



Europe Economics

External Reference Pricing

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Executive Summary

The study

External Reference Pricing (ERP) is the system by which health authorities in the EU inform themselves of prices paid in other Member States and take this information into account when negotiating prices with pharmaceutical companies. Like parallel trade, ERP tends to reduce price differentials between countries.

The purpose of this study is to assess the effects of ERP in the EU on access by EU citizens to patented medicines, and to draw implications for pricing and reimbursement systems.

The study was commissioned by Merck Sharp & Dohme (Europe) Inc. and Merck Sharp & Dohme (Europe) Inc. experts assisted in the interpretation of the IMS data that were used in the study. However, Europe Economics is solely responsible for the analysis and for the conclusions reached.

Pricing of medicines is influenced by many factors, including the medical benefits offered by each medicine, the administrative processes followed in each country, and the negotiating abilities of each purchaser and supplier. This study concentrates on three main economic factors that help to determine the outcomes of negotiations, namely:

- the use of ERP;
- the patent system; and
- EU laws encouraging parallel trade.

Theory

Within any market, prices of any products will tend to converge as a result both of arbitrage trade and of price comparisons. For most products the convergence will be towards a price that covers the on-going costs of the more efficient suppliers. For patented products, however, convergence will be towards a price that includes a return on the costs of research and development in addition to the on-going costs of manufacture and distribution.

For any product or service whose cost structure includes large fixed costs (such as pharmaceutical research and development) socially efficient pricing takes account of the willingness and ability to pay of different groups of customers, and encourages suppliers to “price to market”. Such pricing (referred to as Ramsey pricing) maximises welfare, as it allows high levels of output while charging each group of consumers at or less than they would have been willing to pay. It also leads to the levels of profitability and hence incentives for future investment that best meet the needs of consumers as a whole.

Within the EU Single Market, once a patented medicine has been sold, the patent rights are “exhausted” so that the patent – holder cannot control what subsequently happens to the product, and cannot prevent its being re-sold. This opens the way to arbitrage trade (“parallel trade”) in which wholesalers and others sell medicines originally delivered into one Member State for re-sale in another in which prices are higher. This creates pressure for prices to converge. A similar effect results from ERP, since purchasers use information about prices that are lower in other countries to negotiate reductions, while suppliers face added pressure to avoid conceding low prices in any part of the EU.

Since price convergence must be towards a price that includes a return on sunk R&D and other costs this means that prices will be higher in low-income countries than they would otherwise have been. Affordable access to essential medicines in the EU is therefore lower than it could and should be.

None of these results are the fault of any individual supplier, purchaser or trader. They are the inevitable result of the legal and regulatory framework which has led to unintended adverse consequences for the wellbeing of patients.

Evidence

The report provides results from empirical studies that show substantial convergence of medicine prices within the EU since 1986 (when the first data are available) until about 2007, when the process halted and slightly reversed as other factors have for a time outweighed the pressures for convergence.

As a result, prices are very substantially more similar today than they were in the 1980s.

We compare the present price levels for representative medicines with those that would be charged according to two alternative measures of affordability:

- national incomes per capita; and
- the amounts of money spent in 2010 on healthcare by both public and private sector purchasers in each Member State.

These calculations show that in combination ERP and parallel trade have added a substantial cost burden for each medicine in lower income Member States.

We also show that new medicines are not launched as soon in low income countries as elsewhere, which is another adverse effect of ERP and parallel trade.

Policy implications

We agree with the OECD view that healthcare systems should:

- provide affordable access for patients;
- be sustainable; and
- encourage innovation.

The present practice of ERP and the EU laws encouraging parallel trade are not consistent with these principles.

ERP practices should be reformed, so that any comparisons made allow for differences in affordability between Member States. Comparisons should not in any case be made with prices in Member States whose income levels are lowest.

There is a theoretical case for legislation to abolish parallel trade, but that is not the subject of this report. However, we note that in the various cases brought before the European Court of Justice relating to differential pricing, trade dress, packaging, and limitation of supply to local requirements all of which bear directly on parallel trade it has not so far been explained that EU citizens in low income Member States are suffering reduced affordable access. When the ECJ is presented with these facts and arguments, it may be able to reach different conclusions that would improve EU healthcare.

1 Introduction

1.1 Terms of reference

This report was commissioned by Merck Sharp & Dohme (Europe) Inc.

The objective is to analyse the effect of External Reference Pricing (ERP) on access to and affordability of patented medicines in the EU, examining in particular the effects in low-income countries.

The work should also contribute to discussion of two broader questions:

- What is the role of confidential prices in this context? (In reality, even though EU Member States were willing to abandon External Reference Pricing / parallel trade they would be likely to compare prices informally if they are transparent and available.)
- How could pricing and reimbursement (P&R) systems in the EU improve affordable access to patented medicines without undermining incentives for research and development of new medicines (R&D), as the OECD recommends?

We have reviewed a number of previous studies of ERP and of parallel trade, and carried out some original analysis of IMS data relating to launch dates, prices, and sales volumes. Our use of this information from IMS benefited from comments by pricing and marketing experts within Merck Sharp & Dohme (Europe) Inc., but we remain responsible for the interpretation and presentation of the data.

Pricing of medicines is influenced by many factors, including the medical benefits offered by each medicine, the administrative processes followed in each country, and the negotiating abilities of each purchaser and supplier. This study concentrates on three main economic factors that help to determine the outcomes of negotiations, namely:

- a) the use of ERP;
- b) the patent system; and
- c) EU laws encouraging parallel trade.

We rely on the standard theories and principles of welfare economics, in which the wellbeing of each individual is equally important, and in which arrangements that benefit one person without harming others should be adopted. There are alternative philosophies, in which (for example) any measures that reduce price differences between EU Member States are by definition to be welcomed; indeed this might be the position of those that consider price convergence as a sign of a well-functioning single market. We disagree, largely because this assumes that other structural features (such as real wages and purchasing power) have converged as well. This report shows the seriously adverse consequences of such an approach for patients in both the short and long term.

1.2 External Reference Pricing

A recent WHO report uses the following definition of ERP:

“The practice of using the price(s) of a pharmaceutical product in one or several countries in order to derive a benchmark or reference price for the purposes of setting or negotiating the price of the product in a given country.”^{1,2}

As will be discussed in detail later, most EU Member States now use some form of ERP in helping to set prices and reimbursement levels (although at times some have ceased to do so). Clearly, the effect of ERP is likely to be to reduce differences between prices paid in different countries. In this respect, ERP has effects similar to those of parallel trade (in which arbitrageurs – parallel traders – buy medicines from pharmacists and others in countries in which they are cheap and sell them in other Member States where they can profitably undercut the manufacturer’s price).

1.1 ERP in combination with parallel trade

It is not immediately obvious how ERP and parallel trade work with or against one another in the marketplace.

Both in general contribute to reducing price differences, so that each may reduce the impact of the other – smaller price differences for whatever reason reduce both the scope for parallel trade and the practical effects of ERP. On the other hand, the use of ERP by a low income Member State might reduce its prices – e.g., Greece takes the average of the lowest prices in 22 countries, including Bulgaria, Romania, the Czech Republic, Hungary, and Lithuania and so may increase the scope for parallel traders. The interrelationship will differ from case to case.

1.2 Hypotheses

The hypotheses which we wish to test are that ERP and parallel trade are harmful to the interests of patients in the EU because:

- 1) They lead to delays in the launch of new patented medicines or even total lack of access (no launch at all, in particular in small markets).
- 2) They cause low-income Member States to pay significantly higher prices than they would otherwise have been paying, and lead to free-riding by high income countries.
- 3) They reduce overall access to medicines and the incentives for future research and development.

To the extent possible, we try to distinguish the effects of ERP from those of parallel trade.

We also attempt to quantify some of the main effects. This requires an assessment of what prices would have been in the absence of ERP and parallel trade (the “counterfactual” situation). By definition, no counterfactual situation can be known exactly, but we suggest how a reasonable assessment should be made.

1.3 OECD principles

The report “Value for Money in Health Spending” (OECD 2010) reads:

¹ WHO/HAI Project on Medicine Prices and Availability Review Series on Pharmaceutical Pricing Policies and Interventions Working Paper 1: External Reference Pricing May 2011 Jaime Espin, Joan Rovira and Antonio Olry de Labry, Andalusian School of Public Health.

² A definition used by the European Commission services is similar: “External reference pricing (ERP) is a direct price control. It usually takes the form of setting a maximum price per standardized unit, e.g. per defined daily dose (DDD), based on prices of the same product in other countries.” DG ECFIN (2012), p. 19.

“OECD countries’ pharmaceutical policies seek to balance three broad objectives: make medicines accessible and affordable to patients; contain public spending growth, and provide incentives for future innovation”.³

The report continues:

“Policy makers have continuously adapted pharmaceutical policies to respond to new challenges posed by market dynamics and medical progress, with the objectives of ensuring access to affordable medicines to their citizens, containing spending growth and sustaining R&D efforts.”⁴

1.4 EU policy context

This report comes at a time when various Directorates-General of the European Commission are again turning their attention to the EU pharmaceuticals market, including pricing and reimbursement issues.

1.4.1 DG Enterprise and the Transparency Directive

The Transparency Directive, which was introduced in 1989, is being updated. The aim of the Directive was “to ensure the transparency of measures established by Member States in order to control the pricing and reimbursement of medicinal products.”⁵ The Directive set a series of minimum standards that the approval and pricing and reimbursement processes must meet at Member State level. These minimum standards are:

Timeliness – Pricing and reimbursement decisions must be made within a stated time window.

Transparency – Member States are to communicate decisions to the applicant on the basis of objective and verifiable evidence.

Right to appeal – Decisions on pricing and reimbursement must be contestable via judicial appeal at the Member State level.

Revisions to the Transparency Directive are not the only focus for DG Enterprise’s pharmaceuticals policy. DG Enterprise’s 2012 Industrial Policy Communication argued that:

“The lack of coordination between Member States on methodologies and criteria for taking decisions on pricing/reimbursement of medicinal products causes incoherencies and delays in access to innovative medicines. Whilst this is being partly addressed through the Transparency directive and the work on health technology assessment, a wider policy strategy agenda is needed in order to secure the competitiveness and long-term viability of the EU pharmaceutical industry.”⁶

The EU pharmaceutical industry is indeed important for EU industrial policy as a whole, representing as it does one of the sectors that invests most heavily in research and development, at the forefront of science. Increasing investment is one of the main goals of industrial policy.

³ OECD, 2010, Value for Money in Health Spending, page 156.

⁴ Page 180. See also Panos Kanavos: “A viable VBP approach must deliver efficiency defined as value for money for the NHS, ensure that the system is stable and predictable over time and also provide appropriate incentives for pharmaceutical innovation to flourish and deliver increased results over the long term” (Kanavos, 2010, Implementing value-based pricing for pharmaceuticals in the UK, page 14).

⁵ http://ec.europa.eu/enterprise/sectors/healthcare/competitiveness/pricing-reimbursement/transparency/index_en.htm

⁶ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2012:0582:FIN:EN:PDF>, p 16

1.4.2 DG SANCO

DG SANCO has recently launched a survey of stakeholders on the European external reference pricing system. This study is being conducted through the Executive Agency for Health and Consumers group within DG SANCO. This study was supported in a recent meeting of the Working Party on Public Health at Senior Level, where additional work on the study of European ERP systems was encouraged.⁷

1.4.3 DG ECFIN

An October 2012 working paper published by DG ECFIN reviews cost containment measures adopted by EU Member States affecting pharmaceuticals.⁸ The paper examined a variety of cost containment policy options available to or currently in use by Member States, including a discussion on ERP. The paper rated ERP as a potentially useful policy tool for cost containment, but also highlighted some possible disadvantages to the policy. These disadvantages are similar to those that we will discuss later in this paper, including launch delays and prices that do not reflect purchasing power. This shows that the Commission services are aware of benefits and shortcomings of ERP.⁹ The same paper shows that the Commission services are aware of evidence that parallel trade does not bring significant benefits to healthcare services in importing countries.¹⁰

1.4.4 Cost containment measures at the Member State level

The financial and sovereign debt crises have created significant economic problems for EU Member States, particularly within the Eurozone. As economic activity has fallen, so have tax revenues, putting pressure on public budgets.

Economy measures have included cutting reimbursement levels for relevant medicines. In the face of shrinking budgets and growing health care expenditure, Member States may turn to ERP as a cost containment measure. We see some evidence for this. In July 2012, Portugal changed its ERP basket with an aim to reduce pharmaceuticals prices.¹¹

1.5 Report structure

Section 2 of this report sets out the main arguments that are deployed. Section 3 presents statistical evidence in support, and Section 4 draws implications for P&R systems.

Supporting material is in Annexes.

⁷ <http://register.consilium.europa.eu/pdf/en/12/st15/st15014.en12.pdf>, p 3-4

⁸ http://ec.europa.eu/economy_finance/publications/economic_paper/2012/pdf/ecp_461_en.pdf

⁹ Ibid, p. 16: “Moreover, one should also consider the risk that too low prices may lead to access problems, as companies may postpone or not introduce pharmaceuticals in low-price countries. Also, importing prices of other countries implies importing their health care priorities, which may not correspond to the health needs of the population at stake. Therefore, price control should be supplemented by other policies promoting the rational use of medicines.”.

¹⁰ Footnote 15 reads: “Parallel trade refers to legal trade of patented pharmaceuticals from countries with low to countries with high pharmaceutical ex-factory prices. Kanavos and Costa-Font (2005) state that parallel trade increases the profits of the distribution chain rather than generating saving for health insurers or consumers. This is because imported pharmaceuticals are priced just below the prices of pharmaceuticals in the destination country.

¹¹ <http://healthcare.blogs.ihs.com/2012/07/10/a-new-cost-containment-protocol-in-portugal-lower-hospital-drug-debts-more-stability/>

2 Argument

2.1 Prices for patented medicines in the EU are settled in negotiation between patent-holders and (predominantly) national health services

Once a new medicine has been approved as safe and efficacious, the patent-holder or manufacturer will enter into negotiations with the potential purchasers. Some purchasers are private healthcare providers or insurers, but the most important are the national health services or insurance schemes. National governments are responsible for healthcare (a situation which is protected under the EU Treaties) and for deciding which medicines should be provided to patients at the expense of the health service or insurance scheme.¹²

The national healthcare authorities also decide what proportion if any of the price of medicines should be paid directly by patients (co-payments).

Details of the arrangements for pricing and reimbursement naturally vary in different Member States, although a framework for some aspects of the system is provided by the EU Transparency Directive. Some countries carry out relatively sophisticated health technology assessments of the benefits offered by each new medicine in comparison with alternatives already available, and are guided in their decisions about reimbursement by estimates of the amounts that should be paid on behalf of the people concerned (taxpayers, contributors to health insurance schemes, and potential patients) for a given likely health benefit (e.g., in the UK the responsible authority, NICE, has an estimate of about £20,000 to £30,000 that it thinks the NHS should pay per quality adjusted life year or QALY with adjustments for treatment at the end of life). Other health authorities use less formal methods of evaluation, and many Member States use a version of ERP to inform themselves for the negotiations with the manufacturers of patented medicines.

Prices and reimbursement rates, once settled, are unlikely to be increased, although there may be a requirement for reductions from time to time (e.g. as part of emergency public expenditure reductions).

However the detailed assessment is made of the price that should be paid for a new medicine it will include the essential elements of a) expected health benefits from the new medicine and b) the amount it is worth paying for these benefits.

2.2 ERP and PT lead to price convergence

In any market, there is a tendency for prices to converge (the “law of one price”). This is because within a single market arbitrageurs can, by definition, buy cheap and sell at a higher price, which will tend to reduce any price differentials. Information flows within the market have the same effect, by influencing decisions and by showing where arbitrage could occur.

The law of one price does not mean that there is literally a single price in any market. Other factors also have an effect: some purchasers and some sellers do not systematically search the market, or may be misinformed; others are not fully incentivised to get the best value for money. Differences in transport and

¹² Treaty for the Functioning of the European Union (TFEU) Art 68(7): “Union action shall respect the responsibilities of the Member States for the definition of their health policy and for the organisation and delivery of health services and health care. The responsibilities of the Member States shall include the management of health services and medical care and the allocation of the resources assigned to them.”.

delivery costs and in product or service specifications also account for some differences in prices paid for similar goods and services.

In the EU single market for medicines, arbitrageurs are referred to as parallel traders and information flows are systematised through ERP. The other important factors influencing price either towards or away from convergence and which may predominate at any particular time include policy decisions by national authorities.

2.3 The convergence price for patented products will be higher than least-cost production

The purpose of the patent system (which is founded on valid economic principles and embedded in EU law) is to allow prices to be charged during the patent life that provide a return on the research and development that led to the patent, and provide an incentive for future R&D. For successful patented products, these prices must therefore exceed the current costs of manufacture and distribution by a significant margin.

For generic medicines, as for other products not protected by patents, competition in a single market will help to bring prices towards the costs of the most efficient supplier. This is not the case for patented products, which can by law only be supplied by or on behalf of the patent-holder.

The margin that can be earned above manufacturing and distribution costs is limited by the difference between the value to consumers of the patented product compared to the nearest alternatives, or to doing without.

2.4 Affordability differs between Member States

The ability and willingness to pay for medicines differs between Member States because income levels, and financial strength, differ substantially.

There are extreme differences of income and wealth within many countries, and some rich people or private health insurance schemes are willing and able to pay very large sums for medical treatment. However, as the major purchasers of medicine are national health services or large regulated insurance schemes, affordability is reflected by average national incomes. These differ substantially within the EU. For example, GDP per capita in Bulgaria and Romania is half the EU average, and about one third of that in the most prosperous Member States.¹³

These comparisons are made at purchasing power parity (PPP) which allows for differences in the cost of living in different countries. The amounts of money available to be spent on healthcare are an alternative measure of affordability, and these differ more than GDP per capita.

2.5 The convergence price would be unaffordable for some

The price that is affordable to each healthcare provider depends on the health benefit offered, and the price. If it is worth a relatively wealthy country such as the UK paying about £30,000 (say €35,000) for an expected gain of 1 QALY, then it might be worth about €15,000 to the Romanian or Bulgarian health service on the basis of relative incomes, or less on the basis of available funds for healthcare. Actual prices differ, but not by so much, so that healthcare providers in lower income Member States have either to pay higher real prices, or purchase smaller volumes than would be desirable, or do without some essential medicines.

¹³ Source: Eurostat.

For example, it is said that no significant new medicines have been introduced in Romania (with a population of 22 million) for the last five years.¹⁴

2.6 There will be delays to launch

When considering whether to launch a new medicine in a low income Member State and being offered a correspondingly low reimbursement price the patent holder must take into account whether agreeing to that price would result in reduced earnings in other parts of the EU as part of the commercial reality they face. If the price would be used in ERP systems and result in lower prices being negotiable in other Member States, that loss of potential revenue would be a cost attributable to agreement to launch in the low income country. Similarly, if the price offered is less than about 15 per cent below prices achieved elsewhere, this may lead to parallel trade which also causes losses in other Member States.¹⁵

As a result, the patent holder's incentives are to delay launch in the low income Member States until terms and conditions have been agreed elsewhere; and even then, to insist on a higher real price than relative affordability would suggest.

2.7 Utilisation of medicines is sub-optimal

If pricing and supply arrangements were more rational, most medicines would be supplied throughout the EU more or less in relation to population (epidemiological differences, age distributions, diet and other factors affecting health and the need for particular medicines do differ, but as a general rule, health needs depend mainly on population). However, as a result of delays to launch, and of reduced volumes to accommodate high prices, the numbers of patients able to receive modern patented medicines in the EU is currently sub – optimal.

2.8 In the absence of ERP/PT patent-holders would seek more differentiated prices

The cost structure of a research-based pharmaceutical company is characterised by substantial costs sunk in R&D and in clinical trials etc., to bring a new medicine to market with proven safety and efficacy. The marginal costs of production and distribution are small in relation to these sunk costs.

The numbers vary from case to case, but marginal costs might be only about 5 per cent of total costs (though significantly more for vaccines and for biological products which are more difficult to manufacture).¹⁶

It follows from this that if the company can differentiate its pricing without fear of ERP (whether formal or informal) or parallel trade, and if it were faced with a potential customer able and willing to pay even a small fraction of the average cost, this would add to profits. For example, if in a particular case the marginal cost were 5 per cent of the average cost including R&D, an offer of a price of say 10 per cent for sales that would not otherwise have been possible would be highly profitable.

As has been stressed, however, this is true if and only if the low price does not cause a loss of revenues in other parts of the EU.

¹⁴ This was stated by the US Embassy representative at a recent round table health conference in Romania “European Perspectives in Health April 9, 2013 Bucharest”, in the presence of Department of Health officials and other experts including from leading pharmaceutical companies, and not questioned.

¹⁵ 15 per cent is an informal trade estimate of the margin normally needed before parallel traders enter the market. A smaller percentage margin may well be sufficient for expensive products.

¹⁶ The 5 per cent figure is an informal industry estimate.

2.9 Socially efficient pricing for products with high fixed or sunk cost reflects demand elasticity

Where willingness to pay differs between different potential customers for goods or services whose marginal cost is much lower than their average cost, Ramsey pricing is the most efficient form of pricing.¹⁷ Ramsey showed that in such cases welfare will be maximised if prices vary inversely with the elasticity of demand. This principle was developed with regulated utilities and the most efficient forms of taxation in mind, but it clearly applies to the case of patented medicines whose marginal cost of production and distribution is only a small fraction of the total cost.

In the case of medicines, there are additional benefits from ensuring efficient pricing and hence full access to medicines. Each individual's health contributes to the welfare of others, and a healthy workforce is more likely to achieve other economic goals.¹⁸

2.10 Profit incentives and public policy objectives are aligned

Both the profit incentive of a patent holder and the public policy objective of improved health and economic performance point to the desirability of allowing new medicines to be supplied to those who can afford to pay enough to cover the marginal costs of supply and distribution.

2.11 ERP and PT are harmful to EU patients

Within the EU there are two main reasons why socially efficient and profitable pricing strategies cannot be followed; these are ERP and parallel trade. These are the principal factors that cause delays and reduce affordable access to medicine for large numbers of EU citizens.

Even in the absence of formal ERP systems purchasers would presumably try to inform themselves about prices being paid in comparable parts of the EU; and smaller or low income countries would retain a valid interest in the results of health technology assessments carried out in countries better able to find resources for such assessments. However, the present system of ERP pays little attention to affordability, and encourages higher pricing in low income Member States.

2.12 ERP in itself is in some ways less harmful than PT

Parallel trade has a number of features that do not arise under ERP, all of which are harmful to patients' interests. These are:

- Parallel trade makes the supply chain more complex and obscure and hence easier for counterfeiters to penetrate.
- For the same reasons, it reduces the efficiency of product recalls when these are necessary.

¹⁷ Ramsey was a gifted young British economist who proved that the most efficient and socially beneficial form of charging for an essential service characterised by large fixed costs and low marginal costs would be to charge prices that reflect ability and willingness to pay. Under Ramsey pricing, prices depend on the elasticity of demand of different customers. Higher prices are charged to those most able and willing to pay and lower prices to those less able and willing to pay, which maximises output, and the overall social benefits of production, including providing the efficient incentive to future investment.

¹⁸ According to the International Social Security Association (ISSA), around 350 million working days are lost in the European Union each year due to "illness and the economic crisis have increased levels of stress and depression, which are among the major causes of disability. In developed economies, sickness and disability benefits can cost as much as 2.5 times the amount dedicated to unemployment benefits." Improving the health of the working age population will contribute to an increase in productivity.

- It involves widespread re-packaging and re-labelling which increase the chances of damage to the product, faulty packaging, and erroneous patient information leaflets.
- It increases the risk of periodic shortages, as supplies are exported.
- It consumes significant economic resources in additional packaging, transportation, and the other costs and profits of the traders.

However, ERP may affect all products, whereas parallel trade generally focuses on the most important in commercial terms.

2.13 Reforming ERP would be justified

Although ERP is less harmful than parallel trade, it would still be appropriate to reform it even while parallel trade continues. This is because reform could increase the flexibility available to manufacturers in developing their pricing strategies.

2.14 Adverse effects of present system are an unintended consequence of present laws and regulations

None of the results predicted by theory are the fault of any individual supplier, purchaser or trader. They are the inevitable result of the legal and regulatory framework which has led to unintended adverse consequences for the wellbeing of patients.

3 Evidence

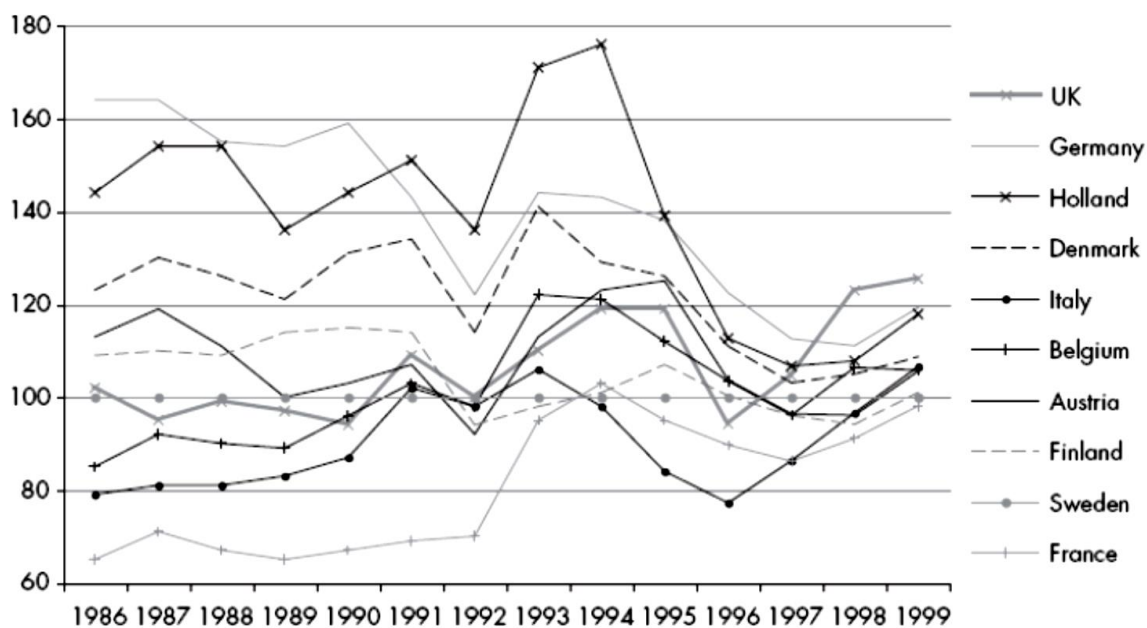
In this section we draw on IMS data and on the results of previous research to review the evidence in support of the arguments set out above.¹⁹

3.1 Tendency for prices to converge

The law of one price shows that prices in a single market will be closer together than they would otherwise have been. Other factors that may lead to price differences include factors specific to each contract, which in the case of patented medicines include different types of price regulation, different degrees of discounting from list price, and differing abilities to pay. Current difficulties in the Eurozone have led to reduced expenditure in low income countries in southern Europe.

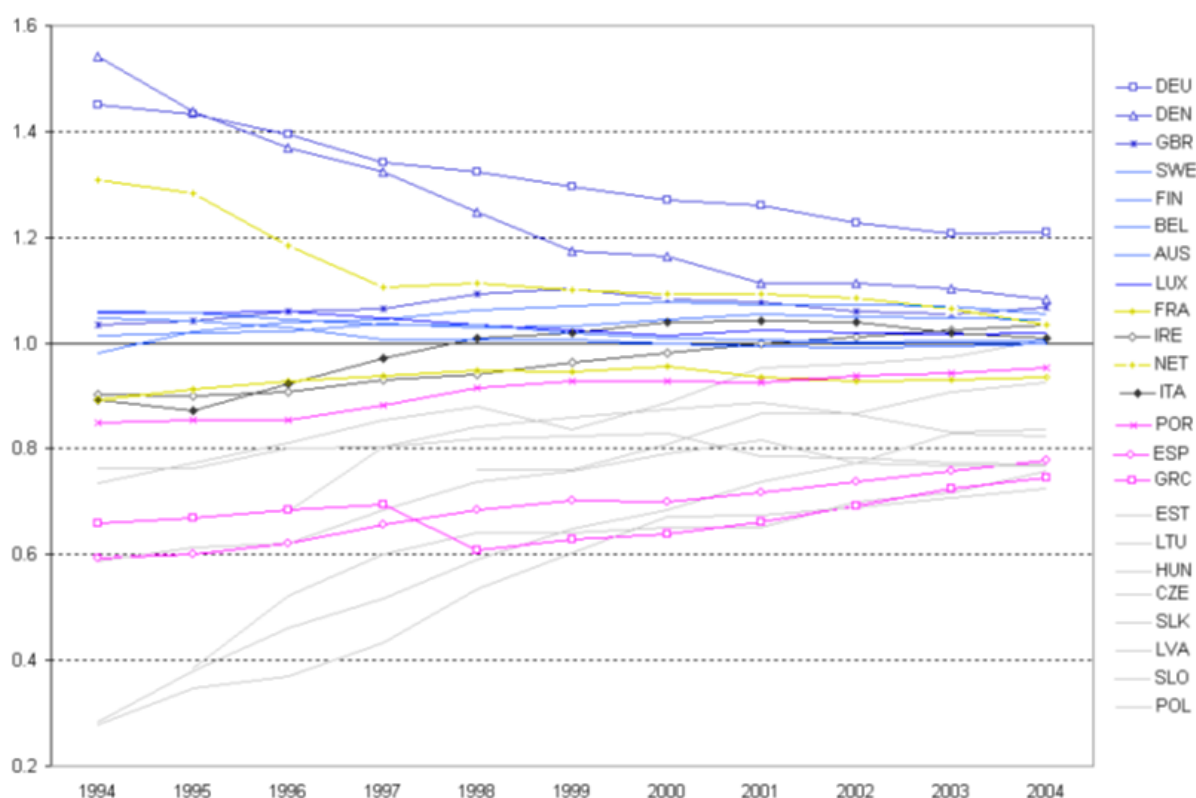
Figure 3.1 and Figure 3.2 indicate that there has indeed been some price convergence in European pharmaceutical markets over time.

Figure 3.1 Convergence in pharmaceuticals prices for 10 European Countries: 1986-1999



Source: Data are taken from the AIP Index from Apoteket AB, providing price comparisons for pharmaceuticals in Sweden and a number of European countries. Comparisons made in January 1999 are based on the 150 brands with the highest sales volumes in Sweden in the previous year.

¹⁹ See Annex I.

Figure 3.2 Price convergence over time in 23 European countries: 1994-2004

Source: Pammolli, Fabio (2007) Health Services in an Open Transatlantic Market, CERM, Italy.

Econometric research confirms the evidence presented in Figure 3.1 and Figure 3.2. Timur (2011) found evidence for price convergence among France, Germany, Italy, Spain, and the UK between 1994 and 2003.²⁰ Timur's pharmaceutical price measure considered price net of time, country, and drug quality effects that might otherwise influence the price. Although evidence for price convergence was found, there were still persistent long term country-specific effects, which she hypothesises arise from differences in pricing and reimbursement systems, geography, and (non-)membership of the Eurozone.

Price convergence may result either from changes in price after launch, or from launch prices becoming closer together over time. Kanavos and Vondoros (2011) observed convergence in volume-weighted ex-factory prices among EU Member States for recently released drugs compared with older drugs, in the early years of the century.²¹

Price convergence could come about in three ways:

- First, prices in lower-price markets could remain constant while prices in higher-price markets fall. This might be the case where drugs are priced close to the cost of production, such as in generics markets.
- Second, prices in high-price markets could hold steady while higher prices are found in lower-income markets rise. One might expect to find this situation where poorer countries are "catching up" with wealthier countries in terms of economic development. As economic features, such as levels of per capita income, in poorer countries begin to approach those of wealthier countries, we might also expect prices in poorer countries to rise reflecting the increase in ability to pay.

²⁰ Timur, Aysegul (2011) "Pharmaceutical price convergence in the EU: preliminary results from the panel data unit root test", *Journal of Business and Economics Research*, Vol 9(10), p 35-46.

²¹ Kanavos, Panos G. And Vondoros, Sotiris (2011) "Determinants of branded prescription medicine prices in OECD countries", *Health Economics, Policy, and Law*, Vol 6(3), p 337-367.

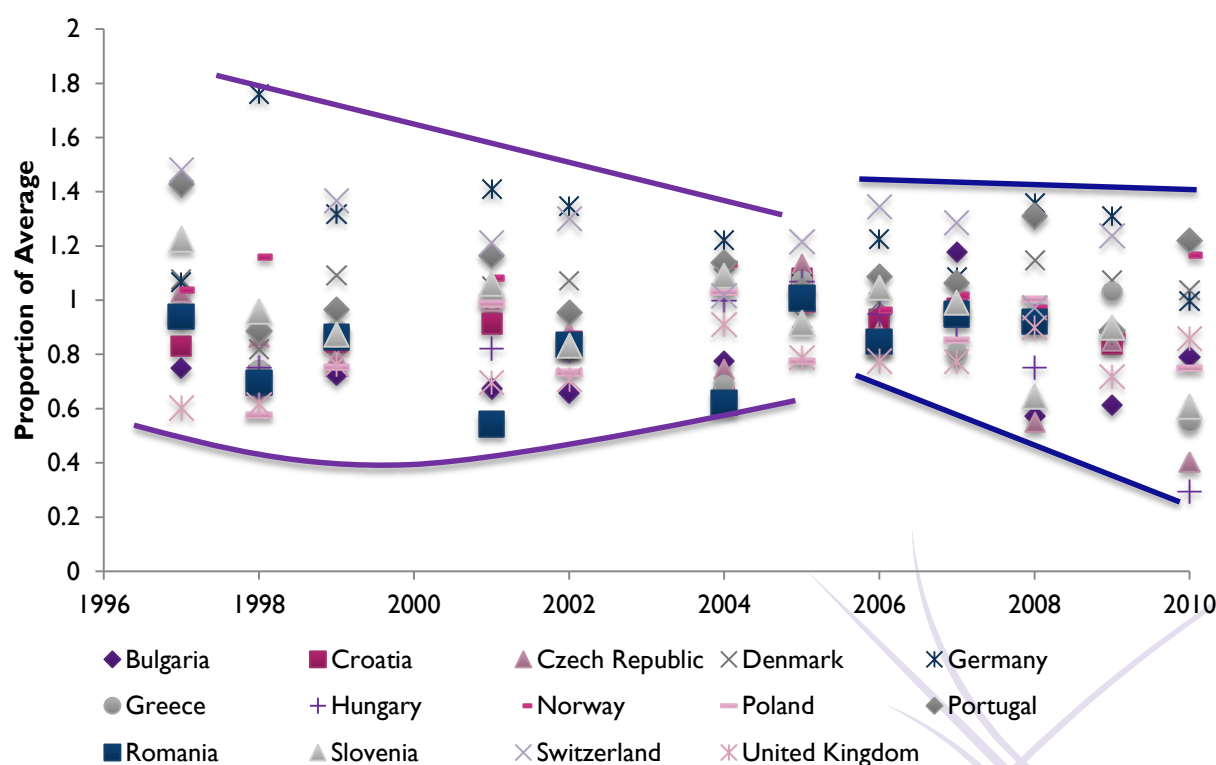
- Third, price convergence could be the result of prices falling in higher-price markets while launch prices become relatively higher in lower-price markets simultaneously. This sort of pattern could reflect ERP and/or parallel trade.

This third scenario seems to describe the patterns observed in Figure 3.1 and Figure 3.2. We observe that prices are quite diffuse at the start of the sample in 1994. Denmark, Germany, and France – all wealthier countries – have relatively high prices. Poorer countries, such as Poland, Slovakia, and Latvia, all have relatively low prices. A decade later, Danish, German, and French prices were markedly lower, while higher launch prices are found in poorer countries.

As an example from Figure 3.2, we observe that in 1994 Danish prices were around 1.5 and Polish prices around 0.3. This implies that Polish prices had been around 20 per cent of Danish prices in 1994. In 2004, we see that Danish prices had fallen to 1.1 and Polish price rose to near 0.7. This means that Polish prices had risen to around 64 per cent of Danish prices in 1994. Had there been no price convergence, the relationship between Danish and Polish price would remain as in 1994 (1.5 and 0.3 respectively).

In order to bring the information up to date we first reproduce in part the analysis of Kanavos and Vondoros (2011)²² using a sample of important molecules of oncology, diabetes, hypertension, rheumatoid arthritis, and respiratory drugs (using IMS data that Merck Sharp & Dohme (Europe) Inc. provided). Following the method designed by these authors we construct price indices for drug molecules released between 1997 and 2010. The price indices reflect the average price in 2011 of drugs using a given molecule.²³ The results are presented in Figure 3.3.

Figure 3.3 Relative price indices of various drug molecules in 2011 by launch date



Notes: Oncology, diabetes, hypertension, rheumatoid arthritis, and respiratory drugs included in price basket. Indices relative to sample average of drug prices in 2011. Sample average is equal to 1.

Source: IMS Health.

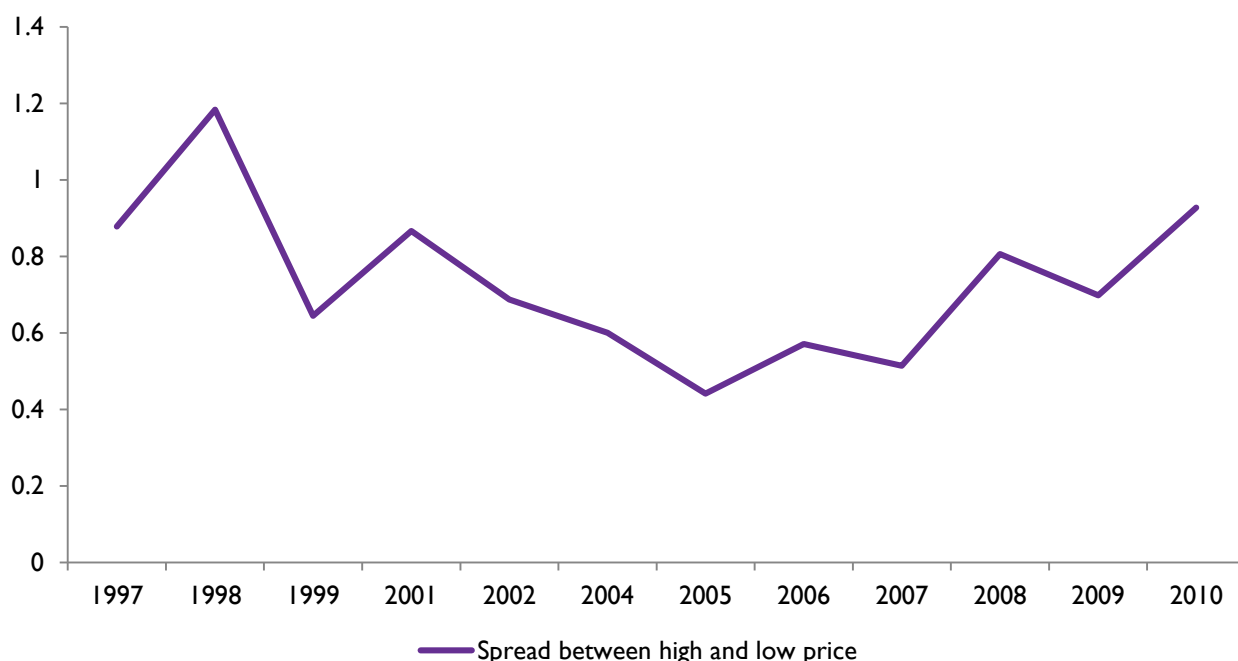
²² Ibid.

²³ To be precise, the average price for all drugs using each molecule in all the countries covered is expressed as 1. The average prices in each country are expressed as a proportion of the sample average.

In line with the findings of Kanavos and Vondoros, this presentation shows convergence of launch prices for the earlier part of the period. This appears to be a consistent pattern for drugs released between 1997 and approximately 2007. For drugs introduced after 2007, however, price spreads begin to widen. This may be attributed to a number of emergency measures introduced in response to the economic crisis.²⁴

An alternative way of showing this tendency for convergence and then some divergence is presented in the following chart. This shows, for each year, the difference between the highest and lowest price indices in each country. Thus as prices converge, so the line in Figure 3.4 will fall.

Figure 3.4 Spread between high and low price indices of drug molecules in 2011 by launch date



Notes: Oncology, diabetes, hypertension, rheumatoid arthritis, and respiratory drugs included in price basket. Indices relative to sample average of drug prices in 2011. Sample average is equal to 1.

Source: IMS Health.

Figure 3.4 shows evidence of price convergence for products released up to 2005 - 2007 and divergence thereafter.

In sum, there has been clear convergence of medicine prices for a period of at least 20 years, from 1986 (the earliest data available to us from Figure 3.1) until approximately 2005 - 2007, at which point convergence appears to have paused. Some widening of differentials is observed in the most recent years, probably reflecting short term price reductions imposed in some low income Member States. However, this change has been very small in relation to the previous convergence, so that over the period as a whole there has been a substantial narrowing of differentials.

3.2 Delays to launch

Patent holders planning to introduce a new medicine to the EU market will be aware of the use of ERP systems and of the strategies of parallel traders. They therefore face an incentive to delay launching in low income Member States until terms have been agreed with healthcare providers in richer countries.

²⁴ A presentation by the PPRI WHO Coordination Centre sets out the main measures that have been introduced: see GLC Pharmaceutical Pricing & Reimbursement Forum: Vienna, April 20, 2012.

There are often delays between when a pharmaceutical product is first launched within an EU Member State and when it is launched in other Member States. At first glance, delays seem somewhat curious. The fixed costs associated with R&D in pharmaceuticals production far outweigh the marginal cost of producing the drug. It would make sense for pharmaceutical companies to want to bring their products to market as soon as possible.

Delays can derive from administrative problems. The duration of the pricing and reimbursement and drug approval processes differ from country to country. Differences in the time needed to ensure regulatory requirements are met and in the length of the price negotiation process account for some of the launch delays. Where countries joined the EU relatively recently, this may have contributed to some of the delays.

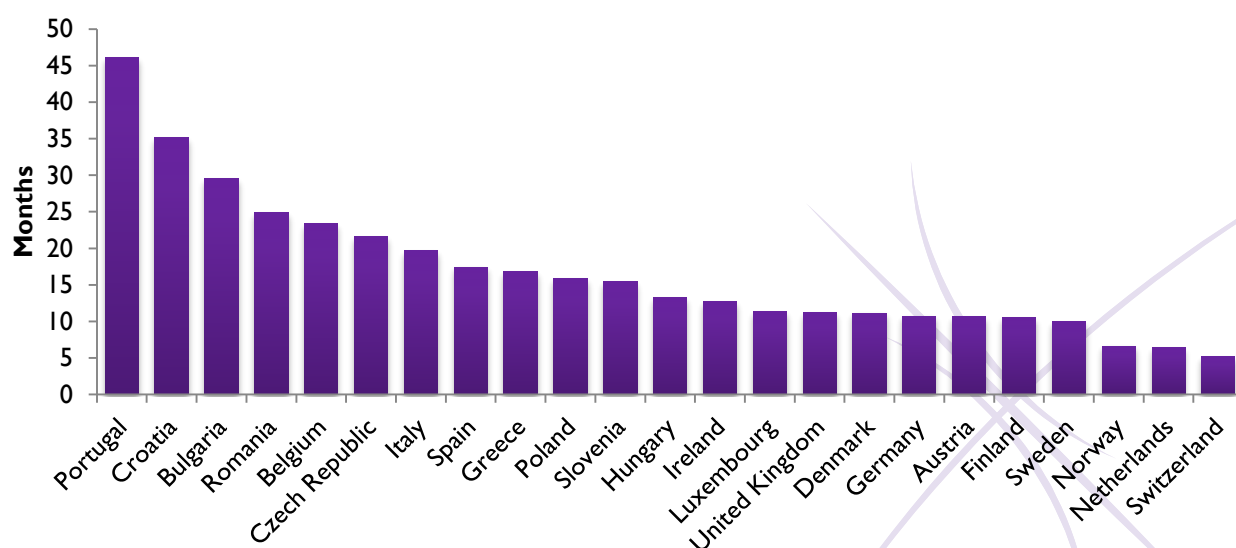
Another reason why manufacturers might delay launching their products is parallel trade. Manufacturers are aware that certain countries are more likely to export a portion of their pharmaceuticals through parallel trade. Pharmaceuticals manufacturers might wish to offset this fall in revenue by delaying the launch of new drugs in known parallel export markets.

A third factor that might cause pharmaceutical manufacturers to delay launching a drug in a country is ERP. As a cost containment measure, ERP typically has the effect of pricing drugs in a country lower than they would otherwise have been. Moreover, manufacturers may strategically delay launching a new drug in a lower-price country if that country's prices will decrease prices in higher-price countries due to ERP.

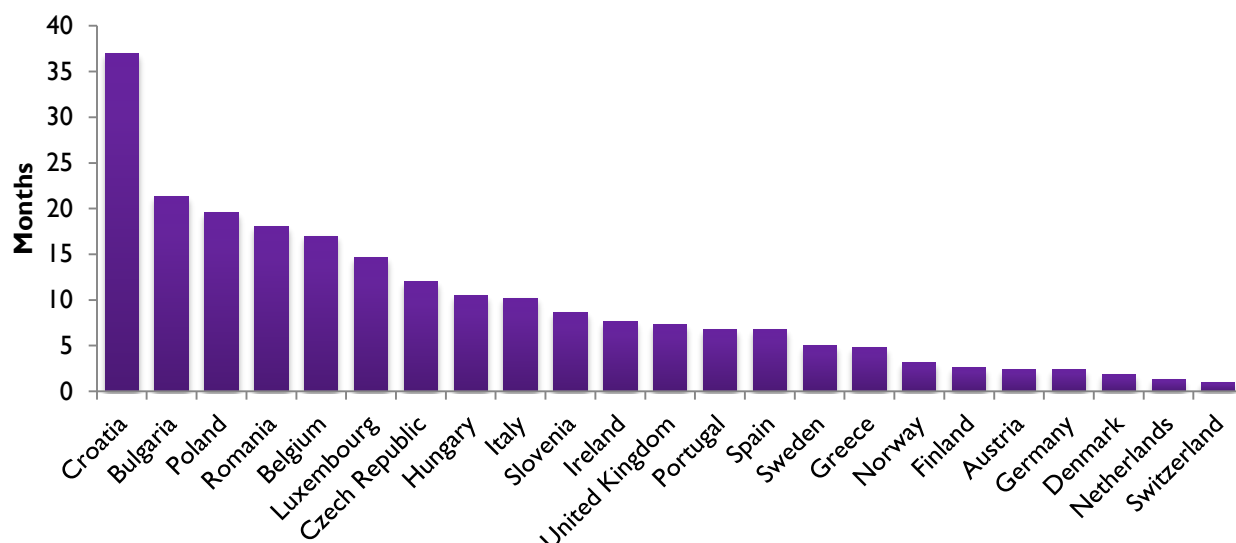
Figure 3.5 and Figure 3.6 give two indicative examples of launch delays. Figure 3.5 charts the average launch delay for common packs of various oncology drugs between 2001 and 2013 in months. Figure 3.6 presents the same data for common packs of diabetes drugs. Delays are calculated as the difference in months between the date a pack was launched in a country and the date the same pack was first launched in the EU.

In both cases, lower income Eastern and Southern European countries tend to face longer delays than their Western and Northern European counterparts. At the extremes, Portugal had to wait an average of 46 months for new oncology drugs after they were released elsewhere in Europe. Switzerland (not an EU member) and the Netherlands had to wait just 5 months. For diabetes drugs, Croatia had the longest delay at 37 months, while Switzerland again had the shortest delay of just one month and five wealthy EU Member States waited only about two months.

Figure 3.5 Average launch delays for in-patent oncology drugs: 2001-2013

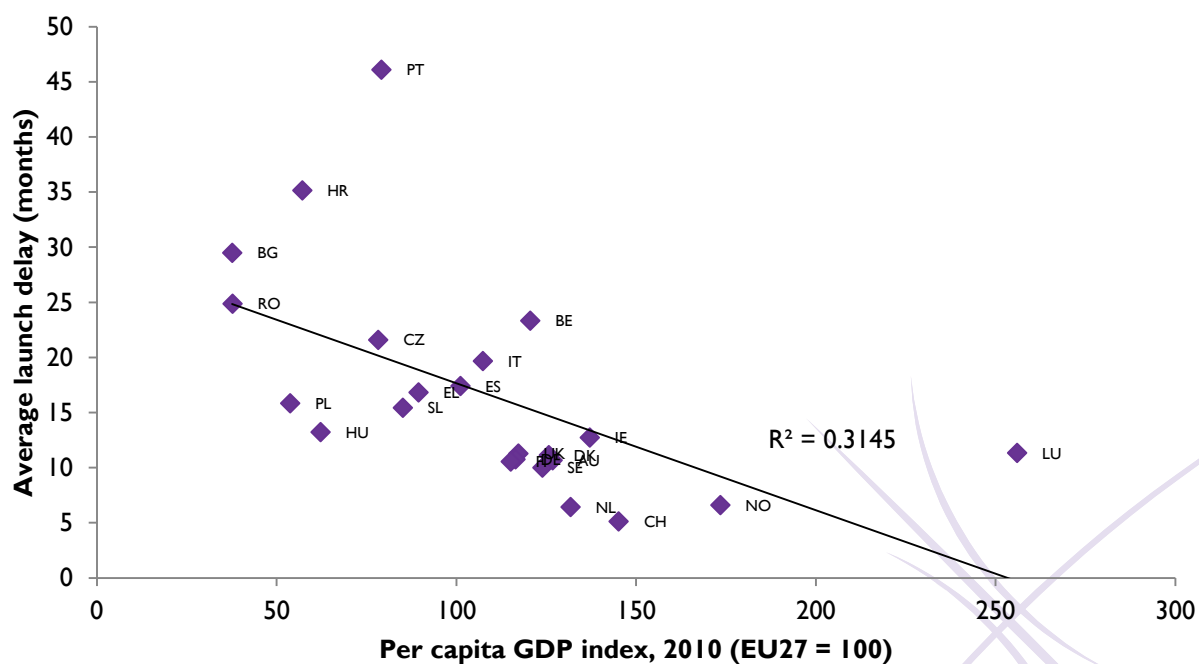


Note: Delays based on packs common to at least 15 countries in the sample.
Source: IMS Health.

Figure 3.6 Average launch delays for in-patent diabetes drugs: 2001-2013

Note: Delays based on packs common to at least 15 countries in the sample.
Source: IMS Health.

Confirming impressions on the ordering of countries in Figure 3.5 and Figure 3.6, Figure 3.7 plots per capita income levels against average launch delays for in-patent oncology drugs in various EU Member States. Per capita income levels alone can account for around 31 per cent of the variation in launch delays among EU countries.²⁵ Observed launch delays for in-patent oncology drugs falls as per capita income rises in our sample.

Figure 3.7 Average launch delays for in-patent oncology drugs versus per capita income

Note: Per capita income and average launch delays data between 2001 and 2012. (There are insufficient data to be sure whether there is a different result in the most recent years.)
Source: IMS Health, Eurostat.

²⁵ When Luxembourg — a very wealthy and very small country — is omitted from the sample, the R^2 rises to 0.45.

3.3 Affordable access to medicines

In theory, if demand is homogeneous market prices for a single drug in different countries should reflect the ability and willingness of countries' consumers to pay for that drug. If, as is the case, Luxembourg's average per capita income is twice that of the European average, then in principle Luxembourg's residents should pay twice as much for that drug relative to the average European price.

In the real world, other forces also come into play. Prices are multifactorial and no one factor determines them. As has already been mentioned, prices in pharmaceuticals market are largely determined through a series of bilateral negotiations between patent – holding manufacturers and national health services or insurance schemes. ERP and parallel trade affect the prices that are agreed, as do regulatory interventions on pricing and reimbursement.

The challenge, then, is to determine what price would be in the absence of market distortions —that is, to establish the counterfactual. Proceeding from the idea that prices for a given drug should reflect the ability and willingness to pay, we have constructed two “Affordability Indices (AIs)”. The AIs are constructed by comparing income and expenditure measures of European countries to a European average. The first AI (AI_1) examines per capita income levels relative to the EU average and is calculated as

$$AI_1 = \frac{GDP_i}{GDP_{Europe}}$$

where GDP_i is per capita income for some country i and GDP_{Europe} is per capita income for the EU. Countries with per capita income greater than the European average will have an AI_1 score greater than one, while countries with income lower than the average will have an AI_1 score less than one. AI_1 is therefore one measure of a country's ability to pay.

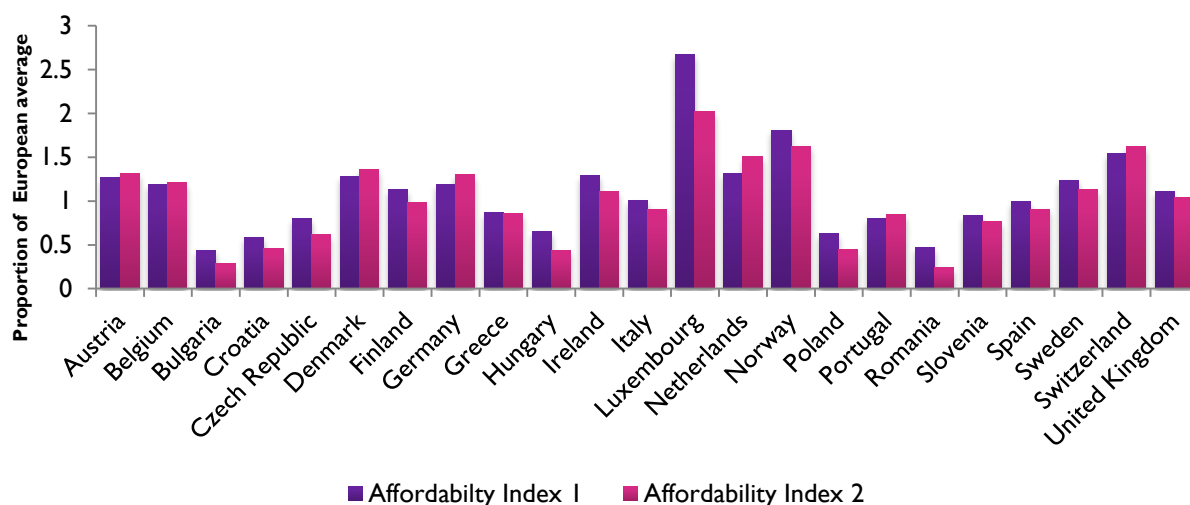
However, other factors than income per head compared at purchasing power parities also affect ability to pay for internationally traded goods such as pharmaceuticals. These include the taxable and borrowing capacity of the economy, and the national governments' decisions about the part of total public expenditure to be allocated to health and other major budget categories. Looking at the amounts of money actually spent on healthcare by the government and by the private sector together (data for which are compiled by the WHO) gives a more direct measure of how much could be afforded for medicines.

The second AI (AI_2) therefore considers total health expenditure in an EU Member State relative to the EU average. In this sense, it is a closer measure of the willingness to pay for pharmaceuticals. AI_2 is calculated as follows:

$$AI_2 = \frac{HExp_i}{HExp_{Europe}}$$

where $HExp_i$ is total health expenditure for some country i and $HExp_{Europe}$ is average total health expenditure for the EU.

Figure 3.8 shows AI_1 and AI_2 for various European countries in 2010. If prices reflected only the ability and willingness to pay, prices in Bulgaria — the European country with the lowest per capita income — would have been between 28 per cent and 44 per cent of the average European price. By contrast, Europe's wealthiest country by per capita income, Luxembourg, would have prices between 2.6 and 2 times the European average.

Figure 3.8 Affordability Indices for European countries in 2010

Source: Eurostat; WHO.

To make this idea more concrete, we apply AI_1 and AI_2 to the average price European price²⁶ for an rheumatoid arthritis drug in Figure 3.9. The first column for each country is the average observed price during 2010. The following two columns are what the prices would have been if prices reflected the willingness and ability to pay, calculated using AI_1 and AI_2 , respectively. Following from the previous example, Bulgaria paid an average of €126.73 for a standard unit of the arthritis drug in 2010. Under AI_1 , Bulgaria would have purchased the arthritis drug at €75.83 per standard unit. Under AI_2 , the price would have been €50.00.

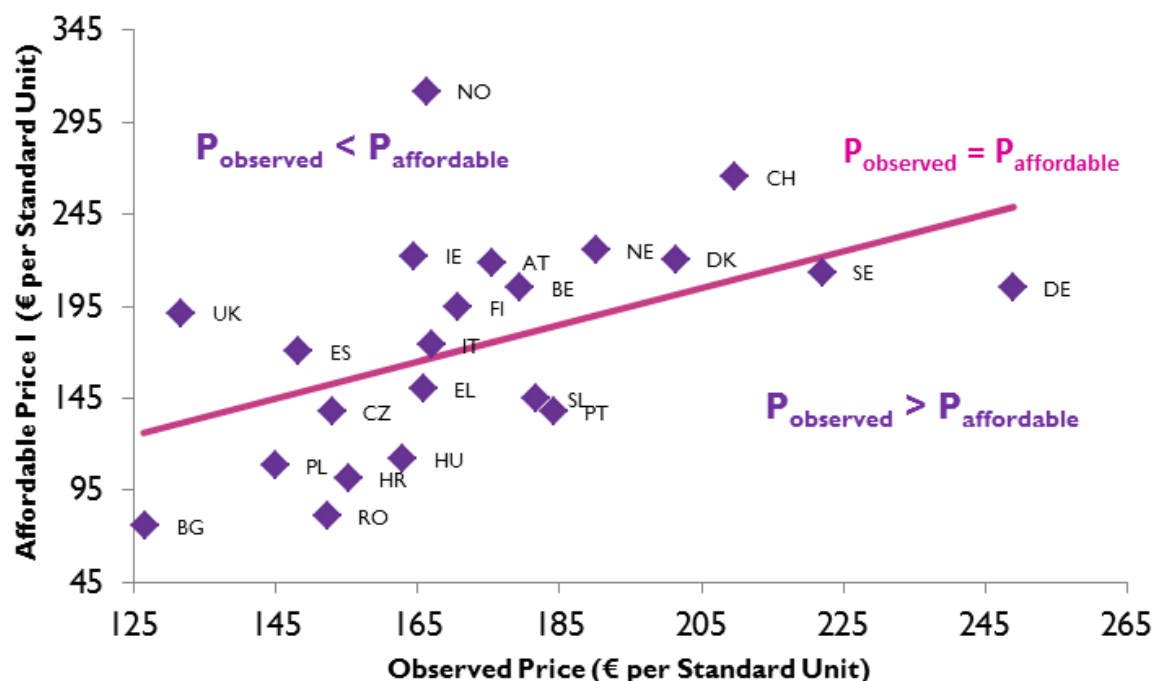
Luxembourg, on the other hand, enjoyed substantially lower prices. A standard unit of the arthritis drug in Luxembourg cost €161.37. Under the counterfactual scenario, prices in Luxembourg would have been between €348.74 and €460.16.

²⁶ All prices converted into euros.

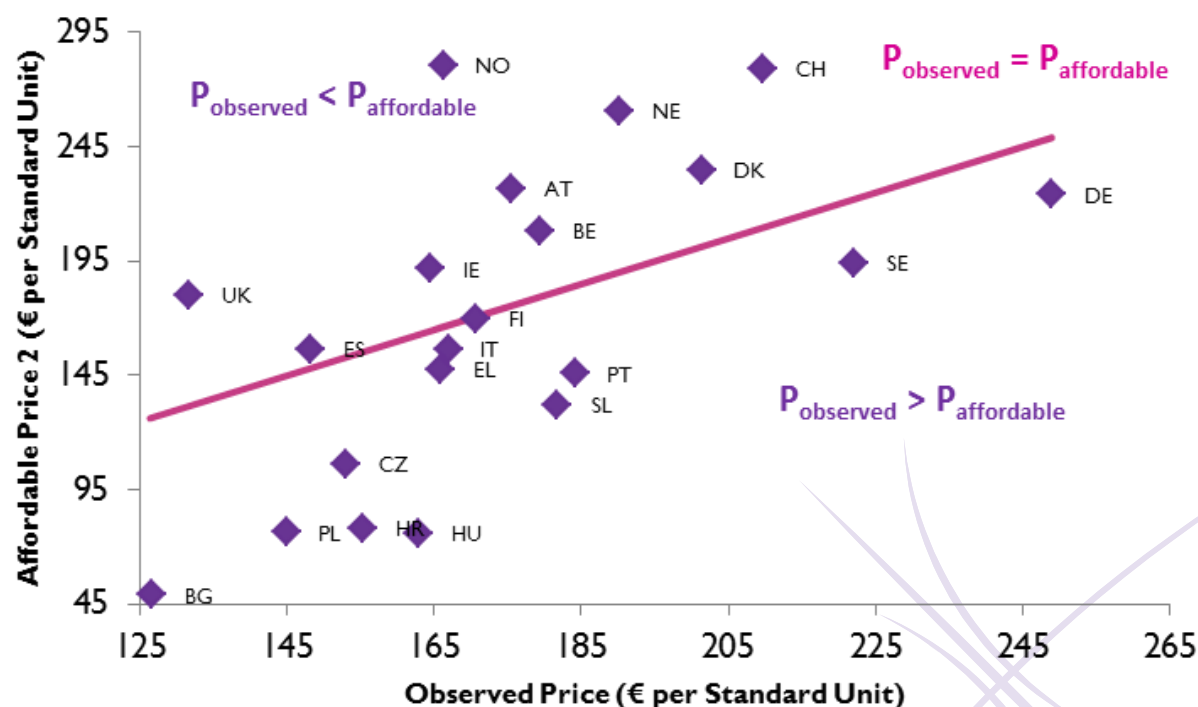
Figure 3.9 Observed and counterfactual average prices (€) for an arthritis drug in 2010

Source: IMS Health; Eurostat; World Health Organisation.

Figure 3.10 and Figure 3.11 examine these data in a different way. The two figures are scatter plots of prices for a drug for treating rheumatoid arthritis in European countries in 2010. Along the horizontal axis is the observed price. Down the vertical axis are the counterfactual prices calculated using our two affordability indices. The line is the plot of points in which the observed price equals the counterfactual price, which is the situation one would find in a market that reflected affordability. For the countries that fall below the line, the observed price is greater than the counterfactual price, indicating that these countries currently pay more for their medicines than they would if prices reflected the ability or willingness to pay. Countries sitting above the line enjoy lower observed drug prices compared with the counterfactual scenario.

Figure 3.10 Dispersion of countries for observed and counterfactual (AI_1) arthritis drug prices in 2010

Source: IMS Health, Eurostat.

Figure 3.11 Dispersion of countries for observed and counterfactual (AI_2) arthritis drug prices in 2010

Source: IMS Health, World Health Organisation.

Using both AI_1 and AI_2 counterfactual prices, we see remarkably similar patterns. In each case, there is a clustering of low income countries — Bulgaria, Croatia, the Czech Republic, Greece, Hungary, Poland, Portugal, Romania, Slovakia, and Spain — under the line, suggesting these countries pay more for their

drugs than they would based on “affordability” alone. On the other side of the line, where prices actually paid are lower than market prices reflecting affordability would be, lie a number of wealthier countries, such as the Denmark, Norway, the Netherlands, Switzerland, and the UK. There are some deviations from this pattern. Germany, a high income country, falls below the line in both instances. These outlier cases aside, the emergent picture is that, compared with prices that reflect the ability or willingness to pay, high income countries enjoy lower prices at the expense of low income countries.

3.4 ERP contributes to the problems

In an attempt to quantify the influence of ERP on access to affordable medicines in low income countries, we simulated the ERP system described in Leopold et al. (2012).²⁷ The system is a model of the ERP system as it was in 2010 and includes the potential for feedback loops between price changes. The simulation was built on the same assumptions as those found in Stargardt and Schreyögg (2006), namely that all local prices update immediately and simultaneously according to the country’s ERP formula.²⁸ This type of simulation does not take into account the dynamic effects of the system, as participants adjust their behaviour, but focuses on calculating the effects of the present rules and prices.

For the starting prices, we take the average prices for a variety of in-patent oncology drugs between 2001 and 2013 from the IMS health database. We then run our simulation once to account for the fact that observed prices often do not reflect the ERP calculations in the first instance. We then use the prices generated from this first simulation as the starting price. This allows us to isolate the simulated effect of price changes, rather than first-round effect of converting observed prices to simulated prices.²⁹

We then simulate a unilateral — that is, independent of the country’s ERP system — price decrease of 10 per cent in Romania.

Only countries for which IMS Health data were available are included in the model. Where countries did practice ERP but the exact calculation method or basket of countries was unknown, we assume that prices would not change. For these reasons, this is only a partial picture of the potential impact of ERP in Europe. The model provides only an indicative description based on available data. The results of the simulation are presented in Figure 3.12.

Figure 3.12 Simulated price and revenue effects of the ERP system in 2010

Country	Starting price	ERP Price	Per cent Change in Price	Standard Unit Sales	Income Forgone (Thousands €)
AT	440.92	432.64	-1.88	1054700	8738.64
BE	440.92	432.64	-1.88	1846100	15295.72
BG*	287.19	258.47	-10	392900	11283.52
CZ	415.42	402.02	-3.23	913200	12238.70
DE	519.01	519.01	0	9365400	0
DK	491.69	491.69	0	839700	0
EL*	287.19	258.47	-10	737500	21179.93
ES	425.83	425.83	0	6804300	0

²⁷ Leopold, Christine, Vogler, Sabine, Mantel-Teeuwisse, A. K., de Joncheere, Kees, Leufkens, H. G. M., and Laing, Richard (2012) “Differences in external price references in Europe – a descriptive overview” *Health Policy*, Vol 104, p 50-60.

²⁸ Stargardt, Tom and Schreyögg, Jonas (2006) “Impact of cross-reference pricing on pharmaceutical prices: — manufacturers’ pricing strategies and price regulation.” *Applied Health and Economic Health Policy*, Vol 5, No 4, 235-247.

²⁹ Following Stargardt and Schreyögg, we run the simulation one time on the assumption that the price effects are realised instantaneously.

Country	Starting price	ERP Price	Per cent Change in Price	Standard Unit Sales	Income Foregone (Thousands €)
FI	470.34	464.97	-1.14	1153700	6190.93
HU	287.19	258.47	-10	1123700	32271.04
IE	445.33	442.24	-0.69	568100	1753.92
IT	629.42	629.42	0	14553400	0
NL	433.47	430.71	-0.64	2645100	7305.26
NO	404.96	401.27	-0.91	627300	2309.98
PL	287.19	258.47	-10	1697000	48735.39
PT	447.48	437.90	-2.14	1040200	9957.68
RO	287.19	258.47	-10	2213000	63554.16
SE	677.88	677.88	0	1498800	0
SL	455.97	452.03	-0.86	298200	1173.59
UK	340.48	340.48	0	7416900	0
Total revenue foregone					241988.46

Note: *: Directly references Romania.

Source: IMS Health, Leopold et al. (2012).

If savings implied by the ERP system were actually observed, some countries would see markedly lower prices. Poland, Greece, Hungary, and Bulgaria, for instance, would have paid 10 per cent less than they did on average between 2001 and 2013. This comes through importing entirely the 10 per cent Romanian price decrease. The effect is imported into Bulgaria and Greece directly through referencing Romania in their basket. Both countries' referencing methodology is biased towards lowering the price by selecting minimums in the basket.³⁰ Hungary and Poland do not reference Romania directly, but instead import the effect via referencing Bulgaria and Greece with formulae also biased towards lower prices in their reference baskets.

Only Greece and Bulgaria reference Romania in our simulation. Price changes in other countries derive from the “spill over” effects of indirectly importing the effects of the Romanian price cut by referencing countries that in turn reference Romania. These indirect effects can be considerable. For instance, prices in the Czech Republic would have been 3 per cent lower and Portuguese prices 2 per cent lower simply through indirectly importing the 10 per cent Romania price cut. Both countries reference countries that have Romania in their ERP basket.

Even countries that are two steps removed from Romania would see price decreases under our simulation. The Netherlands, for instance, references the UK and Germany — both countries that do not practice ERP — and Belgium.³¹ Belgium references Greece, which references Romania. Despite the fact that two countries stand between the Netherlands and Romania, Dutch prices would have fallen 0.64 per cent in response to a 10 per cent price cut in Romania.

These price reductions can clearly have a serious impact on revenues. Using data for the total amount of standard units of the sample drugs sold in 2010 from IMS Health, we calculate the revenues³² foregone from our simulated ERP price changes. In the absence of any spill over effects, a 10 per cent price reduction in Romania would amount to around €64 m of revenues lost. When account is taken of spill over effects the revenues foregone rise almost four-fold to €242 m.

These figures, however, should be considered only an indication of the possible foregone revenues at a certain stage of the “spill over” process, and not a definitive answer. This is because, by design, the model is a simulation of the mechanical effects of ERP rules. As such, it does not capture behavioural responses,

³⁰ Greece simply takes the minimum, while Bulgaria takes the average of the lowest three.

³¹ The Netherlands also references France, which is not included in our simulation.

³² Revenue = Price of Drug x Quantity Sold

such as a refusal by manufacturers to accept prices in one country that would reduce revenues elsewhere in the EU.

Our model also does not capture feedback loops within the spill-overs. For example, it may be that Romania, the country that initiated the price cut in our simulation, later uses the Bulgarian price as part of ERP-pricing of a new drug. Bulgaria imported entirely the 10 per cent Romanian price cut. This means that the Bulgarian price is already lower than it would have been otherwise. If Bulgaria unilaterally cuts its prices in the future, this affects the Romanian price as Romania references Bulgaria in its ERP practice. However, since the Bulgarian price was lowered previously by the Romanian price cut, this amounts to Romania “re-importing” its own price cut by referencing Bulgaria. Of course, there are practical limits to these feedback effects; prices can only fall so far. Nevertheless, even in the absence of these additional effects, ERP dynamics on their own imply considerable foregone revenues.

Price increases do not appear to filter through the system in the same way. We ran a simulation of a 10 per cent price increase in Romania.³³ The only country that realised a price increase was Bulgaria, which included Romania in its average of the lowest three prices in its basket. Prices in every other country remained unchanged. Thus the ERP system is downwardly-biased³⁴ in how it responds to price changes: price decreases filter widely throughout the system, while prices increases have very little effect.

This combination of feedback within the system and downwardly-biased calculations creates added uncertainty for pharmaceutical manufacturers. Where a manufacturer is uncertain about how launching a medicine in a particular country could have effects on revenues elsewhere, the manufacturer may be less willing to launch that medicine, exacerbating the problems noted in Section 3.2.

Despite being a well-known and increasingly popular pricing scheme, ERP's effects have received relatively little attention in the literature. A structured literature review by Espin, Rovira, and Olry de Labry (2011) found that of the mere 21 scholarly works on ERP, only 4 were data-driven.³⁵ The remaining were theoretical models or review/opinion pieces. Not all of these studies considered the European pharmaceuticals market.

Our findings are broadly similar to those found in this budding literature. The study on which our simulation is based, Stargardt and Schreyögg (2006), simulated ERP's direct and indirect effects on prices within the EU-15.³⁶ They found that ERP led to cost reductions, with the size of the price change depending heavily on the formula used to determine the ERP price, but that in general ERP reduced prices in ERP-practicing countries. The researchers assumed that prices are updated automatically.³⁷

Kanavos, Nicod, Espin, and van den Aadweg (2010) analysed price and quantity effects of ERP for seven European countries.³⁸ The researchers found price reductions in four of the seven countries. The ERP formula did not appear to have a noticeable effect. Two of the countries that realised a price reduction used a simple average, one used the average of the three lowest prices in the basket, and another took the

³³ Full results not reported.

³⁴ The ERP system is downwardly-biased in at least two senses. First, some countries take a weighted average (e.g. 95 per cent) of the prices in their basket. Second, other countries use minimum prices in their ERP formulae. At best, price calculations are neutral, using a simple average. None of the formulae take, say, 110 per cent of basket price, and nor do they use maximum prices in the basket.

³⁵ Espin, Jaime, Rovira, Joan, and Olry de Labry, Antonino (2011) “Working paper 1: external reference pricing”, *WHO/IHAI Project on Medicine Prices and Availability*.

³⁶ Stargardt, Tom and Schreyögg, Jonas (2006) “Impact of cross-reference pricing on pharmaceutical prices: manufacturers’ pricing strategies and price regulation.” *Applied Health and Economic Health Policy*, Vol 5, No 4, 235-247.

³⁷ This may be defensible from a modelling perspective, but in reality countries update their prices and ERP information at different times and frequencies. Heterogeneity in updating prices could have an effect on how price changes in an ERP basket country effect prices in the referencing country.

³⁸ http://ec.europa.eu/enterprise/sectors/healthcare/files/docs/valuebased_pharmapricing_012010_en.pdf

lowest price in its basket. Interestingly, the three countries that saw higher-than-average prices all used formulae biased towards the lowest prices in the reference basket, such as the lowest price or the average of the lowest prices. All of the countries suffered from launch delays of between three months and two years.

Assessing whether 2010 price decreases in Greece and Spain filtered through the European pricing system via ERP, Vogler, Zimmerman, Leopold, Schmickl, and Windisch (2011) saw no evidence that ERP reduces prices in the medium term.³⁹ The Greek and Spanish price decreases may not have had an impact on other countries in the short-term due to irregular price updating in referencing countries, the price-increasing effect of VAT increases, and, in the Spanish case, the price decreases coming in the form of increased discounts instead of decreases in the list price.

The assessment from the literature is mixed, with some studies finding price reductions, some pricing increase, and some no effect at all. Studies based on more recent data, such as Kanavos et al. (2010), find that ERP does not have a noticeable effect. This fact, combined with evidence for price convergence presented in Section 3.1, is curious, given that ERP should in principle lead to price decreases.

How might ERP exacerbate the problems of launch delays and price convergence? ERP might lead to launch delays if manufacturers, aware of the likely use of a price being negotiated in a low income country in other negotiations, delay agreement until the other more profitable contracts have been signed.

As countries begin to use one another's pricing information when setting domestic prices, we might expect to see price differences between countries to decrease. One reason is that ERP itself creates pressures that push prices together. If all EU-27 countries were to reference all other EU-27 countries via ERP and the ERP reference formulae were simple averages, then the price in each EU Member State would converge to an EU-27 average over time. We know, however, that this is not the case; Member States often reference a handful of countries in their ERP baskets and formulae other than the simple average are used in ERP pricing. Nevertheless, ERP probably creates some converging pressure in prices.

Another reason why ERP might lead to price convergence is strategic decisions on behalf of the manufacturers.⁴⁰ If manufacturers are aware that prices in ERP-practicing countries are likely to respond to price movements in basket countries, then they might be less willing to set lower opening prices in general. Therefore, we might expect to see manufacturers bargaining for more similar opening prices in different countries in order to limit the influence of ERP and thereby increase revenue streams. We might also see manufacturers bargaining for higher opening prices with a realisation that unilateral regulatory price decreases in one country may bring about price decreases in other countries, regardless of how similar the opening price is.

³⁹ http://whocc.goeg.at/Literaturliste/Dokumente/Posters/DU_Course_Antwerp_EPR_ImpactMedicinesPrices_EL_ES.pdf

⁴⁰ We use the term manufacturers here to mean those taking pricing decisions on behalf of patent-holders.

4 Conclusions: Implications for Pricing and Reimbursement Systems

4.1 OECD principles

According to the OECD, a health care system should

- Provide affordable access to healthcare.
- Be sustainable.
- Encourage innovation.

In our view these principles provide a sound basis for any recommendations for P&R systems.

The term “affordable access” might refer to patients, or to healthcare service providers, or to both. Here we focus on the price of medicines to healthcare providers. If the healthcare systems in low income Member States are able to purchase patented medicines at lower prices, as a result of reforms to ERP systems and to parallel trade, it will be easier for them to provide medicines to patients.

The concept of sustainability also has two relevant meanings. Healthcare services must be financially robust, which involves paying in line with value for money (a combination of price and value), and hence not paying unduly high prices. Prices paid for patented medicines should therefore reflect ability to pay as well as the health benefits which they offer.⁴¹ Sustainability also means that the profitability of effective new medicines should not be unduly reduced; this also points to a reform of ERP and parallel trade law. The OECD’s third principle, of encouraging innovation, is most explicit on this point.

4.1 Recommendations for a P&R framework

Our recommendations for P&R systems follow from the evidence of this report, which has demonstrated that present policies of ERP and parallel trade are harmful to the interests of patients, especially in low income Member States. These policies reduce affordable access to existing medicines and the incentives for continued research and development of new medicines.

The recommendations are explicitly designed to increase the scope for differentiated pricing, so as to allow lower prices to be charged to those who can afford least, without reducing the contributions from those with higher ability and willingness to pay.

We assume that national governments or health scheme authorities should continue to decide which medicines should be paid for in whole or in part by the state or by a regulated health insurance scheme. Those medicines for which no part of the cost is reimbursed need not in general be subject to price controls.⁴²

⁴¹ Pricing that takes account of ability and willingness to pay is a normal market feature, and as we have argued is the efficient form of pricing for products such as patented medicines that are socially valuable and characterised by high fixed costs and low marginal costs.

⁴² Recommendation 6 of the High Level Group on Innovation and Provision of Medicines and published on their behalf by the European Commission in 2002: was
“That the Commission and Member States should secure the principle that a Member State’s authority to regulate prices in the EU should extend only to those medicines purchased by, or reimbursed by, the State. Full

We also assume that the fractions of the total cost that should be paid by the patient, and the fraction to be paid by taxpayers or other members of the insurance scheme, are also for each member state to decide according to its health and social policy priorities. In setting such limits account will need to be taken of the benefits to health expected to be achieved from the medicine at the prevailing price.

In order to allow differentiated pricing, changes required are:

- Patent-holders should be allowed and encouraged to charge different prices to different users on condition that the products are not then re-sold. Confidentiality should be possible for discounting as part of sales contracts. This would significantly curtail the scope for parallel trade, which as we have shown is socially harmful.⁴³
- ERP should be reformed, so that prices paid in low income countries do not reduce prices paid elsewhere in the EU, and any comparisons made are adjusted through the use of an index of affordability.

The relationship between parallel trade and ERP is important; if reforms of ERP led to additional parallel trade this could be harmful.⁴⁴ The two reforms should ideally go hand in hand.

However, if parallel trade cannot be prevented in the short term, it would still be worth making the suggested reforms to ERP. This is for two reasons:

- The reform of ERP would give patent-holders a greater degree of freedom to set prices.
- Explicit acceptance by public purchasing authorities of the need for price difference to reflect differences in affordability might help the EU to reach better conclusions concerning parallel trade.

Thus our recommendations are as follows:

4.1.1 Scope of price controls

No price controls for medicines that are not reimbursed, in part or in full, by the state.

Generic prices have not been discussed in this report but from a policy perspective, and with the interests of patients in mind, we assume that EU procurement law should be applied so that purchasers are encouraged to seek best value for money and to publish in the Official Journal both the purchases they wish to make and the outcome of the contracts.

4.1.2 Pricing of patented medicines

Sales contracts for patented medicines should provide for:

- prohibition of re-sale; and
- maintenance of commercial confidentiality over price.

The interest of the patent-holder in charging what each type of customer is willing and able to pay and the interest of policy-makers in facilitating the maximum possible affordable access to medicines would both be achieved by these reforms. However, there is a risk that unless and until the law is changed contracts explicitly banning re-sale may be open to attack by the European Commission.

competition should be allowed for medicines not reimbursed by State systems or medicines sold into private markets.”

⁴³ There is a theoretical case for legislation to prohibit parallel trade, but this is outside the scope of this report.

⁴⁴ Parallel trade increases the risk of counterfeits entering the supply chain since it complicates the market and makes it less transparent; the re-packaging that is often involved creates a risk of damage to the product and makes it more likely that incorrect patient information leaflets are included.

4.1.3 Role of ERP in P&R systems

It would be unrealistic to expect that healthcare purchasers will stop wanting to take account of prices being paid by others, but entirely appropriate to expect them to take account of differences in the circumstances of different Member States.⁴⁵

We see two main options:

- exclude lower income countries from reference groups; and
- continue with ERP systems as they are but apply affordability indices so the prices used reflect purchasing power.

The first option has already been advocated by EFPIA, and the severity of the crises affecting some members of the Eurozone (Greece, Cyprus, and others) is so severe that they should be given every possibility of making economies without damaging the rest of the EU.⁴⁶

However, the tendency of ERP to lead to price convergence would be only partly redressed by this policy, and we also recommend that any comparisons made should be the result of applying an index of affordability.

A conventional indicator of affordability is national income (GDP) per head, with international comparisons made either at an average exchange rate for (say) a year, or with comparisons made in terms of purchasing power parity (PPP). PPP comparisons allow for differences in the cost of living in different countries, and so give a more realistic comparison of living standards. However, a better index than GDP per head is the amount of money spent on healthcare in each member state, which is the second affordability index used in this report.

Even with these reforms, widespread use of ERP systems must add to the uncertainty facing investors, since the “ripple effects” of a price change in one country may affect so many others.

4.2 Legal issues

The reasons for the undesirable outcome of parallel trade are not malpractice by any of the parties principally involved (the patent holders, the parallel traders, or the purchasing authorities) but their rational response to the ways in which Member States P&R policies have evolved and the ways in which EU law has hitherto been applied to this sector. Three significant elements of this case law relate to patent exhaustion, trademarks / trade dress, and pricing and distribution policies, as follows:

- In a 1981 case, *Merck & Co. Inc. v Stephar BV and Petrus Stephanus Exler* it was held that a patent holder could not sell its products through contracts that imposed conditions on subsequent use or re-sale (patent rights were held to be “exhausted” when the product was sold). This made it illegal for a patent holder to sell at low prices to a health service or insurer representing the interests of low-income patients on condition that the products are not re-sold (although limitations on use or re-sale are legal and quite common in other sectors).⁴⁷
- In a series of cases it has been held that pharmaceutical companies are not entitled to place obstacles in the way of parallel traders by preventing their products from being re-labelled and re-packaged.
- The policy of limiting supplies to what the local patients needed or of charging a lower price to customers who wished to provide medicines to patients than to others who might intend to re-export the products was opposed by the EC and ultimately rejected by the ECJ.⁴⁸

⁴⁵ We have noted that many ERP systems emphasise information from broadly similar countries.

⁴⁶ <http://www.efpia.eu/topics/industry-economy/pricing-of-medicines>.

⁴⁷ Examples include software licencing, and concessionary tickets for transport.

⁴⁸ *Bayer v Adalat*, *GSK v Syfiat* (two cases) and *GlaxoSmithKline Services and Others v Commission and Others* (2009).

Many of these decisions have been strongly opposed, and it is easy to see why. Both Articles 101 and 102 which define anticompetitive practices for the purposes of EU law make it clear that business practices that are beneficial for consumers should not be prevented; and the research-based pharmaceutical industry has already lost substantial resources as a result of parallel trade within the EU.

Our understanding is that in any case taken on appeal by the parties affected to the EU courts the legal challenges are in theory limited to requests for judicial review, not appeals “on the merits”, although in the cases brought concerning parallel trade the parties have been able to deploy arguments of substance.⁴⁹ For example, in the most recent case of *GlaxoSmithKline Services and Others v Commission and Others*, the argument included whether the EC’s wish to prevent dual pricing in Spain would reduce investment in future research and development. In cases in which the national courts refer questions to the ECJ, the Court often partially answers the case on the merits, perhaps due to the way in which the question was formulated. Thus in one way or another it seems that the ECJ would be able to consider the substantive merits of cases referred, as well as questions of legal interpretation and process.

However, as far as we are aware, in no case so far has it been explained to the Court that parallel trade leads to higher prices in low – income Member States and so reduces affordable access to healthcare for many EU citizens. Nor, as far as we know, have the Commission services themselves yet fully addressed this issue.⁵⁰ This means that if a case were brought in which this line of argument were deployed, either by the Commission or by a litigant, then the Court might well (and in our view should) reach a different conclusion than in the previous cases.

⁴⁹ Some observers would say that this distinction is in any case less clear cut in EU law than in English law.

⁵⁰ The final sentence in the report on the recent EC Pharmaceutical Sector Enquiry reads “Based on the objectives outlined in this Communication, the Commission will continue to pursue a constructive dialogue with all stakeholders to ensure that the innovative potential of the Community’s pharmaceutical industry can fully develop and that patients benefit from better access to safe and innovative medicines at affordable prices without undue delays.” (Paragraph 1612).

The tendency for ERP to lead to delays in access to medicines had been noted (paragraph 1600). However the focus of the Enquiry was on other issues.

5 Annex 1: Sources of Information

5.1 IMS Health Data

Price data in this report come from the IMS Health database. We use the price per standard unit of a drug — defined as “a single dose as one tablet or capsule, five milliliters of a liquid (i.e. one teaspoon), or one ampoule or vial of an injectable product”⁵¹ — as it is the most directly comparable measure across countries and pack types. Prices are at the ex-factory level and are taken from purchaser invoices. Our understanding is that pricing data presented by IMS do not take into account any discounts or rebates offered to purchasers. Quantity data are standard unit sales volumes, in order to be consistent with our selected price measure.

Drugs sampled are all in-patent. We used observations taken at the pack and molecule level in this analysis. Our primary analysis is based on observations for oncology drugs, but analysis was also performed on data for rheumatoid arthritis, hypertension, diabetes, and respiratory drugs. Oncology drugs were used as the base sample as the oncology data had the greatest number of cross-sectional observations and the longest time series.

5.2 Descriptions and assessments of ERP

Our primary source for a description of ERP systems is Leopold, Christine, Vogler, Sabine, Mantel-Teeuwisse, A. K., de Joncheere, Kees, Leufkens, H. G. M., and Laing, Richard (2012) “Differences in external price references in Europe – a descriptive overview”.^{52,53}

In 2010 ERP was being used in some form by 24 of the present EU Member States, exceptions being the UK, Sweden and Denmark, with Germany making only limited use of the approach, and it is possible that informal account is taken of prices in other countries even in these cases.

There may be a number of reasons for a country to use ERP in pricing and reimbursement decisions. Most treatments in the literature discuss ERP as a cost containment measure. Countries employ ERP, so the argument goes, to bring prices down.

There are, however, at least two other reasons why a country might opt for ERP in the pricing and reimbursement process. One is learning from other countries about the relative values of different medicines. When determining the pricing and reimbursement status of a new medicine, poorer countries are able to make use of pricing information in wealthier markets in which the medicine has already launched. Poorer countries often lack the resources to perform sophisticated pharmacoeconomic analyses

⁵¹ Timur, Aysegul (2006) *The Single Market and Pharmaceutical Industry in the European Union: Is There Any Evidence of Price Convergence?*, Unpublished Ph.D. Thesis.

⁵² Leopold, Christine, Vogler, Sabine, Mantel-Teeuwisse, A. K., de Joncheere, Kees, Leufkens, H. G. M., and Laing, Richard (2012) “Differences in external price references in Europe – a descriptive overview” *Health Policy*, Vol 104, p 50-60.

⁵³ A recent Swedish government review of P&R of medicines presented a proposal for a new value-based pricing (VBP) model, where ERP would be one component. In short, VBP would be the pricing model at launch, followed by ERP by year 5. The ERP after year 5 would be an average of a basket with the following countries (Norway, Denmark, Austria, Belgium, Finland, Netherlands). After 10 years, a more restrictive model for ERP with the average price of the 3 lowest in the basket.

The proposal has been through a consultation round, which resulted in many negative reactions from stakeholders also when it comes to ERP. The proposal will now be processed in the government office. If ERP is put forward the implementation will be as of 2014 at earliest.

to determine the fair value of a drug.⁵⁴ By using ERP, poorer countries are able to use information from wealthier markets – information wealthier markets acquired through investing resources in pharmaceutical and economic analysis on a medicine – to set their own prices.⁵⁵

Moreover, ERP is likely to be relatively simple to administer. As discussed in the previous paragraph, ERP allows referencing countries to make use of the pricing information in basket countries, saving resources that would have been used on pharmacoeconomic analysis. Many countries use mathematical formulae during the ERP process and specify how the ERP-determined price is used in the final pricing decision, making ERP a relatively transparent as well as inexpensive price regulation mechanism.⁵⁶

Three features help to define any ERP system: the medicines that fall under the purview of ERP; the basket of countries whose prices are referenced; and how the ERP practitioner uses those prices in determining local prices.

5.2.1 Medicines covered

Countries differ in the scope over which ERP is applied. According to Leopold et al. ERP covered at least six separate categories of medicines in 23 of the EU Member States practicing ERP in 2010. These are:

- All medicines – Four of the 23 countries applied ERP to all pharmaceuticals sold in the country.
- Reimbursable medicines – Nearly half (11) of the European countries practicing ERP in 2010 applied the reference system only to reimbursable drugs.
- Prescription-only medicines – Four of the countries in the sample subjected just prescription-only medicines to ERP.
- Imported medicines – Only Cyprus applied ERP to imported medicines.
- Innovative medicines – France and Spain applied ERP to “innovative” medicines only.⁵⁷

5.2.2 ERP basket composition

The second defining factor of an ERP system is the basket of countries referenced in price calculations.

European countries tend to include in their ERP basket foreign countries that are similar to themselves. The number of countries in the basket varies widely among Member States, from only one country (the country of origin) to 26 countries.

A group of “core” Western European countries were referenced most often. Germany (13 times), France (11) and the UK (11) were among the most referenced countries in EU ERP baskets in 2010. Spain was also referenced 13 times, making it the most referenced country along with Germany. This means two of

⁵⁴ Espin, Jaime, Rovira, Joan, and Olry de Labry, Antonino (2011) “Working paper I: external reference pricing”, *WHO/HAI Project on Medicine Prices and Availability*.

⁵⁵ This leads to an interesting if somewhat counter-intuitive result: as drugs begin to penetrate poorer markets, we would expect to see *poorer markets referencing wealthier markets*, and therefore using relatively higher prices in their ERP analysis. There could be a couple of explanations for this. One is that pharmaceutical pricing authorities are willing to allow slightly higher drug prices in exchange for lower information acquisition and analysis costs during the pricing and reimbursement process. Another is that, due to using ERP formulae such as the minimum price of a basket or a weighted average in favour of poorer markets, poorer markets are able to minimise any upward pressure on costs from referencing wealthier markets. Thus, poorer markets may be able to use the pricing information from wealthier markets with little impact on domestic prices.

⁵⁶ Carone, Giuseppe, Schwierz, Christoph, and Xavier, Ana (2012) “Cost-containment policies in public pharmaceutical spending in the EU” Economic Working Papers 461, DG ECFIN.

⁵⁷ It is not clear what “innovative” means in this context.

the top four most-referenced European countries –the UK and Germany - did not practice ERP in 2010, although Germany subsequently introduced it in a limited form.⁵⁸

Figure 5.1 presents the referencing matrix that emerges from European ERP systems as of 2010. The figure is adapted from Leopold et al. (2012). The columns show the countries to which reference is made by the country in each row; so, for example, Austria (AT) referred to prices in 24 Member States, the exceptions being Bulgaria (BG), Norway (NO) and Romania (RO). Or to take a second example, Romania (RO) referred to prices in Austria, Belgium, Bulgaria, the Czech Republic, Germany, Greece, Spain, Hungary, Lithuania, Poland and Slovakia, in this case using the lowest price in this basket. At the time to which this chart refers, the four countries not using ERP can be seen to be Germany, Denmark, Sweden and the UK.

Figure 5.1 ERP referencing matrix for Europe in 2010

	AT	BE	BG	CY	CZ	DE	DK	EE	EL	ES	FI	FR	HU	IE	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	SE	SL	SK	UK	Other Countries	references
AT																														24
BE																														24
BG																														9
CY																														4
CZ																														8
DE																														0
DK																														0
EE																														4
EL																														22
ES																														17
FI																														16
FR																														4
HU																														14
IE																														9
IT																														Unknown
LT																														6
LU																														1
LV																														2
MT																														12
NL																														4
NO																														9
PL																														17
PT																														4
RO																														12
SE																														0
SL																														3
SK																														26
UK																														0
# of times referenced	11	10	3	5	10	13	7	7	11	13	6	13	11	8	11	10	6	7	3	8	1	9	10	3	7	6	8	11		

Source: Leopold et al. 2012.

Another summary, by EFPIA, summarises methods used by referring countries.

Figure 5.2 External reference pricing matrix for Europe from EFPIA

	IPR used?	Formal/ Informal	Calculation used	Price referenced	Drugs	Frequency of re-referencing (months)	No. of reference countries
Austria	Y	F	AVERAGE	MNF	Reimbursed	-	25
Belgium	Y	I	AVERAGE	MNF	All	18	26
Bulgaria	Y	F	LOWEST	MNF	POM	6	15
Cyprus	Y	F	AVG. OF LOWEST 4	TRO	Imported medicines	24	4

⁵⁸ Germany began practicing ERP to a very limited extent in January 2011. We understand, however, that this German ERP is extremely rare and perhaps has not yet ever been applied.

	IPR used?	Formal/ Informal	Calculation used	Price referenced	Drugs	Frequency of re-referencing (months)	No. of reference countries
Czech Republic	Y	F	AVERAGE	MNF	All	12	8
Denmark	N	-	-	-	-	-	-
Estonia	Y	F	Not defined	MNF	Reimbursed	3	3
Finland	Y	I	AVERAGE	TRO	Reimbursed	60	26
France	Y	I/F	AVERAGE	MNF	Innovative medicines	60	4
Germany	Y	I	Not defined	MNF	Innovative medicines	-	15
Greece	Y	F	AVG. OF LOWEST 3	MNF	All	6	22
Hungary	Y	F	LOWEST	TRO	Reimbursed	-	26
Ireland	Y	F	AVERAGE	MNF	Innovative medicines	24	9
Italy	Y	I/F	AVERAGE	MNF	Reimbursed	24	25
Latvia	Y	F	THIRD LOWEST	MNF	Reimbursed	6	25
Lithuania	Y	F	AVERAGE	MNF	Reimbursed	12	8
Luxembourg	Y	I	AVERAGE	MNF	All	18	-
Malta	Y	F	AVERAGE	MNF	All	-	12
Netherlands	Y	F	AVERAGE	TRO	POM	12	4
Norway	Y	F	AVG. OF LOWEST 3	TRO	POM	12	9
Poland	Y	I	LOWEST	MNF	Reimbursed	-	26
Portugal	Y	F	AVERAGE	MNF	POM	12	4
Romania	Y	F	LOWEST	MNF	Reimbursed	12	12
Slovakia	Y	F	AVG. OF LOWEST 6	MNF	Reimbursed	6	25
Slovenia	Y	F	95% OF AVG OF 3	MNF	Reimbursed	24	3
Spain	Y	I	LOWEST	MNF	Innovative medicines	-	26
Sweden	N	-	-	-	-	-	-
UK	N	-	-	-	-	-	-

Source: IMS Health Pharmaquery Sept 2012.

5.2.3 Price calculations

The third main defining factor of an ERP system is how the price in the ERP-practicing country is determined using pricing information from countries in its reference basket. We have categorised this price calculation practices into three broad categories:

- Average – Seven of the 23 ERP-practicing countries take the simple average of the prices of the reference basket.
- Modified average – Seven countries use some sort of modified average as the pricing formula in their ERP calculations. Modifications include taking the average of the lowest three or five price countries in the ERP basket, using 95% of the simple average, or taking the weighted average according to a specified ranking.

- Minimum price – Five countries rely on the minimum price of the basket. The countries that use the minimum price in the basket are all Eastern European countries: Hungary; Latvia; Lithuania; Poland; and Romania.

The remaining countries did not specify how they used pricing information in ERP calculations. France and Estonia, for instance, do not disclose how they use basket price information in their price setting procedures.

5.2.4 Spill-over chain effects

An important feature of ERP systems is that prices in one country affect prices in others, which in turn influence third countries, so that price effects may ripple around the EU. For example, suppose that a particularly low price were agreed for sales into Bulgaria. This would then be adopted in Romania, as the lowest in its basket of comparator countries. Romanian prices are referred to by Greece and by Slovakia. Nine countries in addition to Romania refer to Greek prices, and these include Belgium and Austria. Norway and Ireland, two high income countries, refer to prices in Austria; another eight countries refer to Irish prices; and so the chain effects will continue.

To take a second example: Portugal is one of the Eurozone members facing particularly harsh economic conditions. Its prices are in the reference baskets of Greece, Spain, France and Italy; 13 other countries refer to prices in Spain, and 11 to those in Italy. The commercial consequences for a patent-holder of conceding a low price in Portugal, which is moreover not a large market, could be severe.

5.2.5 Other considerations regarding ERP systems

Although medicines covered, countries to which reference is made, and the formulae used in price calculations are, in our opinion, key defining features of an ERP system there are other factors one should also consider when assessing an ERP system. These include:

- How the ERP information is used – An ERP system might have a greater or lesser influence on domestic prices depending on how the ERP information is used. Some countries use ERP outputs as the main criterion in pricing decisions, while other countries the outputs to support other price regulation practices. One might expect ERP information to have a greater impact on price in countries that rely more on ERP information in the price-setting process.
- How often ERP is actually practiced – ERP may be rarely practiced in a country despite being a statute.
- Adjustments to limit spill-over effects – Some ERP systems contain measures that could limit any spillover of a country's local price into other pricing systems. Germany, for instance, envisages using a purchasing power adjustment to ensure that prices it gains from ERP are proportional to the buying power of German consumers. Norway uses a six month average of Norwegian kroner versus the currency of the reference country to control for exchange rate volatility that could affect relative prices.

5.2.6 Practical shortcomings of ERP

Though acquiring and, to a more limited extent, analysing information is less resource intensive under ERP as compared with other price regulation mechanisms, ERP still demands some analysis of prices and pharmacoeconomic findings of basket countries.^{59,60} This introduces complexities that are not found in pricing practices that do not reference foreign prices. For instance, there might be difficulties in identifying

⁵⁹ Espin, Jaime, Rovira, Joan, and Olry de Labry, Antonino (2011) "Working paper 1: external reference pricing", *WHO/IHA Project on Medicine Prices and Availability*.

⁶⁰ Carone, Giuseppe, Schwierz, Christoph, and Xavier, Ana (2012) "Cost-containment policies in public pharmaceutical spending in the EU" *Economic Working Papers 461*, DG ECFIN.

the correct pack to analyse, since the unique combination of dose, strength, pack size, and even brand name available in the basket countries may not be available in the referencing country. Furthermore, there are difficulties in knowing how prices function concretely in basket countries. The official list price of a medicine is not always the price that is paid by the purchaser. There may be unspoken or confidential agreements, such as discounts, that render the effective price lower than the list price. The division of surplus between manufacturers, distributors, pharmacists, and tax revenue may differ from country to country, further complicating information from price signals. Finally, importing prices from basket countries could also entail import reference countries' policy objectives. Policy objectives could be based on a number of factors, such as domestic political concerns or the health structure of the domestic population, that are of little concern to referencing countries. Indeed, it might even be that one basket country's pricing policy objectives are antithetical in some way to policy objectives in the referencing country.

Thus, although ERP does offer some benefits, these benefits often come at a cost.

5.3 Parallel trade

The parallel trade in pharmaceutical products in Europe has received considerable attention in academic and trade literature, greatly exceeding coverage of ERP.

Evidence on who captures the surplus generated by the price arbitrage in parallel trade is mixed. Some studies find that parallel importing has created savings for national health budgets and lower prices than would have been realised in the absence of parallel trade.^{61,62} Other research has found that the parallel traders themselves keep the bulk of the surplus, with relatively little benefit accruing to parallel importers, and this is the most likely outcome.^{63,64,65,66}

The benefits of any reduction in prices in wealthier (importing) Member States are necessarily less than the costs to the exporting countries since the costs and profits of the parallel traders need to be deducted. Moreover, it may be argued that a euro saved in a richer Member State has a lower social value than an additional euro cost in a low income Member State. Parallel trade increases the likelihood of entry by counterfeits and of packaging and leaflet errors, and leads to periodic shortages.

⁶¹ https://gupea.ub.gu.se/bitstream/2077/25497/1/gupea_2077_25497_1.pdf

⁶² <http://www.ifn.se/Vfiles/wp/WP622.pdf>

⁶³ <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2517281/pdf/hesr0043-1308.pdf>

⁶⁴ <http://www2.lse.ac.uk/LSEHealthAndSocialCare/pdf/eurohealth/VOL14N2/Kanavos%20and%20Kowal.pdf>

⁶⁵ Panos Kanavos and Sotiris Vondoros (2010) "Competition in the prescription drug markets: is parallel trade the answer?", *Managerial and Decision Economics*, Vol 31, No 5, p 325-338.

⁶⁶ Kanavos, Panos and Costa-Font, Joan (2005) "Pharmaceutical parallel trade in Europe: stakeholder and competition effects." *Economic Policy*, Vol 20, No 44 (October), p 751-798.

6 Annex 2: Additional Analysis

6.1 Break-point analysis

When a patent-holder is faced with the possibility of sales in a lower-income Member State at a price that would cover the marginal costs of manufacture and distribution, and make a contribution to recovery of the costs already sunk in research and development, it would presumably wish to make the sale. Other things being equal, its profitability would be improved by doing so. However, if the effects of the sale were to include a reduction in revenues in other parts of the EU, this might make the sale unprofitable.

To illustrate, with stylised figures:

Assume that in a low income Member State:

- Marginal cost of supplying additional package of medicine: €5.
- Price per package offered: €6.
- Units that could be sold: 1m per year.
- Potential surplus from sale in low income Member State: €1 per package, total €1m.

In high income Member State:

- Marginal cost of supplying additional package of medicine: €5.
- Price per package being received €100
- Units sold 10m per year.
- Surplus achieved €95 per package, total €950m.

Now assume that as a result of ERP the sale in low income Member State at €6 per pack reduces price received in the high income Member State by €10. The patent holder would lose €100m in that country, and gain only €1m in the low income country.

Or assume that the prospect of parallel trade from the low income Member State were to increase sales there by 5m packages, and the exports were then to reduce sales in the high income Member State by the same amount. The patent holder would now sell 6m packages and make €6m surplus in the low income Member State, but lose 5m sales in the high income Member State, reducing the surplus there by $(5m \times €95) = €475m$.

Clearly, it would be commercially impossible to agree to sell in the low income Member State at anything like a price of €6, even though that price would be profitable were it not for the effects of ERP and / or of parallel trade.

The numbers used in this illustration may be extreme, but the point made is decisive at realistic assumptions for prices and volumes. The patent-holder would find additional sales at low prices in low income Member States profitable only if revenues from sales in low income Member States are greater than the revenue foregone in high income Member States.