branded drug will pay the difference between it and the cheaper generic where available.		**2010:** Rebates for generics abolished
Israel					

	Policies targeting physicians /hospitals	Policies targeting pharmacists	Policies targeting patients	Generic price linkage	Other
Italy	**2012:** GPs are allowed to prescribe by INN	**2012**: Pharmacists have to substitute with generics with the lowest price			**from 2011**, AIFA is to identify a maximum of four generic drugs to be reimbursed by the national health system for drugs whose patent has expired. The decision about the 4 drugs will most likely be influenced by cost, therefore encouraging competition (GABI 2010)
Japan	**2012:** Higher targets are set in terms of generic use for hospitals to get a bonus.	**2012:** Higher targets and higher bonuses for higher target achievements in the P4P scheme for pharmacists.			**2013:** Roadmap for further promotion of the use of generic drugs, targeting a generic market share of 60% (of off-patent market) in 2018
Korea				The price of all generics is set at 55.35% of originals since April 2012.	
Luxembourg					
Mexico					
Netherlands					
New Zealand					
Norway					
Poland					
Portugal	**2011:** Compulsory generic prescribing		**2010:** Campaign to promote rational medicines use;		**2011**: Entry of 25 active generic substances into the market to be expedited subject to resolution of patent disputes Between 2007 and 2010, the retail price of a new generic included in a

	Policies targeting physicians /hospitals	Policies targeting pharmacists	Policies targeting patients	Generic price linkage	Other
					homogeneous group had to be 3% (5% since 2010) lower than the lowest priced generic with at least 10% (5% since 2010) generics market share in that reference group. In 2014, the concept of minimum price was introduced, below which the generic price cannot decrease. The retail price cannot be lower than 20% the retail price authorized for the reference product
Slovak Republic	**2011:** Introduction of optional generic prescribing.				
Slovenia					
Spain	**2011** Optional generic prescribing introduced.		**2010:** National campaign on generics		
Sweden					
Switzerland					
Turkey					
United Kingdom					
United States					

Sources: Leopold et al, 2014; Thompson et al., 2014; national authorities' websites.

ANNEX 4: METHODS TO FORECAST PHARMACEUTICAL SPENDING

109. National authorities and international organisations produce forecasts for public health spending, but do not generally estimate or publish forecasts for pharmaceutical spending in isolation (Astolfi et al., 2012; OECD, 2103, European Commission 2012). Some countries have horizon scanning systems to foresee technological changes in health care systems (e.g. the United Kingdom and Italy). Horizon scanning studies have a short-term perspective and list high-impact technologies expected to be integrated in medical practice within 1-5 years. They only consider technologies which are about to emerge in the system (just before approval or adoption). They usually estimate the expected budget impact of these technologies but they do not offer predictions on total or public pharmaceutical spending.

110. A few studies have tried to predict pharmaceutical spending in the short term future from a payer perspective. For the United Kingdom, O'Neill et al. (2014) predicted trends in pharmaceutical spending in the UK National Health Service until 2018. To do so, they used an expert-driven and bottom-up approach to estimate the expected budget impact of new medicines entering the market. They also modelled the uptake or new products and generic penetration at patent expiry using past observed trends in the NHS.

111. Urbinati et al. (2014) produced forecasts for pharmaceutical spending in European countries for a 5 year-period (2012-1016). They used a similar approach and based their forecasts on two models. One model assesses the sales developments and the risk of development failure for new drugs and one model takes into account the direct and indirect effect of the "patent cliff". Both models use country-specific parameters, such as time to market access or generic uptake to predict spending. Both studies present sensitivity analyses to take into account uncertainties.

112. In the United States, the Centers for Medicare and Medicaid Services (CMS) Office of the Actuary publishes predictions for US health spending trends up to 2024 (Keehan et al., 2015). Express Script (a large pharmacy benefit manager) published predictions on pharmaceutical spending in the United States for a two-year horizon (Express Script, 2014).

113. The few existing projections are not totally consistent. There are good reasons for that: all projections rely on a baseline and hypotheses, which depend not only on the operator and the methodology, but also on the timing. Projections prepared at one year interval start with very different levels of available information on the past and on the future.

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