universität wien

DIPLOMARBEIT

Titel der Diplomarbeit

„Regulation in European Pharmaceutical Markets”

Verfasser

Johann-Friedrich Albert Graf von der Schulenburg

angestrebter akademischer Grad

Magister der Sozial- und Wirtschaftswissenschaften (Mag.rer.soc.oec.)

Wien, im Oktober 2008

Studienkennzahl lt. Studienblatt :	A 140
Studienrichtung lt. Studienblatt:	Diplomstudium Volkswirtschaft
Betreuer:	Prof. PhD Panos Kanavos (LSE)

Index of contents

I. Background of the thesis

In the last decade the economic growth of most European countries has lagged behind the escalating health care expenditure. Even economically leading countries like Germany and France have seen their health care outlays increase to more than ten percent of their GDP (Gross Domestic Product). Rising health care costs as a proportion of GDP, increasing drug expenditure as a proportion of health care outlays

Table 1: Health expenditure in % of the GDP in key OECD countries (1995-2006)

Health Expenditure in % of the GDP	**1995**	**2000**	**2006**
Austria	9,7	9,9	10,1
Denmark	8,1	8,3	9,5
France	9,9	9,6	11,1
Germany	10,1	10,3	10,6
Netherlands	8,3	8,0	9,3
Norway	7,9	8,4	8,7
Spain	7,4	7,2	8,4
Sweden	8,0	8,2	9,2
United Kingdom	6,9	7,2	8,4
United States	13,3	13,2	15,3

Source: Data from the OECD

have induced European health policy makers to regulate pharmaceutical markets. These regulations intend to decrease drug costs and regulate the access to medicines in the market. Therefore, the main focus of several countries has been to implement effective price regulations and reimbursement schemes to make drugs accessible to everyone and decrease financial differences within the country.

Hope for health care savings has always been seen in generic use. Generics are drugs which are chemically equivalent to originator brands. They are

allowed to enter the drug market after the patent of the branded pharmaceutical has expired. Usually their prices are much below the branded pharmaceuticals because no further development costs occur. Moreover, manufacturers try to undercut the originators´ prices to enter the market and gain market share.

Accordingly, one major focus of the implemented pricing and reimbursement regulations in Europe has been to increase generics´ market share and through competition, allow prices of generics and originators to decline in order to diminish the ongoing trend of growing health care expenses. However, evidence to that effect is uncertain and positive effects seem to be limited. The acceptance of generics by patients, prescribing by physicians and dispensation by pharmacies does not fulfil the desired expectations. Generics´ market shares are only slowly growing and producers of branded pharmaceuticals seem to be better off keeping their original prices than adjusting them to generic price levels.

To date, there is some evidence of impact of regulation on generic competition and the dimension to which generic drugs can deliver savings to health care systems. Therefore, analyses of regulations and their influence on pharmaceutical prices is interesting for policy makers when determining price changes, which regulations are effective and which should be displaced by other approaches.

This thesis intends to analyse the general impact of regulation and branded medicine prices on generic pharmaceutical prices in six pharmaceutical markets in Europe (UK, Germany, the Netherlands, France, Denmark, Sweden) post patent expiry. Using an empirical investigation on specific regulations and variables the thesis aims to address three specific questions. First, to what extent does regulation impact generic prices? Second, do the prices of originators have an influence on the prices of generics? If so, what direction does it take? And third, to what degree can competition be increased through generic penetration?

The structure of the thesis includes six main sections: chapter 2 provides an overview on the research that has been conducted on the general impact of generics and regulatory influence on pharmaceutical prices. Chapter 3 discusses national regulation in general, and summarizes pricing and reimbursement measures in six countries. Chapter 4 presents the conceptual framework and develops the empirical model and the methodology used based on a panel data approach. Chapter 5 presents the results of the empirical investigation, which are subsequently discussed and summarized in chapter 6. Finally, chapter 7 draws the main conclusions.

II. Literature Review

The market for pharmaceuticals is complex and the factors influencing prices of generics are manifold. The literature has mainly focused on the supply side aswell as on the demand-side factors of price. Main focus of the literature is to identify the factors which influence the price regarding changes of consumption and sales. The size of literature dealing with regulation influences on prices in general or the influence of competition and generic entry on the price of branded pharmaceuticals is striking. Nevertheless, literature about the impact of regulations on generics´ prices or generic price changes ex post patent expiry is rare.

The purpose of this section is to provide a short overview of the most important literature, to identify key papers and report about scientific results in the field described above.

II.1 Regulation and Generic Entry

Empirical evidence has shown that countries with low prices and much regulation tend to have fewer branded and generic launches than unregulated markets. In addition launch delays are much longer (Danzon, Wang and Wang, 2005). This discouragement of rapid product and generic entry has also been pointed out by Jean O. Lanjouw about poor countries (2005). In 2005 and to a greater extend in 2007 Margaret Kyle reflects on the behaviour of firms by showing that the entry of products and generics is less

likely to happen in low price economies and in countries with less regulation. Quite similar results were achieved by Patricia Danzon and Andrew Epstein in 2005 in their paper. They showed that firms launch earlier in high price EU countries and in countries with brand competitor prices. Firms tend to delay their launch in countries with generic competition. Danzon and Epstein find that firms launch strategically due to the direct influence of existing prices for the same drug in other countries (Danzon and Epstein, 2005). Recent empirical research has been done comparing major EU countries with the US and Canada. Findings suggest that most European countries, which tend to be more regulated than the US, show a comparably large presence of generic entrants (Kanavos, Costa-Font and Seeley, 2008).

II.2 Generic Entry and its Effects

It is still an open question if and how large generic entry actually change prices in the pharmaceutical market. Numerous studies with varying results have been published. However, empirical evidence suggests that through generic entry branded prices increase are accompanied by a decrease in the prices of generics (Frank and Salkever, 1992, 1997; Grabowski and Vernon, 1986). This phenomenon is known as the “generic paradox”.

The so called “generic paradox” suggests limited competition between the originator and generics. However, the number of generics might have an influence on the general price level via other substitution factors (Grabowski and Vernon 1994). This is the reason why the “generic paradox” results are still questioned. By including fixed effects to the model to control the unobservable factors that might have impact on prices Wiggins and Maness tried to show that incumbent’s prices do not increase (1995, 2004). In 1991 it was shown empirically that on average, generic competition reduces incumbent brand’s price by approximately 2%. This is a minimal effect, considering that generic sellers quoted prices 40% to 70% lower than branded pharmaceutical sellers´ prices (Wiggins and Maness, 1995, 2004).

The number of branded substitutes still has a negative effect on the launch prices of new products. This is often seen as an indicator of competition

pressure (Lu and Comanor, 1998). This competition is also existent among generic substitutes as shown by Ellison in 1997. Ellison found substantially cross-price elasticity among generic substitutes which also explains the decline in prices of generics (Ellison, Cockburn, Griliches and Hausman, 1997).

Wiggins and Maness showed in 2004 that generic prices decrease over years, which suggests generic competition and a great homogeneity among generic products in addition to a product differentiation towards branded pharmaceuticals (Wiggins and Maness, 1995). The market share of generics for certain products usually becomes quite large in short periods in most countries. Research has found that only after one year of entry, generic pharmaceuticals won a 44% share of POMs dispensed in the US market (Grabowski and Vernon, 1986, 1992).

Some recent empirical evidence suggests that for a small number of pharmaceuticals there are also competitive effects between the branded pharmaceuticals and generics in the presence of reimbursement regulation (Kanavos and Srivastava, 2008). Nevertheless, these are exceptions and in general the “generic paradox” seems to rely.

II.3 Regulation Effect on Generic Paradox and Prices

Price competition between generic competitors appears more often in less regulated markets and it seems that regulated pharmaceutical markets disable generic competition. However, generic entry and its impact differ due to regulations and the degree of pharmaceutical policies in the selected country (Danzon and Chao, 2000).

Recent research which included the UK, Germany, the Netherlands and France has shown that for the UK and France the “generic paradox” (no decline of originator prices after generic entry) relies. However, originator’s prices declined in Germany and the Netherlands (Vandoros and Kanavos, 2008). An explanation might be that Germany and the Netherlands have implied reference pricing systems combined with several demand side

policies. Nevertheless, results concerning regulatory influences on the "generic paradox" remain unclear. Empirical ambiguity was recently presented in a study analysing originator's prices after generic entry in six major EU countries. By considering all countries together results suggest originators´ prices to increase after generic entry. Surprisingly in a second procedure considering each country separately the results were approximately the same for the UK and Sweden but unclear for the remaining (more regulated) countries (Vandoros and Kanavos, 2008).

While regulatory influence on the "generic paradox" seems to remain uncertain, empirical evidence has given some political recommendations to decrease generic prices. The 2008 study by Kanavos, Costa-Font and Seeley has suggested that reference pricing, a part of reimbursement policy, does decrease generic prices but only marginally. Brekke, Grasdal and Holmas (2006) and in the same year the economists Dalen, Strom and Haabeth (2006) analysed a change in Norway in 1993 from a price cap system to a reference based pricing system as well as its influence on pharmaceutical prices. The data showed that the reform reduced brand-name and generic prices within the reference groups and enlarged generics´ market share. Although it needs to be considered that these results do not imply that the decline would have been smaller if there had been no market intervention at all (Kanavos 2008). Still Reference Pricing has influenced health care expenditure in several countries. I.e., in 2001 a study on Germany by Busse found that the savings accumulated by implementing reference pricing were the equal to nine percent of drug expenditure (Busse, 2001).

Supply-side regulations can only be efficient if appropriate demand-side implications have been installed (Mrazek, 2002). E.g., in 2002, Pavcnik demonstrated that not only consumers but also firms do react to potential out-of-pocket payments by patients. If co-payments are increased, firms respond with a decrease in prices (Pavcnik, 2002). Hence, demand-side regulations on patients, pharmacies and physicians seem to be necessary to decrease pharmaceuticals prices and increase generic market shares.

Basically demand-side regulations and incentives can aim patients´ consumption, physicians´ prescription behaviour or pharmacies dispensing (Kanavos, 2008) which may be implemented on a non-monetory or monetary basis (Chaix-Conturier, Durand-Zaleski, Jolly and Durieux, 2000). Empirical evidence has shown that regulations that encourage or oblige pharmacists to substitute branded pharmaceuticals do increase the market share of the substitutes significantly (Andersson, Petzold, Allebeck and Carlston, 2008). Other suggested demand-side regulations such as regressive pharmaceutical retail margins and policies focussing on physicians´ prescription behaviour like drug budgets show do increase generics´ market share (Walley, Mrazek and Mossialos 2004). Although Schulenburg and Schöffski research suggested quite similar results in 1997 they also found in a natural experiment that the number of hospitals admissions and referrals increased significantly after Germany's introduction of pharmaceutical budgets in 1994.

III. Regulation in the Pharmaceutical Market

III.1 The Context

Access, efficiency, safety and supply of pharmaceuticals play a major role in all European countries. Governments and civilians put a huge financial effort in the pharmaceutical market every year. However, actual funding of the health expenditure can be very different and can be raised by several groups within most countries. Private health insurances, statutory health insurances, out-of pocket payments, employers, taxes or other private organizations can possibly be in charge of financing parts of the expenditures. The distribution among funding parties varies in Europe. The countries´ expenditure partitions vary from countries with very low private participation (e.g., 10% in the Netherlands and 12.6% in the UK) to countries with high private funding shares (e.g., the new EU member states like Latvia and Cyprus with approximately 50%)[1].

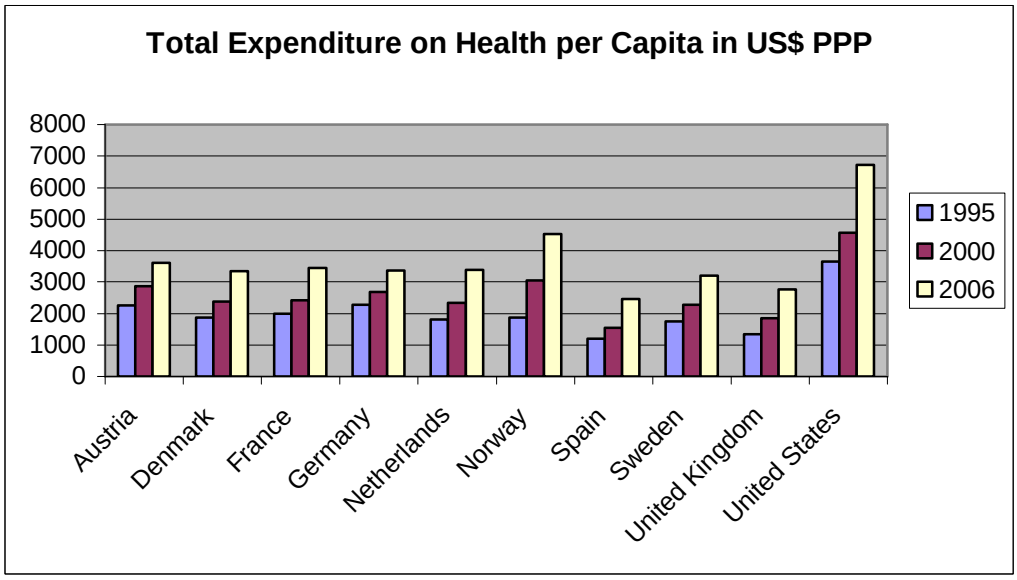
[1] Source: PPRI Report 2007

Not only the structure but also the total outlay of health care systems vary significantly among the EU states. However, one issue all EU countries have to face is that the total health expenditure (THE) in proportion to the GDP (THE/GDP) has been climbing up in all EU countries in the last decade. The average THE/GDP in the European Union was 7.81% in 1995[2]. This average has gone up to 8.87% in 2006[3]. Still the variances are huge and there are striking differences between the new EU countries, Scandinavian countries and other EU states. Some countries like Denmark, the Netherlands, Sweden, Spain and Norway for example still had an average THE/GDP of approximately 8% in 1995. This has reached a mean of 9% in 2006. Compared to the new European member states this increase of approximately 1% is quite moderate. Some old EU member states like Germany and France already had quite a high expenditure rate (THE/GDP) in 1995, but still increased it till 2006. Especially France had one of the highest rates in Europe with 11.1% in 2006.

However, health care outlays in proportion of the GDP have grown between 1995 and 2006 in most OECD countries (Table 1). This trend was not only based on a rising population within the countries. Moreover, statistics show that even the total expenditure on health per capita has been rising tremendously[4].

[2] Average calculated from the OECD data 2008 for 11 available countries
[3] Average calculated from the OECD data 2008 for 11 available countries
[4] Source OECD Data 2008

Table 2: Total Expenditure on Health per Capita in US$ PPP in key OECD countries (1995-2006)



Source: OECD Data 2008

Another relevant expenditure statistic gives the drug expenditure in proportion total health expenditure. Drug outlays in Europe differ. The olds fifteen EU member states have had (with an approximate average of 16.1% in 2005) relatively speaking lower drug expenditure than the new EU states (25.5%)[5]. However, nearly all countries can track an ongoing process of increase throughout the last decade[6].

[5] Source: PPRI Report 2007
[6] Source OECD Data 2008

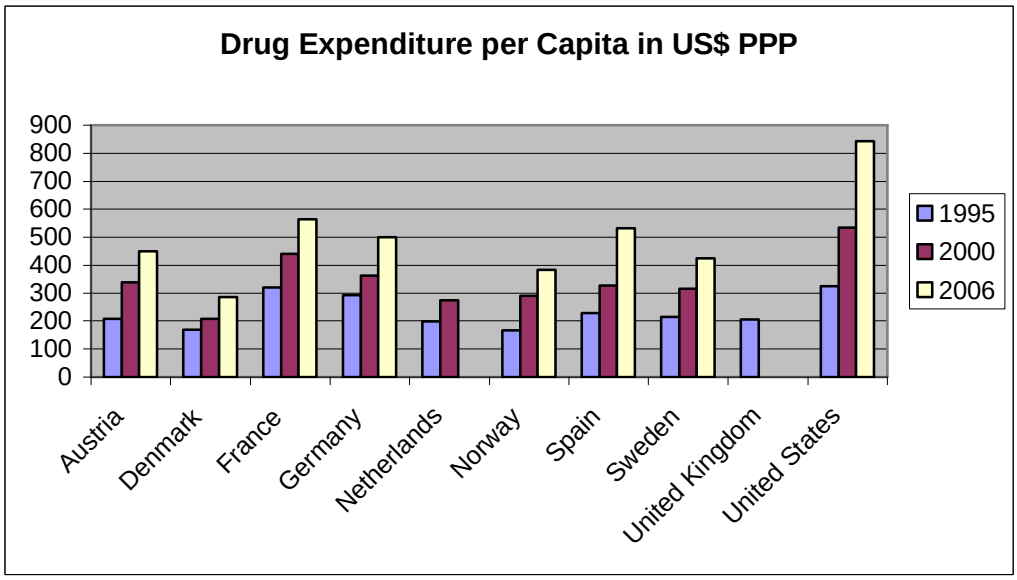
Table 3: Drug Expenditure in % of the total THE in key OECD countries (1995-2006)

Drug Expenditure in % of the THE	**1995**	**2000**	**2006**
Austria	9,2	11,9	12,4
Denmark	9,1	8,8	8,5
France	16,0	18,2	16,4
Germany	12,9	13,6	14,8
Netherlands	11,0	11,7	
Norway	9,0	9,5	8,5
Spain	19,2	21,3	21,7
Sweden	12,3	13,8	13,3
United Kingdom	15,3		
United States	8,9	11,7	12,6

Source: OECD Data 2008

Intuitively, either prices of drugs, their consumption or both have increased. Some exceptions are given by France, Norway, Denmark and Sweden. However, drug expenditure per capita has grown in nearly all key EU countries.

Table 4: Drug Expenditure per Capita in US$ PPP



Source: OECD Data 2008

Therefore, it can be concluded that in the countries with a decreasing drug expenditure in proportion of the THE (Sweden, Norway, Denmark and France) have just shown a slower increase in drug outlays than in total health care expenditure.

The drug expenditure per capita in US$ PPP has increased in most countries, even though the steps are of different heights. The USA for example has shown nearly a doubling in expenditure between 2000 and 2006. The European states have made smaller jumps, but also presented acknowledgeable inflations of drug expenditures per capita.

Statistics, however, on health care expenditure shows why most European states are impelled to regulate the market with pricing and reimbursement schemes, seeking for more competition among therapeutically similar products, for reductions in prices and immoderate consumption and savings from opportunities like generic entry.

III.2 The Pharmaceutical Market

There is no doubt that the health care sector is not only one of the largest markets in most economies but also one of the most regulated ones. First of all these regulations do not only show a huge variety across European health

care systems but also diverse effects and approaches on prices in the markets. First this chapter focuses on explaining the uniqueness of the pharmaceutical market and its stakeholders and consequent reasons for regulations. Secondly it gives an overview on all kinds of pricing and reimbursement regulations including an overview table. Thirdly the chapter presents information based on WHO data about the health care expenses trend of the last decade. Finally an extensive review of the health care systems and its regulations in the selected countries (Germany, UK, the Netherlands, France, Sweden and Denmark) is provided.

The dispensation and payment for pharmaceuticals follow a simple, mainly similar structure in most developed countries. Nearly all markets have several stakeholders who play specific roles in the flow of money and pharmaceuticals. On the one hand there are manufacturers, wholesalers and pharmacies that dispense and on the other hand act third-party payers, physicians and patients who finance, prescribe or consume. However, unique about the drug market is that the flow of money passes other stakeholders than the drug flow due to the existence of third-party payers.

Drugs go through several stations before reaching the final consumer. After being licensed by the government and produced by the manufacturers drugs are sold to wholesalers. These dispense the drugs to requiring pharmacies throughout a country. Finally pharmacies sell the products to consumers who got a prescription for a certain drug from different physicians who select a medicine on their behalf.

The money flow is also linear but a bit more complex than the distribution of drugs. Money flows through several stations before reaching the initial manufacturer. Insured individuals pay a certain amount to third-party payers (e.g., insurances) either through taxes or through contribution which might indirectly be controlled by the government. When a patient buys a product it can be financed in two ways. It can be financed through the third-party payers and corresponding co-payment through the patient. The second possibility is that it is a non-reimbursed pharmaceutical and patients need to

pay the whole amount to pharmacies. After the pharmacy station the money moves to wholesalers and finally to the producer. Every station usually gains a certain margin from reselling the drug.

The economic literature is almost stuffed with discussions dealing with the question of necessity of regulation in general and where deregulation may lead. The main arguments for regulation are the existence of natural monopoly (decreasing average and marginal cost curve), external effects, inelastic demand and asymmetric information (moral hazard and adverse selection). In a lot of non-economic literature the argument of inequalities of income and wealth is also used to defend price regulations and reimbursement schemes.

In most countries prices and reimbursement within the pharmaceutical markets are regulated by authorities. From an economic point of view these regulations can not be defended with the usual monopoly argument like it is done in many sectors such as electricity or telecommunication. However, the drug market does also have monopolies but their existence is not natural. They are only monopolies because governments approve patents to give monetary incentives to invest in research and development.

The main reason for governmental price regulation in the pharmaceutical market is asymmetric information in the market and the will to limit the total health expenses. Governments have an interest in this limitation because often states finance social insurance systems in which pharmaceutical expenses are reimbursed to make drugs accessible to everyone. These systems face the problem of asymmetric information and corresponding moral hazard situations. Health insurers and patients have an inelastic demand curve, do not know what the right treatment is and whether a medicine is appropriate or not. Insured civilians do not need to pay for drug costs and therefore tend to consume unnecessarily expensive drugs. The same rule holds for pharmacies and physicians who tend to over prescribe or offer too expensive drugs. Therefore it is nearly impossible for health insurances to control the expenses without any regulation. Hence a

governmental price regulation is a treatment to decrease Moral-Hazard problems in the pharmaceutical market.

The degree of regulation, monopoly situations within the market (e.g., Sweden and its pharmacies), co-payment for consumers and corresponding reimbursement rates depend on the social history of the country and its cultural roots. Due to the mentioned reasons governments try to achieve through regulations certain goals, namely adjust distribution, reach an optimal allocation of resources and stabilize the spending for health insurance. In a more detailed view specific regulations are directed to achieve equal access to medical care, to control prices and volume of medical services consumed, to provide monetary and non-monetary incentives to patients and suppliers to limit their use of scarce resources and to ration services which are consumed on the expense of public sources[7].

III.3 Regulation in Pharmaceutical Markets

Within the health care sector, the pharmaceutical market is one of the most heavily regulated sectors in most industrialised countries[8]. To structure the tools of regulation on the market for pharmaceuticals it is usually distinguished between suppliers and demanders.

In pharmaceutical markets, the supply side consists of drug manufacturers and wholesalers. The demand side can be split in three parts, namely physicians, pharmacists and patients. Although, there are interactions between the demand and supply side there is still a strict separation between the two. This is partly only chosen for didactic purpose. For instance, one could argue that pharmacists should be part of the supply side, however we will define it as part of the demand side, as pharmacists act – like prescribing physicians as agents of the patient[9]. In most developed countries this demand side does usually not pay for pharmaceuticals itself. It is partially, or completely, financed by a “third party payer” like a public or private insurance

[7] Espin and Rovira 2007, p. 7-11
[8] Rovira, Espin: Presentation in Brussels: Study on Pharmaceutical Policy Practices, 30th of January 2007
[9] Espin and Rovira 2007, p. 27, 28

or a tax financed National Health Service. Obviously this influences (increases) the demand of the demand side and leads to a new market equilibrium in the market[10]. The following graph gives an overview on possible regulations:

Table 5 and Table 6: Overview on regulations on the supply- and demand-side

Overview on Regulations on the Supply-side

A. Supply Side

1. Price Control

Based on: Clinical performance
Economic performance
Cost of existing treatments
Cost-plus calculations
International prices
Controlled price update

2. Free Pricing

3. Control of Expenditure
Discounts
Rebates
Pay-back
Price-volume agreements
Use of prize-freezes and cuts

4. Industrial Regulation
Profit Control/rate-of-return
Tax benefits

5. Reimbursement
Reference Pricing
Negative list

Overview on Regulations on the Demand-side

A. Demand side

1. Physicians

Clinical practice
Prescription guidelines
Education
Information
Monitoring/Audit
Prescription quotas
Pharmaceutical budgeting
Overall budgets

2. Patients

Cost sharing
Information
Education
OTC spending

3. Pharmacies

Generic substitution
Monetary incentives
Clawbacks
Margins
Discounts

National governments and their authorities often implement several controls, incentives and measurements to influence and control supply of and demand for pharmaceuticals. In the following it will be presented what kind of regulations exist and how these influence supply and demand.

[10] Espin and Rovira 2007, p. 27, 28

III.4 Regulation of Supply

There are four groups of regulations or methods that can influence the supply side[11]:

The first way to regulate the market is by **Price Controls**. What price control actually does is that it limits the price at which a pharmaceutical may be sold. In some cases, for instance in a country with a high reimbursement rate, price controls are the only way to limit expenditure for health insurances (see section on why to regulate the pharmaceutical market). The actual amounts that have to be paid by patients, pharmacies and sickness funds are usually set on the basis of the interplay of reimbursement, co-payment and the price itself.

However, the initial price is ordinarily either implemented as a maximum price for a limit or as a fixed price as the only possible price for the product. Regulations can differ. The initial price might for example depend on clinical performance, economic evaluation like cost-effectiveness analysis, costs of already existing similar treatments, the basis of calculation (e.g., average, lowest price), costs plus a certain profit margin or on international and national prices of the same product[12].

Price control is not necessarily implemented in all systems. Medicines can also follow **Free Pricing** systems in which prices may be freely chosen by the manufacturer, wholesalers or even pharmacies[13].

A second more indirect group of measurements to control suppliers' prices and actions is through **Expenditure Control Methods**. These controls are often being used because price controls tend to be unable to control pharmaceutical expenditures due to rising utilization[14].

[11] Description and Explanations based on an author compilation from: PPRI Reports (2006, 2007, 2008), Espin and Rovira (2007), Kanavos, Font and Mcguire (2007)
[12] Espin and Rovira 2007, p. 29
[13] PPRI Report 2007, p. 59
[14] Espin and Rovira 2007, p. 29

Two typical methods are rebates and discounts. Discounts can either be negotiated or mandatory reductions are imposed so that certain institutional demanders get in the drug's final price[15]. Rebates include any returns of the sales made by a manufacturer to an institutional payer[16].

A second policy is a price-volume agreement in which through negotiation between the industry and authorities a maximum sales-volume is fixed. This volume is determined through and based on forecast sales. If the producer exceeds this sales barrier it is penalized and forced to decrease its price or pay back a certain amount.

Expenditure can also be controlled through payback methods. These are mechanisms that force producers to return certain amounts of their revenue to the purchaser if the revenue is higher than "ex ante" determined. Paybacks are often used as thread methods for price-volume agreements.

The last possible direct interference with the expenditure are price cuts and price freezing methods. Either fixed or percentage based price decreases are applied to all pharmaceutical products or a certain latitude is imposed so that just specific products or particular medical sectors are confronted with price reductions.

The third block of regulation that influences the supply side is the **Industrial Regulation**. This is a more indirect way to influence pricing in particular markets. Instead of directly interfering in pricing strategies of companies, regulations are set to mark a profit limit. So profits are manipulated and consequently indirectly prices reduced.

Other possibilities to implement industrial regulations are tax benefits. In this case it might be possible to give tax benefits for investments in R&D or in manufacturing capacity[17].

[15] Espin and Rovira 2007, p. 29
[16] Espin and Rovira 2007, p. 29
[17] Espin and Rovira 2007, p. 30

The fourth regulation sector that influences suppliers is described by **Product Reimbursement**. The amount that third-party payers pay for a drug differs and follows the principle of selective financing. This means that not all products are reimbursed with the same rate. Consequently the reimbursement level influences manufacturers in their price decisions. However, patients can also be affected by co-payment which might occur if reimbursement rates are lower than 100%. This way Product Reimbursement can also influence the demand side. Some countries use different kinds of evaluation methods to support their decision on reimbursement of products. This influences the suppliers, knowing that they might set a low price, to guarantee e.g., cost-effective pharmaceutical product. Normally authorities manage their reimbursement record with either a positive or a negative list. A positive list includes all the products which are being reimbursed and a negative list just mentions the products that are excluded from reimbursement.

One often used subgroup of reimbursement regulations are reference pricing systems. These define a reimbursement rate or level for all products within a specific group or cluster of drugs. In the case that manufacturers decrease their prices to the level of reference prices 100% of the expenses are being paid by third-part payers. Otherwise it follows the same structure as usual reimbursement under 100% and co-payment occurs. That is also the reason why reference pricing is often referred to as cost-sharing.

III.5 Regulation of Demand

If prescriptions for pharmaceutical therapies by doctors are cost-effective treatments is an open question. This question is even more complicated in the long run. Lower health care expenditures today can lead to higher costs in the long run. As the physician as well as the patient and the third party payer are influencing the demand for pharmaceuticals it is important to find a balanced mix of incentives to physicians as well to patients to achieve a cost-effective drug treatment of the population to decrease the current trend in rising drug expenditure.

That is why regulation of the demand sector is important to provide safety to patients, possible home care and incentives to achieve cost-effective medical care. The demand side consists of three units, namely physicians, patients and pharmacists. These can be guided and regulated through different monetary incentives, regulations, schooling and information exchange methods[18].

Physicians usually prescribe medicines on behalf of the patients' health. All regulative mechanisms for physicians can be reinforced by financial or non-financial incentives. Physicians can be partly controlled and guided in their prescription decision. Here guidelines can itemize what prescriptions are allowed to be prescribed, which once are reimbursable and how long prescriptions are valid for certain diseases. The intention is to stimulate cost-conscientiousness, promote a more rational use of medicines, minimize risk and costs and maximize effectiveness.

The right choice and the minimization of risk for patients can be supported and upgraded by educational barriers (classification for physicians) and information methods. Some countries for example implemented computerized decision support and online prescribing advises for physicians. Another installation that controls and keeps track with prescriptions is to monitor prescribing patterns.

Regulation of physicians can also be achieved by establishing prescription quotas and pharmaceutical budgets. The quotas can for example force physicians to prescribe a certain percentage of generics. This could increase effectiveness, decrease costs and facilitate entry of generics in the market. Pharmaceutical budgets motivate physicians to be cost-conscious when it comes to selecting between alternative treatments.

Pharmacies usually purchase pharmaceuticals from wholesalers and afterwards sell POMs to patients with a particular prescription.

[18] Description and Explanations based on an author compilation from: PPRI Reports (2006, 2007, 2008), Espin and Rovira (2007), Kanavos, Font and Mcguire (2007)

Pharmacies are regulated through three main fields. Generic substitution, which has been one of the main issues in the last decade is a law that regulates the connection of generics to prescriptions when it comes to distributing pharmaceuticals. Authorities might either encourage or oblige physicians to distribute generics instead of originators when a patient requires a certain product. Thus policy makers try to increase generics´ market shares, cost-effectiveness and improve entry possibilities for substitutes.

Healthcare authorities also implement monetary incentives for pharmacists with traditional pharmacy mark-up or fixed pharmacy margin systems. To maximize their profit, pharmacists intend to ask for the highest possible price, substitute for the most costly drug in a drug group or try to sell the largest packages with the lowest effort to achieve high quality services. Regulatory measures are taken to provide financial incentives. This is done by mark-up regulations, substitution guidelines and a specific regulatory framework for pharmacies.

Potentially countries can implement claw-backs. They can have different variations. Pharmacies can for example give discounts to public or private insurances by decreasing reimbursement rates. Another option is that claw-backs refer to discounts on pharmacy purchase costs for pharmaceuticals[19].

The last station of the drug flow and eventually most important part of the demand side are the **patients**. Due to high reimbursement levels in most EU countries, their cost-consciousness is often minimal which leads to needless expenses. Ergo governments try to implement regulations to encourage patients for cost-aware behaviour. Patients can be influenced in their decisions through fixed fees, cost sharing and insurance participation. These variables can increase or decrease the demand of patients.

[19] Espin and Rovira 2007, p. 31

Cost-sharing, which is the most common way of affecting patients, is used in many countries. There are many variations in implementing it. Cost sharing might, for example, be set by a fixed co-payment for drugs (per item, per packet etc.) or a fixed fee that has to be given to pharmacists for consultation hours or prescriptions. These payments may also be variable percentage of the prescribed drug's price.

Another possibility of affecting patients´ behaviour lies in informational and educational campaigns. This might increase their awareness of co-payment, roomers about generics and responsibility for economic use of pharmaceuticals.

Table 7: Overview on supply-side regulations in six EU countries, 2007

Country	Price control	Reimbursement	Control of Expenditure	Industrial Regulation
United Kingdom	Branded pharmaceuticals are regulated by PPRS (rate-of-return) Some generics have to follow the Maximum Price Scheme (2000- 2005)	Negative list Guidance on cost-effectiveness by NICE For reimbursement generics prices need to adapt to Drug Tariff NICE has published new "single technology appraisal" in 2007	Payback schemes are installed Price cuts in 1993, 1999 and 2005 Companies with sales above € 1 million had to reduce prices by 7% (2004)	PPRS: Agreement with industry on profit control PPRS is set every five years (last 2005) Members of the PPRS: return on capital target of 21% (2005) Currently arguments on substituting PPRS with a more efficient system
Germany	Price freedom for new products since 1989 Sickness funds negotiate discounts for products with manufacturers (since April 2007)	Reference price for off-patent sector Two negative lists Therapeutic reference pricing Cost-effectiveness analysis and maximum reimbursement prices (not implemented yet)	1993, 1994, between 2002 and 2004 and between 2005 and March 2008 manufacturer were obliged to hand over price increases to the SHI as a rebate Discount on generics of 10% for sickness funds (2006)	
Netherlands	Free pricing for OTC products Price control since 1996 for POMs Maximum wholesale price list redetermined twice a year Average pricing with external reference: Germany, Belgium, United Kingdom and France Generic prices have to be 40% lower than branded drugs (2004)	Since 1991 Reference Price System has been in use with therapeutic reference pricing Positive list Promotion of dispensing parallel imports Cost-effectiveness analysis in use Preference Policy (2008)	Price freeze and cuts: Off-patent product's prices decline 10% (2008) Branded and generics prices decline 50% if patent expired in 2008 (2008)	
Sweden	Since 2002 Pricing and Reimbursement have been combined Free pricing subject to a basket of countries Use of CEA (reimbursement issue)	Cost-effectiveness analysis for reimbursement issues Consumer based reimbursement rates Positive lists for POMs Reimbursement rate is 100% if patient's pharmaceutical expenses per annum are above € 463	Price-Volume agreement for innovative products	

Country	Price control	Reimbursement	Control of Expenditure	Industrial Regulation
France	Ex-factory prices are fixed through negotiations Negotiations between CESP and industry Agreements hold for four years (latest agreement in 2007) Internal reference pricing Periodic price reduction for new and expensive products	Comite Economique du medicament decides on reimbursable prices "Comite" decides on advice from Transparency Committee Positive list Generics need to be half the price of the original product for a positive reimbursement decision without delay (2006) Medical references Reference Price System since 2003 with only 153 generic groups	Negotiations include price-volume agreement Payback clause if the agreed-upon sales target is exceeded Contract is renewed every four years	
Denmark	No price regulation Price agreements between the industry and the Ministry of Health Pharmacy mark-up fixed Last agreement in January 2007 (valid for two years) Wholesale margins are negotiated between producer and pharmacies	Positive list 2000-2005 RPS through average external reference pricing Reimbursement rate based on consumption per annum since 2005 Reference Pricing for "analogous" Non compulsory cost-effectiveness analysis (since 2005)		

Source: Author compilation from: PPRI Reports (2006, 2007, 2008), Espin and Rovira (2007), Kanavos, Font and Mcguire (2007)

Table 8: Overview on demand-side regulations in six EU countries, 2007

Country	Physicians	Patients	Pharmacies
United Kingdom	Department of Health publishes prescribing targets and guidelines Voluntary generic prescribing NHS published recommendation lists NICE advices on cost-effectiveness Computerized monitoring and decision support Quality and Outcomes Framework rewards physicians with good performance Pharmaceutical budget in place	Standard prescription fee of GBP 6.65 per item Information about pharmaceuticals is given through the NHS	No generic substitution allowed Vertical mergers or partnerships are allowed Agreement on margins and targets Remuneration through service fees, allowances and margin won from the price difference of products and the reimbursement rate Claw-back in place as a deduction of reimbursement (average deduction rate is about 10%)
Germany	Negotiated targets on cost control and appropriate prescription through guidelines (since 2002) If overprescribe is more than 25% and justification is rejected, physicians need to pay back Monitoring, information and education schemes are installed in Germany	Co-payment varies with the price of the reimbursed product. Fixed fees and percentage payments are possible (since 2003) VAT raised from 16% to 19% (2007)	Mark-up scheme is regulated Fixed fee and linear mark-up for POMs and regressive Mark-up for OTC products Remuneration of € 8.10 per package and a fixed mark-up of 3% on the wholesaler price for any prescribed drug (since 2004) Voluntary generic substitution (since 2002)
Netherlands	Encouraged to prescribe therapeutically and cost effective pharmaceuticals Preference Policy influences physicians (since 2008) Electronic prescription system Capitation fee per year Insurance funds give financial incentives Physicians should inform patients about the value of generics	Residents need to take out a health insurance (since 2006) Educated and informed through institutions and insurances Co-payment is just in the case if the reference price is lower than the product's price	Except in certain cases generic substitution is obligatory (since 2004) Generic substitution was voluntary (2002-2004) Financial incentives to dispense cheaper substitutes Claw-back refers to pharmacy drug purchase costs (1998) 6.82% discount and € 6.80 per dispensed prescription (2002) Between December 2007 and July 2008 claw-back rate was 11.3%
Sweden	Monitoring of prescribing and medicines Pharmaceutical budgets implemented Guidelines available through a code for non-binding information and help - Physicians encouraged to prescribe generics	Authorities try to inform patients about prices, reimbursement and recommended dosage, contraindications, side effects etc. through homepages Co-payment is the difference from the reimbursement rate and depends on the yearly consumption of the patient	Government has a monopoly on dispensing pharmaceuticals (until January 2009) Generic substitution is mandatory (since 2002) Margin consists of a flat rate per prescription and on a fee which depends on the price of the pack

Country	Physicians	Patients	Pharmacies
France	No prescription budgets and no prescription quotas Since 2007 physicians are able to follow their prescription profile on web sites No financial incentives for cost-aware prescribing High Authority of Health has been publishing guidelines since 2004 – 15% generic prescribing Encouraged to prescribe generics	Co-payment percentage wise Co-payment includes € 0.53 for each pharmaceutical (also reimbursed at that rate) Maximum out-of-pocket payment (OPP) is € 50 per year € 1 flat fee for consultations	Different fixed margins for different pharmaceutical prices Financial incentive to dispense the cheapest product Optional generic substitution (since 1999)
Denmark	Guidance with recommendations, info and advices non-binding Computerized monitoring named ORDIPRAX and accessible for physicians Generic prescribing not allowed	Information available through the Danish Medicines Agency (DKMA) Internet platform available Out-of-pocket payment fixed and percentage based Flat dispensing fee of € 1.34 Percentage co-payment: Difference of the rate of reimbursement and 100%	Mark-up scheme is linear (since April 2007) Voluntary generic substitution (1991-1997) Obligatory generic substitution (since 1997) No claw-backs

Source: Author compilation from: PPRI Reports (2006, 2007, 2008), Espin and Rovira (2007), Kanavos, Font and Mcguire (2007)

III.6 Regulation in the United Kingdom

The United Kingdom is known for its complex and unique system of pricing and reimbursement among the European Union states. Its reputation is based on the regulations focussing more on the demand side than on the supply side incentives and on measures the special way of indirect price control[20].

III.6.1 Supply Side

The United Kingdom has a unique way of pricing pharmaceutical products. The decisions on pricing and reimbursement are not separate and combined to a simple process. Once the National Health Service (NHS) list price of a particular branded pharmaceutical has been set, it is consequently reimbursed at the same price[21]. All prescription prices are regulated indirectly, the branded pharmaceuticals by the Pharmaceutical Price Regulation Scheme (PPRS) and generics by the Drug Tariff (DT).

III.6.1.1 PPRS and Branded Pharmaceuticals

Licensed, branded prescription medicines in the UK follow a relative pricing freedom for medicines when launched. But prices are indirectly controlled through industrial regulations. This implements that company profits gained by sales to the NHS are regulated. This is done by the Pharmaceutical Price Regulation Scheme (PPRS) on the basis of a negotiated target for the rate of return on capital[22]. This voluntary scheme is negotiated every five years between the Department of Health and the pharmaceutical industry[23].

PPRS´ goal is to provide safe and effective medicines to the NHS at reasonable prices, encourage the efficient and competitive supply of pharmaceuticals to the pharmaceutical market and to promote a strong and profitable pharmaceutical industry so that research and development leads to more new treatments in the future[24].

---

[20] Chapter based on an author compilation from: PPRI Reports (2006, 2007, 2008), Department of Health (2005, 2006), Espin and Rovira (2007), OFT (2007), Kanavos, Font and Mcguire (2007)
[21] Espin and Rovira 2007, p. 50
[22] Kanavos, Font and Mcguire 2007, p. 458
[23] Kanavos, Font and Mcguire 2007, p. 458
[24] Department of Health (2005), Summary of the PPRS 2005, p. 1,

The Pharmaceutical Price Regulation Scheme includes two main components. First it sets profit controls that apply to all the branded products which are sold by a manufacturer to the NHS and secondly it provides price controls that allow companies freedom to set an initial price for new substances[25]. If companies choose not to sign the scheme, profit controls and statutory prices are installed. This threat was set by the Health Act in 1999[26]. Obviously a lot of information is necessary to employ those measures. Hence a permanent update of pricing and capital data and information exchange between companies and authorities is obligatory.

In negotiations industry and the Department of Health agree on profit targets of the scheme (PPRS). Unique in Europe is that this system applies for individual companies rather than specific products. If a company exceeds the agreed profit target, it has either to reduce its price for the product or make a repayment to the Department of Health. Hence the UK had price cuts in 1993, 1999 and 2005 on all branded products[27]. In succession to the 1999 scheme a new PPRS was commenced[28] and companies with sales of branded pharmaceuticals to the NHS above £1 million in 2004 were required to reduce prices by 7%[29]. In 2005 negotiations included that "all scheme members will have a common Return on Capital target of 21%"[30]. The scheme also includes regulations on promotion costs, research and development expenses and a margin of tolerance on either site of the profit (rate of return) target.

III.6.1.2 Drug Tariff and Generics

Because of increasing prices of generics, the Department of Health reacted by introducing commissioning the Oxford Economic Research Associates

[25] http://www.oft.gov.uk/advice_and_resources/resource_base/market-studies/completed/price-regulation
[26] PPRI Report United Kingdom 2007, p. 43
[27] PPRI Report United Kingdom 2007, p. 35
[28] PPRS Report United Kingdom 2007, p. 27
[29] Department of Health (2005), Summary of the PPRS 2005, p. 2
[30] Department of Health (2005), Summary of the PPRS 2005, p. 2

(OXERA) to analyse long-term possibilities to regulate prices and supply of generics and by implementing a Maximum Price Scheme in August 2000[31].

In April 2005 the Department replaced the Maximum Price Scheme and introduced a long-term arrangement for reimbursement of generics. The DH introduced two voluntary scheme, namely M for manufacturers and W for wholesalers. To qualify for reimbursement generics producers have to adapt to either agreements of negotiations or calculations by the Department of Health. The reimbursement prices are summarized and published in the Drug Tariff (DT) every month[32]. The DT subdivides the generics in three categories, namely M, A and C[33]. M medicines´ reimbursement prices are set quarterly based on manufacturers´ prices after deduction. It covers 84% by net ingredient cost of generics reimbursed in the NHS[34]. The prices of category A are based on list prices of a basket of two main full-line wholesalers and three manufacturers. The category C is not instantly available and their reimbursement prices are orientated on a manufacturer or a special brand[35].

III.6.1.3 National Institute for Health and Clinical Excellence

In 1999 the United Kingdom implemented the National Institute for Health and Clinical Excellence (NICE)[36]. The institute produces independent professional guidance on public health, health technology and clinical practice. This guidance explains whether a pharmaceutical should be included in the NHS or not and gives recommendations about the pharmaceuticals. These recommendations are usually reviewed after five years.

NICE does not decide alone which medicines should be guided. The Institute undertakes appraisals as formally requested by the Department of Health (DH) or individual manufacturers that can suggest pharmaceuticals to be

[31] Kullman, p. 3, available at
[32] PPRS Report United Kingdom 2007, p. 27
[33] Espin and Rovira 2007, p. 50
[34] Espin and Rovira 2007, p. 50
[35] Espin and Rovira 2007, p. 50
[36] Until 2005 it was named National Institute for Clinical Science

guided if they are not in the list of the NHS. NICE reviews each suggestion received and filters it with the "selection criteria" form, which latest version was developed in June 2006 by the Department of Health. The prioritizing assessment in the UK to choose topics is therefore based on the following criteria[37]:

- Burden of disease
- Resource impact, i.e. the costs for the NHS and the public sector
- Policy importance
- Inappropriate variation in use across the country
- Factors which affect the urgency for guidance to be produced

Once the topics are accepted the pharmaceuticals and treatments are guided by NICE. Among the guidelines health technology is especially important for the NHS because the technology appraisal by NICE are recommendations on the use of old and new medicines within the NHS. The recommendations are based on clinical and economic evidence. Clinical evidence measures how well medicines or treatments change the health status of patients. Economic evidence evaluates how effective the medicine is in relation to how much it costs the NHS. In assessment of clinical and cost effectiveness NICE evaluates health economic analyses and produces Quality Adjusted Life Year data. On this data recommendations are based. The PPRI report from 2007 summarizes that NICE has indicated that the threshold cost per QALY is in between twenty and thirty thousand pounds[38]. However, other factors might also be taken into account[39].

Because of criticism about delays in the process of appraisals and choosing topics NICE has introduced a new "single technology appraisal", a rapid

[37] Department of Health (2006), Selection criteria for referral of topics by NICE 2006, p. 1-3, available on http://www.nice.org.uk/niceMedia/pdf/DH_selection_criteria_July_06.pdf
[38] PPRI Report 2007, p. 104
[39] PPRI Report 2007, p. 104

process for assessing drugs, in 2007. The institution should produce guidance more rapidly on life-saving pharmaceuticals and treatments that have already been licensed and other new medicines that have just become available.

III.6.1.4 Reforming the PPRS: The Office of Fair Trade report (OFT)

Discussions concerning replacement for the PPRS have been around since a report by the Office of Fair Trading (OFT) has been published in February 2007. In this report, "The Pharmaceutical Price and Regulation Scheme", the OFT argues that the current price and profit control done by the PPRS should be replaced with a value-based approach to pricing. The reason for this recommendation is the missing connection between "clinical and therapeutic value to patients" [40] within the PPRS. Even though there are cost measurements by NICE in the UK at the moment; critics blame it to be unfair for patients because its decisions are inevitable based on the limited resources of the NHS and do not focus on the patients demand[41].

The OFT believes that new reforms would increase patients´ benefits and create incentives for companies to research and develop in innovative areas.

The first reform suggested by the OFT would be an ex post value-based pricing[42]. Pricing freedom for new substances would retain, but profit controls and price regulations would be replaced by ex post cost effectiveness reviews. These reviews would set a maximum price according to the clinical benefits relative to competitors[43]. This is different from the time where the NHS had set reimbursement prices and negotiates with the industries about the prices and the profits of manufacturers in one step.

The second option for a reform suggested by the OFT would be an ex ante value-based pricing[44]. In this case price and profit controls would also be

[40] OFT 2007, p. 1
[41] OFT 2007, p. 7
[42] OFT 2007, p. 5
[43] OFT 2007, p. 5
[44] OFT 2007, p. 5

replaced in the same way. Added to the mentioned ex-post review would be an ex ante approach to set an appropriate maximum price and a decision over reimbursement. That way a separation of price and reimbursement decision like in most European countries should be implemented. To decline the chance of extended negotiation processes a facility to assess cost-effectiveness further down the line should allow an early rapid look at the situation.

The OFT believes that these two ideas for a new system would increase cost effectiveness, set better incentives for companies to invest in pharmaceuticals that are useful for society and treatment and build a base of a more stable and sustainable system[45].

III.6.1.5 Negative List and Reference Price System

For reimbursement purposes the United Kingdom carries a negative list[46]. For branded pharmaceuticals under the PPRS reimbursement rates is set by the price of the manufacturer plus the wholesale mark-up. So there are no restrictions in place for what can be reimbursed and what not. But there are restrictions for what can be prescribed and only these products are fully reimbursed. This is regulated through economic analyses by an independent institution named NICE since 1999. Almost all OTC products and pharmaceuticals prescribed by a private physician are not reimbursed. A typical reference price system is not in place in the UK[47].

III.6.2 Demand Side

The UK is known for regulations focusing more on the demand side than the supply side. Here physicians, pharmacies and patients are encouraged and partly obliged to be cost-aware and efficient.

III.6.2.1 Physicians

The Department of Health has spent millions to support reasonable use of pharmaceuticals and indications for rational prescriptions. Therefore the DH

[45] OFT 2007, p. 1-8
[46] For an explanation see the introduction to this chapter.
[47] PPRI Report United Kingdom 2007, p. 53, 54

publishes targets to guide and to offer incentives to local NHS activity on General Practioners (GP). As an example: In England pharmacists are only encouraged by recommendations and guidelines, but not obliged, to hand out prescriptions for generics instead of branded pharmaceuticals "for both clinical and cost reasons, when appropriate"[48].

The local NHS publishes local formularies or lists of recommended drugs which they consider useful to meet clinical needs of their resident populations. Here cost-effectiveness is also considered. Physicians are not obliged to follow these formularies, but they could be asked to justify prescriptions outside the list. In addition the NHS has now more than 1,200 advisers, who are mainly pharmacists, that publish reviews and undertake private reviews with General Practitioners[49].

Physicians can also get information and should be familiar with the guidance by the independent institution NICE whose assessments include clinical and cost effectiveness[50]. NICE runs diverse economic analyzing methods on which the institution bases its recommendations of use and prescription to physicians and to the NHS[51].

The NHS collects and collates a large amount of prescribing data. This is made available to physicians and advisers through computerized systems. Part of this system is a computerized decision support system named "Electronic Prescribing and Financial Information for Practices" (ePFIP) which helps physicians to find appropriate generics and products for treatment[52]. The prescription patterns and the expenditure profiles of physicians are monitored by NICE. Still there are no concrete sanctions on over-spending in place.

Financial incentives are not given by the recommendations and electronic systems but by the Quality and Outcomes Framework (QOF). This is a

[48] PPRI Report United Kingdom 2007, p. 10
[49] Espin and Rovira 2007, p. 129
[50] Also look at the chapter about UK, supply side
[51] Espin and Rovira 2007, p. 129
[52] Espin and Rovira 2007, p. 129

contract that resources General Practitioners for their quality of patient care and not for the number of patients medicated. Payments are annually. Some of the local NHS groups also run prescribing incentive schemes to reward cost-awareness and clinically appropriate prescribing.

Another financial factor, which influences prescriptions, is pharmaceutical budgeting. The local NHS, or the Primary Care Trusts, determines every year an overall budget. Prescribing advisers help the Primary Care Trusts to set budgetary constraints for local areas.

III.6.2.3 Patients

Patients face a fixed fee arrangement in the UK. They have to spend a standard fee of GBP 6.65 per item prescribed. For some patients there might be exemptions. They depend on the method of delivery, medication types, age and financial situation of the patient and on his health status. Percentage related co-payment agreements are not in place in England.

III.6.2.4 Pharmacies

Prescription-only-medicines (POMs) are usually dispensed from a registered pharmacy. Pharmacists are not aloud to substitute prescribed branded pharmaceuticals through generics. They need to dispense the brand if that is what has been written on the prescription by the pharmacist.

There are approximately 11,500 community pharmacy outlets in Great Britain. There are some restrictions on ownership of community pharmacies. A pharmacy has to be registered and owned by a pharmacist or a partnership of two or more pharmacists. A pharmacist partnership can own an unlimited number of pharmacies which leads to an interesting allocation of community pharmacy owners. It consists of large and medium sized chains. Vertical partnerships or mergers are allowed in the UK. This implies that wholesalers and drug manufacturers can also own pharmacies. Due to their ownership these manufacturers are able to absorb all potential discounts that usually are given to pharmacies.

There is no minimum distance between pharmacies or other legal controls over the location of pharmacies. But still pharmacies that wish to provide state funded NHS pharmaceutical services must apply and follow a “control of entry” law.

Remuneration is provided by the contractual framework for community pharmacies[53]. This framework includes service fee remuneration and a remuneration target depending on the patient and the region. The actual rates are a result of negotiations with the Pharmaceutical Services Negotiating Committee and authorities. The pharmacies are paid via fees and allowances, payments for specific services and the margin won on the difference between reimbursement prices and the initial price that was actually paid for the pharmaceutical. Hence margins of the pharmacies are monitored through invoices. If these deviate from the target, which was set in the contractual framework, reimbursement prices for generic medicines are adjusted correspondingly[54].

Claw-backs are not explicitly part of the UK health system. Pharmacies can have an amount deducted from their reimbursement if they exceed agreed targets. This deduction varies depending on the size of the pharmacy. The average deduction rate is around ten percent.

III.7 Regulation in Germany

The German reimbursement, pricing and system for pharmaceuticals is not only one of the oldest ones in Europe but it is also one of the most complicated and comprehensive ones. Funny enough it tries to combine the freedom of pricing for pharmaceutical manufactures with a whole set of indirect and direct price control measures. In recent years and especially after the latest mayor health care reform, which became effective on the first of April 2007 it also uses the competition and the negotiating power of sickness funds to regulate prices[55].

[53] PPRI Report United Kingdom 2007, p. 33-34
[54] PPRI Report United Kingdom 2007, p. 35
[55] Chapter based on an author compilation from: PPRI Reports (2006, 2007, 2008), Espin and Rovira (2007), Kanavos, Font and Mcguire (2007), OECD price study 2004, P. Crawford, M. Feely, A. Guberman, G. Kramer, 2006

III.7.1 Supply side

Generally speaking the price policy of pharmaceutical manufactures is not confronted with many regulations. However German health policy employs a large number of indirect price control mechanisms, some are more directed to the supply side, e.g., co-payments and deductibles, negative lists and drug budgets for office based physicians, others are directed to supply side as the famous reference pricing scheme, and the recently introduced maximum reimbursement prices and negotiated reimbursement prices as well as fixed mark ups for pharmacies and regulated discounts to sickness funds.

III.7.1.1 Pricing Freedom and Reimbursement

The actual pricing and reimbursement system in Germany was established in 1989. After a product has been licensed by the German Food and Drug Administration (Bundesamt für Arzneimittel und Medizinprodukte BfArM) the pharmaceutical manufacturer can launch the product at any price it wants to. It will also be reimbursed by the statutory sickness funds. Patients only have to cover out-of pocket payments reported in the table below (see B 2.2.). However the Federal Joint Committee (Gemeinsamer Budnesausschuss GBA) will audit the cost and benefit profile of the drug. If the drug is considered as a treatment for trifling diseases or as a life style drug – like Viagra – it will be set by the GBA on a negative list. By this it is excluded from reimbursement.

For all other drugs the GBA will explore the question if the new drug can be included in a reference price group.

Some products among the licensed pharmaceuticals are excluded from normal reimbursement shown in Figure B1 and are covered by a reference pricing system. Here the pricing freedom for branded pharmaceuticals is indirectly narrowed through reference pricing as soon as the branded product goes off-patent[56]. Up to the end of 2003 only pharmaceuticals where the patent protection had expired, were covered by the reference pricing

[56] Kanavos, Font and Mcguire 2007, p. 457

scheme. Since 2004 patent drugs can also be put into reference price groups which may contain generics as well as patent drugs (mixed groups are called jumbo groups) and have to contain at least three drugs. Basically the GBA, which is the most important body in the German health care system and which contains delegates of the sickness funds, physicians, hospitals and patients, clusters the medicines in pharmaceutical groups which either have the same active ingredient (generics), or are based on therapeutically and pharmacologically comparable active ingredients or are considered as therapeutically and pharmacologically comparable pharmaceuticals with different active ingredients[57]. The GBA calculates the prices for a daily dose for the drugs in a reference price group following a quite complicated and little transparent procedure[58]:

- Generics: Reference price of a standard pack must not exceed the highest price in the lowest third of the reference group

- Pharmacologically or therapeutically comparable ingredient

- Pharmaceuticals with a similar impact or treatment but different active ingredients

Unlike Germany, in most European countries clustering is restricted to generic medicines only. This way of therapeutic and not just generic clustering was unique in Europe when it was implemented by the Health Care Reform Act in 1989. Germany's reference pricing system has no schedule of external price reference even this procedure is used in many European countries. The only procedure to monitor prices and to refer in Germany is an internal reference procedure. It needs to be said that Germany's reference of prices is not for price mechanisms or price controls. It is just to evaluate the reference price rate for reimbursement.

[57] PPRI Report 2006, p. 90
[58] For detailed explanation of the reference price calculations in Germany: See paper: Schumacher, Greiner 2008 (in German)

Advocates of reference pricing schemes argue that it allows insurance companies and patients to choose between therapeutically similar products without any concern on the cost or price[59].

Products that are not part of the three groups, can stick to free-pricing until their patent expires. Before the patent of a product expires no price control holds for all pharmaceuticals. Hospitals negotiate their prices directly with the manufacturer, so in that case their pricing is not controlled[60].

Since April 2007 the GBA can also give the order to the independent Institute for Quality and Efficiency in Medical Care (Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen, IQWiG) to conduct a cost-benefit evaluation for drugs. The results of these evaluations are taken to set maximum reimbursement prices for pharmaceuticals. It is the obligation of the Federal Association of Sickness Funds (Spitzenverband Bund Krankenkassen, SpiBu) to set those prices. Because the SpiBu is a newly founded organization which stated working in July 2008 and the IQWiG is still in the process of defining the methodological guidelines for economic evaluations, no maximum reimbursement prices have been set yet. In addition, since April 2007 sickness funds may negotiate discounts for drugs with pharmaceutical manufacturers. If a discount contract is in place, pharmacies have to provide the medicine with a discount, if it is a close substitute to a pharmaceutical prescribed by a physician. There is little public information on the discount contracts being in place at the moment. However, most of the sickness funds have used this option to put price pressure on the manufacturers.

Since April 2003 sickness funds have been receiving from the pharmacies for prescribed pharmaceuticals a discount of € 2.30 per products. For all other medications they have been receiving 5% of the prices. In addition the sickness funds receive a discount of 6% of the prices.

[59] OECD price study 2004, p. 5
[60] PPRI Report 2006, p. 106

Because of the rising health expenditure competition between sickness funds was introduced in the 1990s. There are numerous temporary regulatory measures taken to influence pharmaceutical prices. For example in 2006 it implemented an obligatory discount for generics of 10% for sickness funds to keep the prices unchanged[61]. This increased the market share of generics tremendously. Also in 1993, 1994, between 2002 and 2004 and between 2005 and March 2008 manufacturers were obliged to hand out the amount of price increases of medicines compared to the old price to Social Health Insurance (SHI) as a rebate.

III.7.2 Demand side

The demand side is more regulated and especially physicians need to deal with many regulations.

III.7.2.1 Physicians

Germany does not have strong but compulsory prescription guidelines. There are non-binding and binding guidelines. The non-binding guidelines refer more to prescribing drugs and less to restrictions about specific drugs[62]. However, efficiency checks for physicians are in use. These controls are based on the number of prescriptions and the value of sickness funds´ reclaims of individual physicians.

In Germany there are many prescription guidelines by various organizations. However none of them are binding for physicians. Sickness funds can demand for an efficiency audit. In this case physicians have to explain, why they have explained certain pharmaceuticals. As sickness funds are mostly interested in cost-containment they only ask for an audit, if physicians prescribe significantly more than the so called Guideline Value (Richtgröße). The Guideline Value is a physician type specific value in € per treated patient which is negotiated between the sickness funds and the insurance doctors associations on a state level.

[61] PPRI Report 2006. p. 64
[62] PPRI Report Germany 2007, p. 51

Even though there are some incentives to prescribe generics like pharmaceutical budgeting for doctors who are under contract with the sickness funds, the restrictions are too general to consider these as binding prescription guidelines for generic prescribing or as compulsory prescription quotas [63] . Pharmaceutical budgets of varying strictness with regional spending caps were used in Germany till 2002. Since 2002 it is regulated through negotiation based on targets of cost-control and appropriate prescriptions. The negotiations take place between self-governmental partners. If physicians tend to over-prescribe by being 15% above the recommended target they are first informed by a letter and to reconsider their decisions. If they exceed the target by 25% they need to justify their behaviour. If this justification is rejected physicians are obliged to payback the difference of their sales and the 115% of the target to sickness funds. Since 2007 for highly priced pharmaceuticals a cap on average prescription costs was introduced. That way targets for areas are calculated. If a physician exceeds the revenue target by more then 10% he is forced to reimburse the deficit.

III.7.2.2 Patients

At the moment the reimbursement of the sickness funds employs various co-payments. Products that cost less than € 100 follow the prices and the corresponding co-payment rates shown in Figure C.1. For drugs with prices higher € 100 the patient has to pay a flat rate of € 10:

Price of drug	Co-payment rate	Reimbursement rate
€ 0 - € 5	100 %	0 %
€ 5 - € 50	Flat rate € 5	0 % – 90 %
€ 50 - € 100	10 %	90 %
above € 100	Flat rate € 10	over 90 %

Financially weak sickness fund members and people under 18 years are excluded from co-payment. If a patient can prove that the overall co-payments for health care (including co-payment in other areas then drug use, e.g., hospital stays) per year exceed 1% of their gross income the get full

[63] PPRI Report UK 2007, p. 53

coverage over that cap of 1%. This system was introduces in 2003. Before 2003 co-payments were set according to the package size.

In Germany pharmaceuticals are not exempt from standard rate value added tax (VAT). VAT is quite high in Germany compared to most other European countries. The standard and the pharmaceutical VAT rate was raised from 16% to 19% in 2007 for all prescription subscribers.

III.7.2.3 Pharmacies

German marks up schemes change for different pharmaceuticals[64]. The two different pharmaceuticals are in this case the prescription-only-medicines (POMs) and the over-the-counter products (OTCs). Although regulated margins for wholesales or just for singular pharmacies refer to each other, the law distinguishes between the two with different mark up schemes for the wholesale and pharmacy mark up. In the case of wholesalers the POM have a regressive mark-up scheme and in the case of pharmacy mark up, pharmacies are forced to follow a fixed fee and linear mark-up. The over-the counter products follow in both cases a regressive mark up scheme.

Until 2004 pharmacies received a regressive mark up on the manufacturer price. The percentage varied from 12% to 21 % depending on the price of the drug. Pharmacies´ remuneration was changed in 2004. Since then they are paid with a flat-fee of € 8.10 per package and a fixed mark-up of 3% on the wholesaler price for any prescribed drug[65]. For calculations the VAT of 19 % is excluded. This is supposed to be paid by the customer being the sickness funds in most cases.

Since February 2002 it is allowed and recommended for pharmacists to substitute branded pharmaceuticals with generics, unless it is explicitly prohibited by the doctors[66]. This law was part of the Law for Reduction of Drug Related Costs in Healthcare[67].

[64] PPRI Report 2006, p. 72
[65] PPRI Report Germany 2007, p. 33
[66] P. Crawford, M. Feely, A. Guberman, G. Kramer, 2006
[67] P. Crawford, M. Feely, A. Guberman, G. Kramer, 2006

Dispensing physicians are not allowed in Germany. Pharmacies have basically a monopoly on drugs[68]. However, internet pharmacies have already taken over a 4 % of the pharmaceutical market in Germany. Even the same regulations hold for these as for other pharmacies international competition within Europe increases competition and import ratios of pharmaceuticals by patients.

III.8 Regulation in the Netherlands

The Dutch government has tried to ration supply and demand in the last thirty years[69]. But due to the complex structure of this sector it has not been able to effectively allot supply. That is why many instruments have been implemented aiming at a control of prices of pharmaceuticals. In addition they intend with quite strict demand side regulations to stimulate physicians, pharmacists and patients for cost-consciousness and efficiency[70].

III.8.1 Supply side

The supply side faces one of the oldest and fairly strict external referencing pricing and reimbursement systems in Europe.

III.8.1.1 Price Regulation

Except for OTC products´ prices, which are not regulated, the Netherlands controls prices directly and uses price caps and methods to adjust prices to international standards. These methods focus on reducing health care system costs. The pricing system was introduced in 1996. POMs, generics and branded, that are purchased by pharmacies are all subject to the Medicine Price Act. This act lists all the maximum wholesale prices of prescription-only medicines. The list prices are redetermined twice a year. The maximum level is calculated through therapeutic reference pricing as the average price of all pharmaceuticals that are either generics (same active substance), pharmaceuticals with the same strength or have a similar

[68] PPRI Report Germany 2006, p. 22
[69] Chapter based on an author compilation from: PPRI Reports (2006, 2007, 2008), Espin and Rovira (2007), Kanavos, Font and Mcguire (2007), OECD price study 2004, P. Crawford, M. Feely, A. Guberman, G. Kramer, (2006), Wolf, Brouwer and Rutten (2005), OPG Group (2008)
[70] Wolf, Brouwer and Rutten 2005, p. 13

pharmaceutical dosage form in the countries Germany, Belgium, United Kingdom and France[71]. Since 2000 the determined average European price gives equal weight to all comparable medicines. Since 2004 generic prices have to be at least 40% lower than the price of the original product[72].

In 2004 and 2005 authorities tried to react with price cuts and freezes to increase generic´s share in the pharmaceutical market. A convent in 2004 decided to decrease the wholesale prices of generics by an average of 40%. A convent in 2005 decided that the prices of branded pharmaceuticals for which generics are available should decrease by an average of 40%.

In September 2007 Ministry of Health, Welfare and Sport, insurer, industry and pharmacists have agreed on the so called “Transition Agreement”. It includes that the industry’s prices of off-patent branded pharmaceuticals and generics will decline by 10% on average in 2008. All the pharmaceuticals whose patent expires in 2008 and their generics will have a price cut by 50% compared to the ex ante branded pharmaceutical.

III.8.1.2 Reimbursement and Reference Pricing

Since 1991 the Netherlands have been using reference pricing for reimbursement, but the current reimbursement system stems from a reform in 1989. Reimbursable pharmaceuticals are categorised into three groups, as follows.

The first category forms therapeutically equivalent pharmaceuticals. For these reimbursement is according to a reference price system. Reference reimbursement prices are set by the Ministry of Health, Welfare and Sport for all pharmaceuticals. Reimbursable pharmaceuticals are listed on a positive list. As in Germany the regulations and clustering does not only include generics but also in-patent pharmaceuticals. The system clusters groups with “mostly similar indications, routes of administration, targeted age groups and for which no clinically relevant difference in outcomes apply”[73]. The reference

[71] External Price Referencing
[72] PPRI Report 2006, p. 65
[73] Espin and Rovira 2007, p. 91

price is valued using the cost of the DDD (defined daily dose) for each pharmaceutical in the group. The reimbursement level is determined from each group's weighted average prices. Pharmaceuticals that are priced higher than the reference price are only partly reimbursed. Reference Pricing applies to all products. Excluded are only the pharmaceuticals which cannot be grouped into the clusters mentioned[74].

All the products that were introduced after 1999 had and have the opportunity to get a premium price if the producer can show cost-effective medications and added therapeutic value. If they do they are part of a second category. Their reimbursement does not depend on reference pricing. It adapts to the retail price so there are no reimbursement limits. As soon as there is also a second product with the same therapeutically effect, the price of the first product is the reimbursement limit of the whole cluster in which these two and any following therapeutically similar product is placed in.

The last category includes pharmaceuticals that are reimbursed under specific circumstances.

Since 2008, healthcare insurers have been working with a joint and individual preference policy. With this new policy insurers can reimburse the cheapest off-patent pharmaceutical if an off-patent pharmaceutical was prescribed. All medication labels within a range at 5% above the price of the cheapest label is then designated as the preferred product. Any product that is outside this range is not reimbursable[75].

III.8.2 Demand side

The Netherlands have implemented many regulations since 2002 to regulate the demand side and tried to achieve cost-effective handling of the pharmaceutical market through the demand side. The latest regulation is the implemented "preference policy" which intends to enhance efficient prescribing behavior.

[74] Espin and Rovira 2007, p. 91
[75] Press Release OPG May 2008, p. 3

III.8.2.1 Physicians

Physicians are encouraged in many ways to prescribe therapeutically and cost effective pharmaceuticals like generics. Regularly prescription guidelines, experience reports and treatment protocols are published by authorities for GPs. Still there are no objectives for prescription of medicines by individual physicians. Some insurance funds offer financial incentives to physicians for prescribing generics and especially efficient prescription of statins and Proton Pump Inhibitors (PPIs). Physicians are indirectly also influenced by the "preference policy" from 2008, which enables insurances to reimburse the lowest-priced generic when any generic or an off-patent branded pharmaceutical has been prescribed. One electronic prescription system was also tested in experiments but the results showed that even there was a 70% high usage of the system the cost saving effects for the health care system were minimal[76].

Regional pharmacotherapeutic platforms have been installed to support and advise physicians and pharmacists about efficient prescribing practices[77].

Physicians get a poll tax fee per year from publicly insured patients even without any consultation. If patients are privately insured physicians or GPs usually charge a yearly fixed tariff for consultation in which all expenses for prescriptions are included. If it comes to more prescriptions, without any consultation, the tariff decreases to 50%.

III.8.2.2 Patients

Patients are informed and educated through institutions and insurances. These try to make the patients cost-conscious. The Dutch Health Care Insurance Board has launched a website with information on retail prices, co-payment and availability of generics or other cheaper alternatives.

In general there is no co-payment regulation in the Netherlands. However, if the price of the medication exceeds the reference price, the product is just

[76] Wolf, Brouwer and Rutten 2005, p. 13
[77] Espin and Rovira 2007, p. 126

reimbursed to a certain degree. The patients need to pay the rest of the price[78].

Since 2006 all residents of the Netherlands have to sign into a health insurance. Still they can choose among insurances. The insurances are all obliged to offer a standard package. This package includes most necessary treatments from a visit to the physician to a hospital admission as well as prescription fees[79].

III.8.2.3 Pharmacies

If a prescription is not listed by an international non-proprietary name (İNN), a pharmacy has the opportunity to substitute more expensive prescribed pharmaceuticals with cheaper generics. If the physician does not mention the active ingredient but instead the brand name of the branded pharmaceutical then the pharmacy is obliged to dispense exactly as it is written on the prescription.

Pharmacists have a financial incentive to dispense generics. If a pharmacist sells a product and the price is underneath the list price of the branded product, the pharmacy can keep one-third of the price difference. Remuneration of pharmacies follows a yearly fixed tariff for each prescription.

In 1998 the Netherlands introduced a claw-back rule. The rule obliged pharmacies to transform parts of their sales benefits into a price benefit granted to the patients and to the insurances. The discount granted started with 2% in 1998 and then rose to 3% for insurers in 1999. In the period around 2000 and the end 2002 a new claw-back rule was introduced still holds nowadays. The claw-back was increased to 6.82% up to a maximum of € 6.80 per dispensed prescription. The percentage rate of 6.82% was raised temporarily to 11.3% from December 2007 until July 2008[80].

[78] Espin and Rovira 2007, p. 98
[79] Ministry of Health, Welfare and Sport: Health Reform in the Netherlands: a model for Hungary?, Speech 30th of January 2007
[80] Press Release OPG May 2008, p. 2

III.9 Sweden

The Swedish health care system has gone through two major reforms in 2002 and 2006 and has had a time period of five years in which reference pricing was implemented. Nowadays it is a system advantaging the status of generics in the market and patients with high pharmaceutical expenses[81].

III.9.1 Supply Side

The supply side regulations in Sweden have gone through several reforms in the last decades. Especially the merge of the reimbursement and pricing decisions in 2002 and through the switch to a consumption based reimbursement system Sweden has made the step to improve the situation for older and health care treatment dependent civilians. This way Sweden achieved a compared to other countries moderate increase of the pharmaceutical expense.

III.9.1.1 Pricing and Reimbursement

Sweden implemented a reference price system in f but abolished it after nearly a decade (2002) of existence[82]. Since 2002 up to nowadays, Pricing and Reimbursement processes in Sweden have been combined. Only over-the-counter products follow free pricing and are not reimbursed. The other products can request for reimbursement. In that case the Pharmaceutical Benefits Board (PBB) can approve reimbursement following the aim of the system that there should be a rational and cost-effective use of medicines. "Sweden made major changes to its reimbursement system in 2002. Earlier almost all prescription drugs were automatically approved for reimbursement. Today applications are thoroughly scrutinized and cost-effectiveness is a crucial decision-making criteria"[83]. Three principles can put together the eligibility criteria of the reimbursement system in Sweden, which was laid out in the Act on Pharmaceutical Benefits:

[81] Chapter based on an author compilation from: PPRI Reports (2006, 2007, 2008), Espin and Rovira (2007), Kanavos, Font and Mcguire (2007), OECD price study 2004, P. Crawford, M. Feely, A. Guberman, G. Kramer, (2006), Rudholm (2001), LFN Report (2007), Ministry of Health and Social Affairs Homepage

[82] Rudholm 2001, p. 351

[83] LFN Report 2007, p. 1

- Human value principle
- Need and solidarity principle
- Cost-effectiveness principle

As there is no direct or separate price control, prices are part of the cost-effectiveness analysis for reimbursement matters. If the product shows cost-effectiveness with the given price by the applying company, then the product is reimbursed for that price. The prices are set at the wholesale level.

If companies want to change prices of reimbursed products it needs to apply for acceptance. Because of time reasons and the aim to increase price competition it was established in 2002 that without further investigation applied price changes are accepted if they are below or as maximum the same as the highest price of all substitutable pharmaceuticals.

After the products have been accepted for reimbursement the scheme is quite similar to the one in Denmark. The reimbursement rate is based on the consumption of the patient. Reimbursement basically rises with the consumption which shows that this is profitable for older and handicapped people. The patient needs to pay the full cost of his medication up to a threshold of € 97 in a one year period. After passing this the reimbursement rate rises gradually and the patient pays (status 2006)[84]:

- 50% of the costs between € 97 and 183.
- 75% of the costs between € 183 and 355.
- 90% of the costs between € 355 and 463.
- 100% of the costs above € 463.

For newly innovative products price-volume agreements can be implemented.

III.9.2 Demand Side

[84] Source: Swedish Ministry of Health and Social Affairs Homepage: http://www.regeringen.se/sb/d/2061

The demand side in Sweden has been influenced through the government's monopoly on dispensing pharmaceuticals for many years. Now in 2008 the government has published new ideas of restructuring the market and put forward ideas to gain free market economy in the pharmacy sector.

III.9.2.1 Physicians

Sweden faced pharmaceutical budget concerns and reacted with a decentralization of responsibility about the health care budget. County councils are in charge of financing pharmaceuticals for out-patient and in-patient care and check pharmacies´ budgets regularly.

As a result of the decentralisation and increased awareness of costs also prescriptions of medicines are monitored in various county councils. The system works because physicians have to indicate a so-called code on the prescription before a patient can get a medicine reimbursed[85]. This code enables their superior to overlook all prescription patterns but physicians can also decide if they want to have access to statistics of their patterns. Prescription guidelines in Sweden are available on a national and a regional level. As long as it is not malpractice the guidelines should just guide but there are no explicit sanctions against physicians if they do not follow the guidance[86].

Regional committees in the county council point out first choice medicines and recommend certain treatment patterns and medicines. Some county councils have also installed incentive agreements to primary care centres and hospital clinics. These incentives usually try to give impetus to reach prescription and budget targets for effective prescribing and cost-aware treatment of patients[87].

Even though there is mandatory generic substitution in Sweden since 2002 physicians are still encouraged to prescribe generics.

[85] PPRI Report Sweden 2007, p. 48
[86] PPRI Report Sweden 2007, p. 48
[87] PPRI Report Sweden 2007, p. 48

III.9.2.2 Patients

Authorities try to inform patients about prices, reimbursement and recommended dosage, at contraindications, side effects etc. This is done through homepages by the MPA, the pharmacies and other institutions[88].

Co-payment regulations have an interesting approach advantaging patients with high health care costs. A patient has to pay full price of a reimbursable product, up to a certain cost level of € 97. As soon as this level is reached, co-payment reductions grow in four steps (status 2006)[89]:

- 50% of the costs between € 97 and 183.
- 75% of the costs between € 183 and 355.
- 90% of the costs between € 355 and 463.
- 0% of the costs above € 463.

Like in most European countries you find a high VAT on pharmaceuticals. Sweden is different in this case. OTC products need to be taxed with 25% and POMs are exempt from VAT.

III.9.2.3 Pharmacies

All pharmacies in Sweden are state-owned and organised as one formal chain named Apoteket. This situation and that the state has a monopoly status of pharmacies in its country is unique in Europe. This also includes that prices in pharmacies are the same all over Sweden.

The market share of internet pharmacies has increased in the last two years. Since 2006 pharmacies have been able to sell OTC products and POMs online.

The retail margin of the pharmacies is decided by the Pharmaceutical Benefit Board (LFN). There are different margins for OTC products and prescription-

[88] PPRI Report Sweden 2007, p. 48
[89] Source: Swedish Ministry of Health and Social Affairs Homepage: http://www.regeringen.se/sb/d/2061

only medicines. The margin consists of a flat rate per prescription and on a fee which depends on the price of the pack.

The LFN changed the pharmacy mark-up scheme in 2006. The change meant an increase of the mark-up scheme. The last decrease of the mark-up scheme had occurred was in January 2005.

Since October 2002 generic substitution is mandatory in Sweden according to the Act on Pharmaceutical Benefits. The regulation includes generics and parallel imported pharmaceuticals[90]. The LFN announced this law as a great success in 2005, when a result showed that the regulation had decreased generic prices by 40%[91].

The new government which started its period in office in fall 2006 has announced the goal to deregulate the pharmacy market and abolish the state monopoly to decrease prices, increase accessibility and secure supply of medicines[92]. It has imposed a Committee of Inquiry which presented its final report to the Ministry of Health and Social Affairs in January 2008. The report includes mechanisms which will enable others than governmental owned pharmacies to dispense both prescription and non-prescription pharmaceuticals. However, every actor who wants to retail pharmaceuticals needs to get a permit from the Medical Product Agency. First the government will found a new company that owns all the state pharmacies. This company will be in charge of selling a certain number to private individuals. This new appraisal was consented in a parliament election on May 8th 2008 and the new deregulation of the pharmaceutical market will be active on January 1st 2009[93].

III.10 Regulation in France

France has one of the highest health care expenditure rates among the old EU countries[94]. The health care system stands for weak regulations. The

[90] PPRI Report Sweden 2007, p. 51
[91] LFN Report 2007, p. 4
[92] PPRI Report Sweden 2007, p. 57
[93] The Local online May 9th 2008
[94] Source: OECD data 2008

supply side regulations are mainly based on negotiations and price-volume agreements. The demand side is much less guided or provided with fewer incentives for cost-aware prescribing and dispensing than in most other EU states[95].

III.10.1 Supply Side

The French pharmaceutical regulation starts off with the usual procedure of authorizing medicines according to a reasonable quality and security. Afterwards the Medicy Agency separates the products in POM and OTC pharmaceuticals. These are then directly monitored for pricing and reimbursement possibilities.

III.10.1.1 Price Control

In the out-patient market the manufacturer can choose if he wants to apply for reimbursement or not. If producers decide to enter the non-reimbursement market he can set the price freely. If he chooses to enter the reimbursement market, the Pricing Committee controls prices and regulates the status of reimbursement.

In negotiations between the industry and the Economic Committee for Health Care Products (CEPS) the ex factory prices are set. If an agreement can not be reached, prices are set by the CEPS. Apart from wholesalers´ margins also pharmacists´ margins are regulated. These regulations have duration of four years. The latest agreement was signed in 2007.

The pricing procedure in France relies on an internal and external price referencing. The internal price referencing carries out a comparison of prices for all reimbursable pharmaceutical. This comparison is usually based on the DDD of treatment. The external price referencing process takes about 14 days. Applying companies need to set their price at least similar to the price accepted in Germany, Spain, Italy and the UK.

[95] Chapter based on an author compilation from: PPRI Reports (2006, 2007, 2008), Espin and Rovira (2007), Kanavos, Font and Mcguire (2007)

Generic´s prices are also regulated. and there is an incentive for manufacturers to apply for reimbursement with a low price. If a generics producer applies for a price that is a certain percentage below the branded price it will be accepted for the reimbursement list immediately. In 2006 the price of generics was supposed to be half the price of branded pharmaceuticals[96].

Like mentioned in the introduction not only prices but also wholesale and pharmacy margins and mark-ups, sales taxes and dispensing fees for products are regulated in France. Since 1990 a regressive mark-up scheme has been in place which was changed in 1999 with the introduction of a fixed fee per pack for pharmacists. In 2004 authorities changed it again. It was transformed to a three revel mark-up scheme which is still valid today.

Any international price changes in the mentioned countries also need to be reflected by the company in France and companies need to sign a contract for sales forecasts. This price-volume agreement, which is also negotiated between the CEPS and the Association of Pharmaceutical Industry also include a payback clause if agreed sales are exceeded[97].

France was one of the first countries publishing prices for more then twenty years and making them access able for the public. Nowadays this information can be seen on the internet through the homepages[98] of the sickness funds[99].

III.10.1.2 Reimbursement

The reimbursement scheme is product and disease specific. A positive list holds all the reimbursed pharmaceuticals. For including a product in the positive list economical studies are not legally required. A composition of the Transparency Commission which is in charge of reimbursement decisions is defined through twenty members from authorities and the industry with voting

[96] PPRI Report France 2007. p. 35
[97] PPRI Report France 2007, p. 34
[98] For more information: http://www.ameli.fr/professionnels-de-sante/medecins/exercer-auquotidien/codage/medicaments/index.php
[99] PPRI Report France 2007, p. 31

rights. This Commission decides on the rate of reimbursement according to two appraisals.

The first appraisal determines the actual level of clinical benefit on the basis of medical value, interest for public health and which population group is targeted through the product. The usual reimbursement rate is 65%. If there is no special gravity the rate is only 35%.

The second appraisal is set by the level of improvement of clinical benefit. This appraisal is structured in five stages varying from new therapeutic area to no improvement drugs. For this precise determination comparisons are made with the products of the same Anatomic Therapeutic Chemical classification code and also with products with the same therapeutic indications. The reimbursement rate for severe diseases can be 100% which is listed in a special list approved by Minister of Health. In the de-listing process the actual reimbursement rate comes only to 15% which is just a temporary rate for vein tonics[100].

III.10.1.3 Reference Price system

In France there is no particular reference price system. But a part of the generic sector has been regulated through a reference price system since August 2003. For example often one level of reimbursement is set for a whole generic product group. The reimbursement rate and the generic price are both based on this tariff. The list includes 153 generic groups[101].

If companies want to be granted with reimbursement without a process delay it needs to offer a manufacturer price that is half the price of the branded pharmaceutical (2006)[102].

III.10.1.4 Expenditure Regulations

There are several expenditure regulations in place in France. As mentioned in the pricing section profit-volume regulations are in place. When companies

[100] PPRI Report France 2007, p. 43, 44
[101] PPRI Report France 2007, p. 46
[102] PPRI Report France 2007, p. 35

exceed the expected sales paybacks need to be spend by the companies. This system which has been implemented in 2002 has been working according to the groups of therapeutically related pharmaceuticals[103]. Usually high value medicines and low-cost drugs are excluded from the plan for several years. If the manufacturers' turnover increases faster than a predetermined rate, companies must pay back a part of it to sickness funds. These parts vary between 55% and 68.1% for an excess of 1% to 8%. In 2004 the threshold of one percent was fixed for 2005 till 2007[104].

III.10.2 Demand Side

The demand side faces few regulations and financial incentives. However patients are encouraged to cost-aware behaviour through cost-sharing rules and information gained from sickness funds.

III.10.2.1 Physicians

In France there are no pharmaceutical budgets in place to give monetary incentives to prescribe cheap pharmaceuticals. Still the prescription habits or the volume is monitored by sickness funds. This way physicians can be advised and encouraged to prescribe cheap and effective products. Since 2007 physicians are able to follow their "prescription profile"[105] online on the sickness funds´ web sites[106]. As there are no financial incentives for cost-aware prescription recommendations and assistance can only be given through information and non-binding guidance. France has increased the availability of computerized software by the High Authority for Health to foster particular methods of prescription according to the INN and substitution for products with the same substance. Since 2004 the High Authority of Health is in charge of publishing guidelines for the fully reimbursed pharmaceuticals.

Physicians are not only verbally encouraged to prescribe generics. But there are certain indirect monetary incentives for them as well. It was for example targeted that physicians need to prescribe at least 15% generics per year[107].

[103] Espin and Rovira 2006, p. 108
[104] PPRI Report France 2007, p. 51
[105] PPRI Report France 2007, p. 52
[106] PPRI Report France 2007, p. 52
[107] Kanavos, Font and Mcguire 2007, p. 457

However, if pharmaceutical expenditure grows too quickly it might be the case that consultation and visit fees will not increase. Target budgets were also introduced for setting a lower limit requirement for physicians to prescribe at least fifteen percent generics per annum[108].

Dispensing remuneration of physicians is similar to the remuneration of pharmacies[109].

III.10.2.2 Patients

In France co-payment does exist in a fixed and a percentage scheme. The fixed co-payment includes € 0.53 for each pack of pharmaceuticals, that the patient purchases. The patient also pays a fixed co-payment for consultations with a physician. Here the maximum out-of-pocket payment (OPP) is € 50 per year. Percentage co-payment is set by the difference between the rate of reimbursement and 100%. So it can either be 0%, 35%, 65%, 85% or 100% corresponding to the actual reimbursement rate of the purchased product[110].

Usually patients are informed about rational use of pharmaceuticals through the sickness funds. These advertise and do fund campaigns to inform and educate patients throughout France.

III.10.2.3 Pharmacies

Pharmacists´ remuneration depends on the profit margin plus the flat fee per package. If the ex-factory price is below € 22.90 the margin is 26.1% of the price. This margin decreases for products from € 22.91 to € 150 to 10% and finally finds its lowest point at 6% for products with ex-factory prices above 150. Additionally € 0.53 fee per package needs to be added[111].

In June 1999 France has introduced optional generic substitution. Parallel imports are included in the substitution system. Pharmacies are also allowed to substitute generic prescriptions with branded pharmaceuticals. There are

[108] Kanavos, Font and Mcguire 2007, p. 457
[109] See section on pharmacies
[110] PPRI Report France 2007, p. 49
[111] PPRI Report France 2007, p. 34

also indirect financial incentives to substitute branded pharmaceuticals. It was for example targeted that physicians need to prescribe at least 15% generics per year[112]. If this recommended rate of substitution is not reached new reference rates will be implemented and pharmacists would that way loose money[113]. Generics have started to be promoted after the GP network was established in 2002[114].

Comparing the VAT in France with other countries (Germany 19%) it is quite low and differs from reimbursed pharmaceuticals to non-reimbursable medicines. It is only 2.1% for reimbursable pharmaceuticals and 5.1% for non-reimbursable pharmaceuticals.

III.11 Denmark

Denmark has an analytically interesting system because of the many changes it has gone through in the last decade. The indirect price control through reimbursement was a external price reference system from 2000 to 2005 and was changed to a consumption based system, quite similar to Sweden's approach of calculating the reimbursement rate, in 2005. However the demand side is weakly regulated[115].

III.11.1 Supply Side

Manufacturer and wholesale prices or corresponding profits are not regulated in Denmark. Pharmaceuticals are therefore in general freely priced. But through reimbursement regulations and pharmacy profit control prices are indirectly regulated. Between 2000 and 2005 external price referencing was in use to calculate the reimbursement prices. Here European average prices were set equal to the reference prices in the reimbursement scheme.

III.11.1.1 Pricing

Wholesale margins are not regulated by law but are usually negotiated between the wholesalers and the pharmacies. These margins are not

[112] Kanavos, Font and Mcguire 2007, p. 457
[113] Espin and Rovira 2007, p. 149
[114] Kanavos, Font and Mcguire 2007, p. 458
[115] Chapter based on an author compilation from: PPRI Reports (2006, 2007, 2008), Espin and Rovira (2007), Kanavos, Font and Mcguire (2007), www.ordiprax.dk, www.dsam.dk

officially known. An indirect profit control is set through the mark-up scheme of pharmacy's profits[116] to calculate the pharmacy retail price. Until March 2007 the related negotiations were scheduled every two years and correspondingly the mark-up scheme was adjusted. In April 2007 a linear mark-up scheme was implemented.

Denmark has a long history of price agreements with the pharmaceutical industry. Some agreements were on price cuts, freezes and some agreements were also statutory. The latest price ceiling was based on a voluntary agreement in December 2006 and started being valid for two years in January 2007. The aim is to eliminate uncertainties on reimbursement policies. However, authorities agreed not to make major changes in the reimbursement system without involving the Danish Association of the Pharmaceutical Industry[117].

III.11.1.2 Reimbursement

In Denmark the decision-making power to decide on reimbursement issues is in the hands of the Danish Medicines Agency (DKMA). Even prices can be freely chosen by the manufacturer and are not regulated by authorities they are still important for reimbursement issues and the price of a product needs to be in a reasonable relation to the therapeutic value[118]. When a company applies for reimbursement it needs to state the pharmacy retail price for cost-effectiveness analysis because this price is relevant for looking at the relation to the therapeutic value. Another factor relevant is if the pharmaceutical has a safe and valuable therapeutic effect on a specifically defined indication[119].

Generics are regulated and reimbursement issues are handled the same way as for branded pharmaceuticals. It is even not necessary to get recommendation from the Reimbursement Committee. Still prices should not be higher than the once from the original product.

[116] Executive Order, No. 270 of March 2007
[117] PPRI Report Denmark 2008, p. 38
[118] Espin and Rovira 2007, p. 95
[119] PPRI Report Denmark 2008, p. 42

Until 2000 all pharmaceuticals eligible for reimbursement could either be reimbursed for 50% or 74%. Nowadays the reimbursement system has a similar set up to Sweden's system. The reimbursement rate changes with the consumption of the patient. It was introduced in April 2000. According to the status of January 2007 the reimbursement rate for adults is set according to the following scheme[120]:

Expenses per annum	Reimbursement rate
below € 62	0%
€ 62 - € 151	50%
€ 151 - € 355	75%
over € 355	85%

100% reimbursement is only for chronically ill and terminally ill patients.

The reference price system in Denmark goes back to 1993. But the current system is managed by the Danish Medicines Agency (DKMA) and entered into force in 2005 in the Danish Health Act, No. 546 of 24th of June 2005[121]. The main characteristic of the system is that similar pharmaceuticals are equally clustered in reimbursement groups which are the same ones as the groups for generic substitution[122]. Denmark groups the drugs based on active ingredient, forms of assigns and forms of strength.

These groups´ reference prices are updated whenever new pharmaceuticals or new package sizes etc. are launched or withdraw from the pharmaceutical market[123]. The reference price is the lowest price within the substitution group. If a product is reimbursed due to a price equal or below the reference price the reimbursement rate depends on consumption and can vary as mentioned before[124].

This implies that when a physician prescribes a product more expensive than its reference price from the lowest substitution group and forbids generic

[120] Espin and Rovira 2007, p. 62
[121] PPRI Report Denmark 2008, p. 46
[122] PPRI Report Denmark 2008, p. 46
[123] PPRI Report Denmark 2008, p. 47
[124] PPRI Report Denmark 2008, p. 47

substitution that the patient has to pay regular co-payment and the difference between the two products[125].

III.11.2 Demand Side

Danish demand side regulations focus more on the patient and are fairly weak for the stakeholders such as physicians and pharmacies. Physicians face a relative freedom and pharmacies do not need to follow regulations except generic substitution. Patients are encouraged and informed through campaigns and cost-sharing forces them to cost-aware behaviour.

III.11.2.1 Physicians

Budgetary constraints for physicians are not in place in Denmark. But still cost-ware treatment may be necessary. Physicians have to consider the reimbursement policy when prescribing pharmaceuticals due to the consumption based reimbursement rate.

General Practioners receive an evaluation of their prescribing habits on a regular basis which includes the amount and costs of all the prescribed pharmaceuticals. This was implemented to rise increase the physician's cost-awareness and comparability with other physicians in the region. In the last years a computerized monitoring named ORDIPRAX[126] was implemented which is an online system. Here physicians can compare their own prescribing habits with the habits of other physicians in the same region[127].

Prescription guidelines are mostly not binding in Denmark and rely on recommendations, advices and reimbursement rules[128]. This is in one way achieved through the mentioned monitoring but also through an annual voluntary audit for physicians, information journals on pharmaceutical recommendations in different therapeutic areas and finally through the

[125] PPRI Report Denmark 2008, p. 47
[126] www.ordiprax.dk
[127] PPRI Report Denmark 2008, p. 55
[128] Espin and Rovira 2007, p. 122

Danish College of General Practioners´ guideline [129] accessibility for pharmacists and physicians online[130].

Generic prescribing is not allowed in Denmark but physicians have to use the name of the pharmaceutical (for original, a generic and a parallel imported product) when prescribing[131].

III.11.2.2 Patients

Danish patients can gain information on prices and pharmaceuticals through the Danish Medicines Agency (DKMA). The DKMS offers an extensive internet platform which informs about “prices of pharmaceuticals, the patient percentage co-payment and the possibility of generic substitution, their content including benefits and any potential risks”[132].

Out-of-pocket payments that patients need to raise can be fixed and percentage co-payments. Before calculating the reimbursement level a flat dispensing fee of € 1.34 for each medicine package needs to be added to the reimbursement price. Percentage co-payment is the answer to the consumption based reimbursement rates. The higher the reimbursement rate, the lower is the percentage co-payment by the patient. Hence is the reimbursement rate is 75% for example the co-payment rate is 25% so the whole price of the product is raised. The period from where pharmaceutical expenses are calculated is the first of March. From there every twelve months a new reimbursement period starts.

III.11.2.3 Pharmacies

Pharmacies have a monopoly on sales of POMs to patients. Pharmacies must be run by a pharmacists and need to have a permission from the Government to dispense pharmaceuticals in a certain location. However, due to increasing opportunities through the internet a rising proportion of pharmacies have started selling products online. As mentioned in the chapter

[129] www.dsam.dk
[130] PPRI Report Denmark 2008, p. 55
[131] PPRI Report Denmark 2008, p. 63
[132] PPRI Report Denmark 2008, p. 24

on pricing pharmacists' margins are strictly regulated and the mark-up scheme as been switched from regressive to linear in April 2007. The current regulation notices that the PPP times 0.088 and a constant amount is the mark-up scheme[133].

Since 1991 voluntary substitution has been allowed. This was changed into an obligatory generic substitution law in 1997[134]. This forces physicians to always dispense the cheapest substitute available. Still patients and physicians can refuse the substitution but have to deal with higher co-payment. As seen in the section of reference pricing there is a close connection between generic substitution and reference pricing. The reimbursement groups are the same groups as the substitution groups and non-reimbursable pharmaceuticals are included in the substitution scheme.

Claw-backs are not used in Denmark and there are no financial incentives for cost-efficient decision making.

[133] PPRI Report Denmark 2008, p. 35
[134] Espin and Rovira 2007, p. 145

IV. Analysis of the impact of regulation on off-patent drug prices: Data and Methods

The preceding section has highlighted the complexity of shown regulation in European pharmaceutical markets. In order to analyze if specific regulations have a negative and significantly effect on prices the IMS MIDAS dataset has been used for that purpose. Price and sales data were obtained from Intercontinental Medical Statistics (IMS) for fourteen available ACE 1 inhibitors (Captopril, Cilazapril, Enalipril, Lisinopril, Ramipril, Moexpril, Fosinopril, Quinapril, Trandolapril, Benazepril, Perindopril, Imidapril, Zofenopril, Spirapril), in six EU member states (Germany, UK, the Netherlands, France, Sweden, and Denmark) on a quarterly basis over the period 1991-2006.

Table 9: Overview on IMS Data for the empirical model

Data Source: Intercontinental Medical Statistics (IMS)
Countries: Germany, UK, Netherlands, France, Sweden and Denmark
Products: 14 ACE 1 Inhibitors (Captopril, Cilazapril, Enalipril, Lisinopril, Ramipril, Moexpril, Fosinopril, Quinapril, Trandolapril, Benazepril, Perindopril, Imidapril, Zofenopril and Spirapril)
Time period: 1991/2-2006/2 (quarterly basis, 61 quarters)
Information: Prices, Sales

All monetary figures which include sales and prices are in Euros. Additionally, inflation and currency adjustment were employed based on the exchange and inflation rates given by the World Development Index (WDI)[135]. To adjust different formulations, prices and sales of pharmaceuticals a weighted price index per molecule for originator and for generics was constructed to obtain a comparable basis.

IV.1 Rationale for country and the therapeutic class selection

For the empirical analysis six countries (UK, Germany, France, Denmark, Netherlands and Sweden) have been selected marked with the indicator i in the model. To gain insight to the effects of regulations on generics´ prices

[135] Inflation and currency rates obtained from the WDI (World Development Index)

from an empirical analysis it is essential to select and analyse countries in this empirical analysis which reflect the variety of pharmaceutical supply and demand side regulation schemes prevailing in EU member states. Otherwise it can not be distinguished between methods and influence of these regulations on prices and market shares of pharmaceutical products. The challenge of this analysis is that all countries use direct and indirect systems to regulate prices. Hence it is important to include a diversity of countries in the empirical investigation which on one hand have quite a free pricing system and on the other hand a direct price control, different indirect policy control tools like profit control, economic analysis or reference pricing. Even though the intention seems clear it is not easy to choose because of several reforms that have taken place in the last decades within each country you might consider. Generally speaking because of international reference and European inter-correspondence the reforms that have taken place in Europe have narrowed down the regulation differences between the countries.

The selection of the countries is based on two primary criteria. I have selected large, often referenced and important markets like Germany, France and the UK and countries which are very specific in their use of methodology and tradition to regulate their pharmaceutical market (Netherlands, Sweden, Denmark). All countries have a significant variety of regulatory approaches.

According to these criteria six countries have been selected to be explicitly introduced and empirically analysed in this thesis.

Germany, with the third largest pharmaceutical market in the world and also mostly price referenced market in Europe, gives a unique combination of free pricing and few regulations on the demand and supply side. However, it is the first country in Europe which introduced reference pricing for patent expired medicines in first instance.

The United Kingdom is also one of the biggest and most important drug markets in the world. Furthermore, it is known for its unique indirect price control via rate of return regulation (profit control) and for explicitly tackling

the demand-side through a mix of regulatory measures such as clawbacks and incentives (e.g. prescribing guidance, monitoring audit, budget etc.).

France has the highest health care expenditure relative to the GDP in Europe and is the third largest drug producer in the world accounting for 7% of the world's drug output. Additionally, France has also one of the highest per capita spending. Market size, the country's importance in Europe and a system in which regulations are principally based on negotiations and agreements both on the supply- and the demand-side elevate France to a unique position among European markets.

The Netherlands have a different concept of regulating their pharmaceutical market. It strongly regulates several market stakeholders and had already implemented an international reference price system over ten years ago. This is combined with the case of reference pricing and the use of economic analysis for new medicines. Together with the UK, the Netherlands has a unique approach to providing incentives to physicians and pharmacists, including the claw back for the letter[136].

The Scandinavian countries have shown parallel to their economic success in the last decades also several influential and effective reforms in the pharmaceutical market based on their social traditions, tax funded health care system and the intention to decrease the rate of growth in pharmaceutical expenditure. Therefore a specific analysis of Sweden and Denmark was considered to be useful.

Sweden has a tradition of social support of medicines. However, Sweden was able to keep the drug expenditure relatively low (drug expenditure was 13.3% of the health care expenditure in 2006). This might be due to its system which shows a huge variety of cost-effectiveness analysis for price regulations. Another reason for a specific look at Sweden are the reforms that have taken place since 2002. The reimbursement and pricing decisions

[136] Other countries are Austria, Belgium, Italy, Germany, Poland and the UK

have been combined and the reimbursement rate has been adapted to the consumption.

Finally, Denmark, has introduced several reforms over the past decade. It has its approach to free pricing and weak regulations on the demand side, put relies on very aggressive purchasing of medicines which introduce an element of competition to the Danish pharmaceutical market.

Including these six selected countries the empirical analysis should offer insights to some major countries, shows a huge variety of regulations on the supply and demand side and European states with either a history of high or low health care expenditure.

ACE (Angiotensin-Converting Enzyme) inhibitors are a group of pharmaceuticals that are used to treat the chronic illnesses hypertension and congestive heart failure. The market volume is quite high and has been growing in the last decades. This growth has also increased the drug expenditure. ACE inhibitors are will diffused and the market shows a healthy balance between on-patent and off-patent producers. The empirical results obtained, however, are by no means representative of the entire pharmaceutical market.

IV.2 The empirical Model

The IMS data is used to explore the developments of prices after patent expiry and the influence of regulations and market competition on the prices of generics and originators. Therefore the models include generic and branded prices described by several variables. The empirical models which are used to analyse the panel data are simple due to the fact that they are one of the first analysis of its kind. The algebraic forms of the used models testing at drug level are as follows:

(1) $P_{ijb} = \alpha + \beta_1 * G_{Present} + \beta_2 * N_{ijg} + \beta_3 * D_{1i} + \beta_4 * D_{2i+} \ldots \beta_{10} * D_{8i} + \beta_{11} * T_{trend} + \varepsilon_{ij}$

(2) $P_{ijg} = \alpha + \beta_1 * N_{ijg} + \beta_2 * D_{1i} + \beta_3 * D_{2i+} \ldots \beta_9 * D_i + \beta_{10} * T_{trend} + \varepsilon_{ij}$

(3) $P_{ijg} = \alpha + \beta_1 * N_{ijg} + \beta_2 * P_{ijb} + \beta_3 * D_{1i} + \beta_4 * D_{2i+} \ldots \beta_{10} * D_i + \beta_{11} * T_{trend} + \varepsilon_{ij}$

The dependent variable for the analysis is in model 1 by the weighted average branded price **(P_{ijb})** and in model 2 formed by the weighted average generic price index for country i and product j **(P_{ijg})**. These prices are expected to be described by prices, generic presence, the number of generic producers, several dummy variables or a time trend. The date of generic entry and start and implementation has been identified as the first quarter where a second producer has larger sales than 0. Therefore some co-licensing manufacturers might be considered as generic producers.

D_{1i} to **D_{8i}** (named as RF, SM, CONTGEN, MARKUPREG, PROFITC, TAXFUNDED, CEA, CLAWBACK) are selected dummy variables representing demand side and supply side regulations employed or not employed in the selected country i. Because the introduction and existence of certain regulations differs by country, the actual implementation date has been identified and introduced to the analysis. Because there is some general price inflation in the pharmaceutical market a time trend on a quarter basis is employed in the model to capture this factor (**T_{trend}** named as

QUARTER). The number of generic competitors (**N** named as N) and a variable to show if a generic competitor is present or not ($\mathbf{G_{Present}}$ named as GENERICS) are also included in the model. $\boldsymbol{\varepsilon_{ij}}$ is the error term. Expected results for the variables are explained in the next section (IV. The Variables).

The analysed panel data combines cross section (country, weighted average price index and net ingredient) and time series data (1991-2006). It needs to be considered that heteroscedasticity, as the variance of the error terms might not be constant. Hence prices are logged to decrease this problem and a Breusch-Pagan / Cook-Weisberg test is taken to identify if heteroscedasticity needs to be harmed by standard robust errors[137].

IV.3 The Variables

Regulation is usually introduced in the pharmaceutical market to ensure "Efficiency, Equity and Quality" [138] and accordingly decrease prices of pharmaceuticals. Hence, the "null hypothesis" about any dummy variable in the empirical analysis should be that regulations have a negative effect on generic and branded prices. In any case, it might occur that certain regulations do not show a significant value, are inefficient or just decreased prices once (e.g., price freeze) rather than over a certain time period.

Table 10: H_0 Hypothesis for all describing variables of all models

	Dependent Variables	
Independent Variables	P_{ijb}	P_{ijg}
P_{ijb}	--------	(+)
P_{ijg}	(+)	--------
$G_{Present}$	(-)	--------
N_{ijg}	(-)	(-)
All D_{ij}	(-)	(-)
T_{trend}	--------	--------

[137] Test in Appendix
[138] Mrazek and Frank 2004

On the supply side were chosen four dummy variables, namely, reference pricing, price control of generics, profit control and cost effectiveness analysis. These have been chosen because they either are the most basic regulations existing in the health care market (reference pricing), are standing for a unique system (e.g., profit control in the UK) or present newest approaches to pharmaeconomic evaluations within the health care sector.

Reference Pricing (RP) presents an indicator variable which provides information about the existence of a reference price system for reimbursement matters within the discussed countries. The variable defines the reference price system existence even if the regulation does only apply for certain groups of pharmaceuticals. Empirical evidence from the literature has suggested that reference pricing has a minor negative effect on the prices in a pharmaceutical market, especially if it is connected to appropriate demand side regulations (Kanavos, Font-Costa and Seeley 2008). This does make sense because it encourages manufacturers to decrease their prices to achieve reimbursement.

Price control of generics (CONTGEN) is a variable that distinguishes between countries that have price control regulations that are just valid for branded pharmaceuticals, countries with no price regulation and countries with specific price regulations for generics. Only for pricing regulations that hold either for all pharmaceuticals or regulations that only hold for generics (e.g., UK where a special maximum price scheme was implemented in August 2000) the dummy variable takes a 1. Different degrees of price control between countries are not considered by the variable. However, it is expected that the dummy variable present a significantly negative effect on the prices of generics due to a price limitation for manufacturers.

The industrial regulation dummy variable named **profit control (PROFITC)** was defined as an indicator if a country has any indirect price control through profit control regulations. The variable only holds for regulations applying for manufacturer's profits. For voluntary schemes such as in the UK where a price control is used as a threat to stabilize a voluntary profit control

agreement the indicator variable also takes a 1. Because governments try to limit profits and indirectly encourage companies to react with price reductions, this indicator is supposed to provide negative influence on generic prices.

The last supply side dummy variable used in the regression analysis is the factor if countries have implemented a **cost-effectiveness analysis (CEA)** for reimbursement decisions. This cost-effectiveness analysis could be compulsory or mandatory and needs to affect the reimbursement decision, its rate or the reference pricing scheme. Nevertheless, it should strengthen the entry criteria for reimbursement. Additionally reimbursement schemes are encouraged to increase analytical attention to pharmaceutical prices. Therefore the cost-effectiveness analysis shall decrease prices in the market.

There are three demand-side dummy variables that have been installed, namely, substitution mandatory, mark-up scheme on pharmacies regressive and clawbacks. These three variables were chosen to specifically analyse pharmacists´ behaviour and their influence on generic prices within the drug market to see whether regulations provide good incentives and if coexistence of supply side and demand side regulations lead to desired effects. Generally speaking the demand side regulations intend (such as supply side regulations) to increase generics´ market share, increase patients´ consumption of pharmaceuticals and finally to decrease prices on the pharmaceutical market.

The dummy variable **substitution mandatory (SM)** takes a 1 if a pharmacy is obliged to dispense a generic when a branded pharmaceutical was prescribed and the physician has not explicitly requested the pharmacy not to substitute. The substitution variable is expected to have ambiguous effects. Certainly they have been installed to decrease pharmaceutical prices. This result is also expected. However, it might be the case that generic substitution for example increases market shares of generics because of derived substitution effects and on the other hand decrease the prices of originators to adjust to substitution. With a growing market share of generics,

the demand for generics could grow. Accordingly prices of generics could also increase.

Another variable concerning pharmaceutical behaviour within the drugs market is the variable **mark-up scheme on pharmacies regressive (MARKUPREG)**. This dummy shows if pharmacies have to follow a regressive mark-up scheme or not. It does not show if there is any mark-up scheme implemented in the country and also not to what level the regulation controls pharmacies´ sales and prices. The variable takes a 1 even for regulation schemes that are not precisely regressive but show a similar behaviour (e.g., Germany where the scale has instead a declining flat fee structure). A regressive mark-up scheme for pharmacies serves as a financial incentive to distribute cheaper pharmaceuticals. Therefore it is expected that pharmaceutical producers will decrease their prices to be chosen by pharmacies. However, it could also be differently due to the same argument given about substitution. A regressive mark-up scheme could increase the market share of generics, their demand and correspondingly their prices.

The last demand side dummy variable concerns **clawback (CLAWBACK)** regulations within the systems. This variable does not consider payback schemes for price-volume control systems or other possible supply side clawback regulations. It just applies for clawback regulations concerning the demand side. The variable takes a 1 if clawbacks in the shape of discounts of pharmacies´ dispensing fees claimed by insurances or clawbacks in the shape of discounts on pharmacy purchase costs of drugs are implemented in the country's health care sector. Otherwise it takes a 0. Clawback regulations tend to decrease prices in generic markets.

The last indicator variable shows if the **health care system (TAXFUNDED)** is financed through public contribution or if it is funded by taxes. In systems where both funding is possible the indicator chooses the system which has a higher share. Especially in the case of the Netherlands where 65% of the citizens are under compulsory health insurance paid by the people and their

employers it could be argued that a contribution and tax based financing is being used. In this case it has been decided to choose that the dummy variable considers Netherlands to be a contribution based health care system. Generally the indicator variable presenting the form of funding for the health care system is expected to show that a tax funded health care system includes higher prices than a system which is financed through contribution.

Empirical results have suggested earlier that regulation has a limited effect on prices and that competition among producers and products is more sufficient to decrease prices in the market. To analyse this question two variables were included to analyse competition factors. If a generic is present or not is shown by the variable **(GENERICS)**. Intuitively, this variable is supposed to show a decrease of branded prices. The same results are expected for the variable which indicated the number of generic competitors **(N)**. This should increase competition and correspondingly decrease prices.

Finally to every regression a time trend was added **(QUARTER)**. A dummy variable for each quarter except the first quarter (60 quarters) was included to get rid of time effects.

V. Empirical Results

In pursuing the analysis, several regressions were estimated which included generic prices, branded prices, regulation variables (underneath the line in every table) and competition measures such as a variable that indicates whether generic producers are present (GENERICS) or a variable which presents the number of generics (N). The first table shows the estimation from model (1).

Table 11: Estimation results of model 1

Ordinary Least Square
Dependent Variable: Branded Prices (ln)
3402 Observations, R-squared = 0.2249, F (70, 3331) = **13.82***

Ind. Variables	Coefficient	SE	T-Value	P>T
N	-0.033	0.002	-15.76	**0***
GENERICS	-0.332	0.391	-8.47	**0***
RF	0.068	0.663	1.03	0.303
SM	-0.176	0.688	-2.56	0.011
CONTGEN	-0.344	0.565	-6.09	**0***
MARKUPREG	0.005	0.084	0.06	0.952
PROFITC	-0.024	0.132	-0.19	0.852
CLAWBACK	-0.166	0.621	-2.68	**0.01***
TAXFUNDED	-0.12	0.677	-1.76	0.078
CEA	0.067	0.078	0.86	0.388

* refers to a significance at 5%

As table 11 shows, the estimation coefficient of the number of generics (N), the presence of generic competitors (GENERICS), regulations to control prices (CONTGEN) and clawbacks (CLAWBACK) are statistically significant at a 5% significance level. All significant variables have a negative influence on the prices. This means that the results are in line with the hypotheses expected. For all other variables the estimators are not significant.

An increase in N by one competitor can be interpreted as a decrease of 3.3% in branded prices. The indicator which presents the presence of generic competitors has an even more influential impact. Drugs which face generic competition have 33.2% lower prices than products without generic competition. Price control measures of generics, which could obviously also

influence branded prices decrease the prices of branded pharmaceuticals by 34.4%.

In summary, it can be said that regulation seems to fail to decrease branded prices except through direct control schemes such as clawbacks or regulation of prices.

The second empirical analysis, which was conducted to see how regulations influence prices presents results for regulatory and competition variables on generic prices in the drug market. The following table shows the results from model 2.

Table 12: Estimation results of model 2

Ordinary Least Square (standard robust error)
Dependent Variable: Generic Prices (ln)
1701 Observations, R-squared = 0.3105, F (70, 1576) = **15.46***

Ind. Variables	Coefficient	SE	T-Value	P>T
N	-0.05	0.002	-26.12	**0***
RF	0.481	0.12	4.09	**0***
SM	-0.14	0.105	-1.33	0.182
CONTGEN	-0.306	0.096	-3.19	**0.00***
MARKUPREG	0.119	0.134	-0.86	0.39
PROFITC	-0.396	0.238	-1.66	0.096
CLAWBACK	-0.101	0.105	-0.96	0.338
TAXFUNDED	-0.071	0.119	0.6	0.552
CEA	-0.189	0.144	-1.31	0.19

* refers to a significance at 5%

As table 12 shows, the estimation coefficient of the number of generics (N), reference pricing (RF) and regulations to control prices (CONTGEN) are statistically significant at a 5% significance level. All significant variables have a negative influence on the prices except reference pricing. Hence, reference pricing does not go in line with the H_0-hypothesis. For all other variables the estimators are not significant.

An increase in N by one competitor decreases generic prices by 5%. For regulations the results give ambiguous and unexpected indications. On the

one hand, countries with reference pricing have 48% higher generic prices, while on the other hand, countries with price control have 30.6% lower prices than ones without price control.

´

In summary, it appears that regulation has limited effects on generic prices.

The third empirical analysis, which was conducted to see how regulations influence prices presents results for regulatory and competition variables on generic prices in the drug market including branded prices as a describing variable. The following graph shows the results from model 3.

Table 13: Estimation results of model 3

Ordinary Least Square (standard robust error)
Dependent Variable: Generic Prices (ln)
1647 Observations, R-squared = 0.8503, F (70, 1576) = **267.26***

Ind. Variables	Coefficient	SE	T-Value	P>T
N	-0.012	0.001	-10.24	**0***
BRANDED PRICES (ln)	1.058	0.017	63.46	**0***
RF	0.154	0.045	3.38	**0.001***
SM	0.196	0.447	4.39	**0***
CONTGEN	0.188	0.038	4.98	**0***
MARKUPREG	0.104	0.059	1.76	0.079
PROFITC	-0.13	0.104	-1.24	0.214
CLAWBACK	0.179	0.045	3.93	**0***
TAXFUNDED	-0.267	0.045	-5.9	**0***
CEA	-0.03	0.065	-0.46	0.642

* refers to a significance at 5%

As table 13 shows the estimation coefficient of the number of generics (N), branded prices (BRANEDD PRICES), reference pricing (RF), mandatory substitution (SM), regulations to control prices (CONTGEN), clawbacks (CLAWBACKS) and tax funded systems (TAXFUNDED) are statistically significant at a 5% significance level. Except the number of generic producers all significant variables have a positive influence on the prices. For all other variables the estimators are not significant.

As in model 3 one could argue that there is the problem of endogeneity because generic prices might depend on branded prices and vice versa,

results might not be useful. A look at specific countries, regulation seems to have a limited effect. Usually the number of generics and the presence of generic producers decrease prices of pharmaceuticals, although most regulations show no significant influence on the prices. However, if regulation shows significant coefficients, the results dismiss our hypothesis and are positive. The following gives three examples of empirical results for three unique countries (Denmark, Germany and the UK) should present this finding.

To understand the results one must consider that any regulation which was present in a country for the whole analysed time period drops out of the empirical statistics. Therefore no results can be conducted for these regulations.

Table 14: Estimation results of model 1 on Denmark, Germany and the UK

Denmark: Ordinary Least Square
Dependent Variable: Branded Prices (ln)
504 Observations, R-squared = 0.254, F (62, 441) = **2.42***

Ind. Variables	Coefficient	SE	T-Value	P>T
N	-.109	0.012	-8.91	**0***
GENERICS	0.917	0.137	6.68	0*
RF	0.014	0.486	0.03	0.977
SM	-0.898	0.474	-1.89	0.059
CONTGEN	Dropped			
MARKUPREG	Dropped			
PROFITC	Dropped			
CLAWBACK	Dropped			
TAXFUNDED	Dropped			
CEA	0.602	0.444	1.36	0.175

* refers to a significance at 5%

Germany: Ordinary Least Square
Dependent Variable: Branded Prices (ln)
685 Observations, R-squared = 0.4617, F (62, 662) = **8.60***

Ind. Variables	Coefficient	SE	T-Value	P> T
N	-.0279	0.002	-13.63	**0***
GENERICS	-0.151	0.0683	-2.21	0.028
RF	Dropped			
SM	-0.3985	0.2754	-1.45	0.148
CONTGEN	Dropped			
MARKUPREG	-0.6963	0.3397	-2.05	0.041
PROFITC	Dropped			
CLAWBACK	-0.175	0.27	-0.65	0.517
TAXFUNDED	Dropped			
CEA	Dropped			

* refers to a significance at 5%

United Kingdom: Ordinary Least Square
Dependent Variable: Branded Prices (ln)
588 Observations, R-squared = 0.2208, F (62, 525) = **2.40***

Ind. Variables	Coefficient	SE	T-Value	P>T
N	-0.221	0.038	-5.79	**0***
GENERICS	0.364	0.219	1.66	0.097
RF	Dropped			
SM	Dropped			
CONTGEN	-0.118	0.379	-0.31	0.755
MARKUPREG	Dropped			
PROFITC	Dropped			
CLAWBACK	-0.168	0.437	-0.39	0.700
TAXFUNDED	Dropped			
CEA	-0.16	0.388	-0.41	0.681

* refers to a significance at 5%

Regulations in Denmark, Germany and the United Kingdom seem not to show any significant effect on branded prices in the ACE-1 market. The only influence comes from generic competition, as can be seen in the significance of generic presence (N) and the number of generic producers (GENERICS).

On a country basis, the results are partially different for generic prices compared to the empirical results on branded pharmaceuticals. Several regulations in selected countries show statistical significance and useful policy implications.

Table 15: Estimation results of model 2 for Denmark

Denmark: Ordinary Least Square (robust standard error)
Dependent Variable: Generic Prices (ln)
Observations, R-squared = 0.79

Ind. Variables	Coefficient	SE	T-Value	P>T
N	-0.1799	0.0146	-12.31	**0***
RF	-0.2447	0.074	-3.33	**0.00***
SM	-1.857	0.617	-3.01	**0.00***
CONTGEN	Dropped			
MARKUPREG	Dropped			
PROFITC	Dropped			
CLAWBACK	Dropped			
TAXFUNDED	Dropped			
CEA	0.14	1	0.14	0.888

* refers to a significance at 5%

E.g., regulation measures in Denmark, such as reference pricing and mandatory substitution, do have a significant and negative impact on prices. It seems that generic prices respond differently to regulation than branded producers do as expected in the hypothesis. The implemented mandatory substitution, in particular, shows a strong significant impact. Denmark's generic prices decreased 185.7% when it introduced mandatory substitution which is a surprisingly successful implication.

Considering that most regulation implication seems not to be suitable to decreasing drug prices and that empirical results show that most prices

appear to fall due to competition through generic entry and generic competition, further research might be useful.

VI. Conclusions and Policy Implications

The intention of the empirical analysis was to arrive at potential policy implications and research whether individual regulations perform better than others. However, results seem to be ambiguous.

European countries have faced exploding health care costs in the last decades. Policy makers and governments search for ways to stop this ongoing trend. One relevant part of these costs is made by pharmaceutical expenditure. The pharmaceutical expenditure share of health care expenditure has been growing due to rising drug costs and growing drug consumption. Therefore the need for efficient regulations and incentives for market competition and decreasing pharmaceutical prices is significant.

In sight of this problem this thesis tried to provide an introduction to the problem in most EU countries, show the regulation schemes in six countries and finally analyse statistically whether regulation leads to lower prices in the drug market, particularly in products whose patents have expired.

Pricing and reimbursement schemes in most European countries are very different and the approaches to decrease drug costs are quite diverse. However, the last decade has shown how the variety of the approach to regulation between Europe countries has narrowed down. Nevertheless all EU countries are in search of regulation that delivers a positive effect on their budget.

Empirical evidence has shown that most regulation schemes do not lead to significant price reduction(s). Indeed price competition and, especially, generic pricing does seem to have significant influence on prices.

In summary, the analysis has shown that policy makers need to increase competition within their pharmaceutical markets, give incentives for generic market entry and only introduce certain market regulations, to stop the ongoing trend of rising drug costs.

They appear to imply different regulations for patented and off-patent products as generic prices and branded prices react differently to regulation schemes. In general the empirical results suggest that regulation has limited power to control pharmaceutical prices for generics and branded pharmaceuticals. Nearly all regressions show that competition and generic entry enables market competition and corresponding price adjustments. Nevertheless, some regulations show negative and significant effects on prices and can be seen as possible implications to improve allocation and the drug expenses in European countries.

Direct price controls have an impact on price reduction. This comes as no surprise, as direct interference in the market and obligatory control of pricing behaviour must have an effect. Other regulations such as reference pricing, mandatory substitution, profit controls or regressive mark up schemes for pharmacies seem not to be efficient. Secondly the data recommends improving generic entry possibilities and competition. Therefore, the data suggests, on the one hand, direct regulation of prices and, on the other hand, policy implications that improve opportunities for generics to enter pharmaceutical markets.

Policy makers should be mindful of regulations when it comes to regulating and controlling generic producers and prices. As with branded prices, direct control measures can also decrease generic prices. In parallel empirics suggest that reference pricing might even increase the prices as producers seem to remain closer to originators. All other regulations showed no significant impact and seem not to be useful to decrease or increase prices. Therefore policy implications should focus on market behaviour and provide incentives and market freedom for competition and entry of more generic producers.

As seen from the analysis, to decrease drug prices, policy makers should increase the number of generic producers and improve possibilities for generic entry. This would yield decreasing pharmaceutical prices. This way competition among producers can be improved and prices in a market can be reduced for better allocation. Intuitively, most regulations do probably decrease the number of generic producers and should, hence, not be implemented in order to achieve market competition. However, most regulation variables request a political trade-off. The suggested direct price controls, on the one hand, decreases pharmaceutical prices and, on the other hand, decreases market freedom and generic entry. Therefore policy makers need to consider this ambiguous effect.

VII. Appendix

VII.1 Tests

Heteroscedasticity Test

Heteroscedasticity Test for lprice (before robust standard errors)

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of lprice

chi2(1) = 1.83
Prob > chi2 = 0.1761

Heteroscedasticity Test for lpricegen (before robust standard errors)

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
Ho: Constant variance
Variables: fitted values of lpricegen

chi2(1) = 189.01
Prob > chi2 = 0.0000

VIII. References

Andersson K, Petzold MG, Allebeck P, Carlsten A (2008), Influence of mandatory generic substitution on pharmaceutical sales patterns: a national study over five years, BMC Health Serv Res., 8.

Brekke KR, Grasdal A, Holmas TH (2006), Regulation and Pricing of Pharmaceuticals: Reference Pricing or Price Cap Regulation?, CESifo Working Paper No. 2059

Busse R (2001), Interesting times in German health policy, Eurohealth 7(2), pp. 7-8.

Chaix-Couturier C, Durand-Zaleski I, Jolly D, Durieux P (2000), Effects of financial incentives on medical practice: results from a systematic review of the literature and methodological issues. Int J Qual Health Care,12(2), pp. 133-42.

Costa-i-Font J, Kanavos P, Rovira J (2007), Determinants of out-of-pocket pharmaceutical expenditure and access to drugs in Catalonia, Applied Economics *39,* no. 5, pp. 541-551.

Crawford P, Feely A, Guberman G, Kramer G (2006). Are there potential problems with generic substitution of antiepileptic drugs? A review of issue, available at www.sciencedirect.com.

Dalen DM, Strom S, Haabeth T (2006), Price regulation and generic competition in the pharmaceutical market, Health Economics Research Programme at the University of Oslo HERO 2006, Working paper 1

Danzon M, Chao LW (2000), Does regulation drive out competition in pharmaceutical markets?, Journal of Law and Economics, 43(2), pp. 311-357.

Danzon P, Epstein A (2005), Launch and Pricing Strategies of Pharmaceuticals in Interdependent Markets.

Danzon P, Wang R, Wang (2003), The impact of Price Regulation on the Launch Delay of New Drugs - Evidence from Twenty-Five Major Markets in the 1990s, NBER Working Paper No. W9874.

Danzon P, Wang R, Wang (2005), The impact of price regulation on the launch delay of new drugs-evidence from twenty-five major markets in the 1990s, Health Economics, John Wiley & Sons, Ltd., Volume 14(3), pp. 269-292.

Department of Health (2005), Summary of the PPRS, available on http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4093395

Department of Health (2006), Selection criteria for referral of topics by NICE, available on http://www.nice.org.uk/niceMedia/pdf/DH_selection_criteria_July_06.pdf

De Wolf P, Brouwer WBF, Rutten FFH (2005), Regulating the Dutch pharmaceutical market: improving efficiency or controlling costs, International Journal of Health Planning and Management 20(4) **,** pp. 351 – 374.

Ellison SF, Cockburn I, Griliches Z and Hausman J (1997), Characteristics of demand for pharmaceutical products: an examination of four cephalosporins, RAND Journal of Economics, 28(3), 426–46.

Espin and Rovira (2007), Analysis of differences and commonalities in pricing and reimbursement systems in Europe, Brussels.

Frank RG, Salkever D (1997), Generic Entry and the Pricing of Pharmaceuticals, Journal of Economics & Management Strategy, Volume 6 Issue 1, pp. 75 – 90.

Frank RG, Salkever DS (1992), Pricing, patent loss and the market for pharmaceuticals, Southern Economic Journal, Volume 59, pp. 165–179.

Grabowski H, Vernon J (1986), Longer patents for lower imitation barriers: The 1984 Drug Act, American Economic Review, Volume 76(2), pp. 195-198.

Grabowski H, Vernon JM (1992), Brand loyalty and price competition in pharmaceuticals after the 1984 Drug Act, Journal of Law and Economics, Volume 35(2), pp. 331-350.

Grabowski H, Vernon JM (1993), Returns to R&D on new drug introductions in the 1980s, J Health Econ., Volume 13, pp. 383-406.

Kanavos P (2007), Do generics offer significant savings to the UK National Health Service?, Current Medical Research and Opinion, Volume 23, No 1, pp. 105-116.

Kanavos P (2008), Generic policies: rhetoric vs. reality, Euro Observer Volume 10, Number 2, Summer 2008, pp. 1-6.

Kanavos P, Costa Font J and McGuire AJ (2007), Product differentiation, competition and regulation of new drugs: The case of statins in four European countries, Managerial and Decision Economics 28, pp. 455-65.

Kanavos P, Costa-Font J, Seeley E (2008), Competition in off-patent drug markets: Issues, regulation and evidence, Economic Policy Volume 23 Issue 55**,** pp. 499 – 544.

Kanavos P, Mossialos E (1999), What we know and what we do not know, Journal of Health Services Research and Policy, 4(2), pp. 122-26.

Kanavos P, Srivastava D (2008), The impact of patent expiry on product competition and generic market entry: Evidence from 4 European countries, European Journal of Health Economics, under consideration.

Kullman D, United Kingdom Pharmaceutical Price and Reimbursement Regulations, available at http://ec.europa.eu/enterprise/phabiocom/docs/tse/uk.pdf.

Kyle M (2005), Pharmaceutical Price Controls and Entry Strategies, Duke University, available on http://www.duke.edu/~mkyle/Price_controls_and_entry.pdf.

Kyle M (2006), The Role of Firm Characteristics in Pharmaceutical Product Launches, The Rand Journal of Economics.

Kyle M (2007), Margaret Kyle: Pharmaceutical Price Controls and Entry Strategies, Review of Economics and Statistics, 89:1, pp. 88-99.

Lanjouw JO (2005), Patents, Price Controls, and Access to New Drugs: How Policy Affects Global Market Entry, NBER Working Paper No. W11321.

LFN Report (2007), The Swedish Pharmaceutical Reimbursement System, available at, http://www.lfn.se/LFNTemplates/Page____389.aspx.

Lu ZJ, Comanor WS (1998). Strategic Pricing of New Pharmaceuticals, Review of Economics and Statistics, 80 (1), pp. 108-118.

Mrazek M (2002), Pharmaceutical Pricing in Developing Countries: Issues of Access to Medicines, Expert Review of Pharmacoeconomics & Outcomes Research 2, no. 1, pp. 43-50.

Mrazek MF, Frank R (2004), The off-patent pharmaceutical market, in E. Mossialos, M. Mrazek and T. Walley: Regulating Pharmaceuticals in Europe: Striving for Efficiency, Equity and Quality, Buckingham: Open University Press.

OPG Group (2008), Press Release, Preference policy causes extreme price decline, available at www.opggroup.nl.

Pavenik N (2002), Do pharmaceutical prices respond to potential patient out-of-pocket expenses? Rand J Econ., 33(3), pp. 469-87

PPRI Report final (2008), Pharmaceutical Pricing and Reimbursement Information Report, Vienna, available at http://ppri.oebig.at/.

PPRI Report France (2007), Pharmaceutical Pricing and Reimbursement Information Report France, Vienna, available at http://ppri.oebig.at/.

PPRI Report Germany (2008), Pharmaceutical Pricing and Reimbursement Information Report Germany, Vienna, available at http://ppri.oebig.at/.

PPRI Report Norway (2007), Pharmaceutical Pricing and Reimbursement Information Report Norway, Vienna, available at http://ppri.oebig.at/.

PPRI Report Norway (2007), Pharmaceutical Pricing and Reimbursement Information Report Norway, Vienna, available at http://ppri.oebig.at/.

PPRI Report Sweden (2007), Pharmaceutical Pricing and Reimbursement Information Report Sweden, Vienna, available at http://ppri.oebig.at/.

PPRI Report UK (2007), Pharmaceutical Pricing and Reimbursement Information Report United Kingdom, Vienna, available at http://ppri.oebig.at/.

Rudholm N (2001), Entry and the Number of Firms in the Swedish Pharmaceuticals Market, Review of Industrial Organization, Springer, Volume 19 (3), pp. 351-364.

Schulenburg JM, Schöffski O (1997), Unintended Effects of Cost-Containment Policy: Results of a Natural Experiment in Germany, Social Sceince & Medicine, Vol. 45, No. 10, pp. 1537-1539.

Schumacher, Greiner (2008), Festbeträge als Instrument der Ausgabensteuerung in der GKV, Systematik der Berechung und resultierende Wirkungen, in: Gesundheits- und Sozialpolitik, No. 1, pp. 53-64.

The Local (2008), Parliament vote ends pharmacy monopoly, available at http://www.thelocal.se/11644/20080509/, May 9th

Vandoros S, Kanavos P (2008), Regulated pharmaceutical markets: The generics paradox revisited, LSE Health Working Paper. Forthcoming.

Wiggins SN, Maness R (1995), Price Competition in Pharmaceuticals: The Case of Anti-Infectives, unpublished paper.

Wiggins SN, Maness RS (2004). Price competition in pharmaceuticals: The case of anti-infectives, Economic Inquiry, 42, pp. 247–62.

Abstract

Die vorliegende Arbeit beschäftigt sich mit den ansteigenden Kosten in Pharmamärkten in Europa. Ziel ist es empirisch unterlegte Implikationen für Politiker zu liefern, um den anhaltenden Trend der ansteigenden Kosten im Pharmasektor zu unterbinden. Hierfür wird vorerst die Problematik der ansteigenden Kosten im Pharmamarkt beleuchtet, eine ausführliche Einführung in mögliche Erstattungs- und Preisregulierungen für Medikamente gegeben und der derzeitige Regulierungsstand in sechs ausgewählten Ländern in Europa (Deutschland, England, Frankreich, Schweden, Niederlande und Dänemark) beschreiben. Anhand eines IMS Datensatz (1991-2006) werden anschließend in den ausgewählten Ländern empirisch die Einflüsse spezifischer Regulierungen auf patentierte und generische Preise untersucht. Die empirischen Ergebnisse zeigen, dass nur wenige Regulierungen einen statistisch signifikanten Einfluss auf die Preise von Medikamenten haben, jedoch der Wettbewerb mit Generika und die Anzahl der Generika in einem Markt, Preise signifikant verringern können.

Academic CV

Name:	Johann-Friedrich Albert Graf von der Schulenburg
Birthday:	4th of March 1985 in Berlin (DE)
Citizenship:	German

07/2008 – 11/2008	London School of Economics and Political Science, UK Economics, Research Student "Diploma-thesis" on "Regulation in European Pharmaceutical Markets"
Since 10/2004	University of Vienna, AT Economics, Student
Since 10/2004	University of Vienna, AT Art History, Student
Until 05/2004	Wilhelm Raabe Gymnasium, DE Bilingual Abitur
10/1995 – 02/1996	Ephesus Elementary School, USA
07/1991 - 09/1995	Gleidinger Grundschule, DE
Scholarships	Scholar of the German National Academic Foundation (Studienstiftung des deutschen Volkes)