

2. The Pharmaceutical Industry

Understanding the actions taken by pharmaceutical firms in order to thwart competition requires the information on how the pharmaceutical sector is constructed. The pharmaceutical market, referred to in this paper, contains all firms that produce or develop pharmaceuticals or compounds that are used to produce drugs and all other participants that interact with those firms for the purpose of selling or purchasing a drug, not regarding other healthcare products. Furthermore, understanding of which market participants exist and how important it is for an economy to keep this sector growing by supporting its production and development, is required to understand anticompetitive actions performed by pharmaceutical innovators. This chapter will give an overview on the above defined market, how drugs are developed and launched, how costs for drugs are assembled and on the constituents of pharmaceutical firms' costs. As a conclusion, section 2.5 will show why firms have a motivation to prevent competition and which actions innovating drug manufacturers can choose to thwart competition.

2.1 Facts and Figures

The modern pharmaceutical industry is fairly profitable. In 2014, total revenues of the world pharmaceutical market added up to about € 965.03 billion¹ and is expected to reach € 1,159.7 billion² in 2018 (IMS Health 2015: 1; IMS Health 2014: 5). Exports of pharmaceutical goods are important for the economy of developed countries. In 2014, for example, pharmaceutical exports in Europe amounted to € 316,000 million. According to the European Federation of Pharmaceutical Industries and Associations (EFPIA), pharmaceutical imports, however, were only € 238.5 billion, leaving a Trade balance of € 78 billion (2015: 2). In comparison, the European automotive sector showed a trade balance of € 95.1 billion, with € 124.2 billion exports and € 29.1 billion imports (European Automobile Manufacturers Association (ACEA) 2015: 50). Although the automotive industry exhibited a higher trade balance, the overall amount of money circulating was much higher in the pharmaceutical sector. This proves the importance of the pharmaceutical sector for the European economy.

¹ This value is converted from United States-Dollar (\$) (USD) to Euro (€) (EUR), referring to the exchange rate of 1st August, 2015, because that date's exchange rate approximates the average value exchange rate of 2015. The referencing value published by Institute for Healthcare Informatics (IMS Health) (2015) amounts to \$1,057.1 billion.

² This value is converted from USD to EUR, referencing to the exchange rate of January 8th, 2016. The referencing value published by IMS Health (2014) amounts to \$ 1,300 billion.

The pharmaceutical industry, in addition to that, does not only contribute to high export rates within the European Union but the market is one of the most important employers worldwide (Ostwald, Zubrzycki, and Knippel 2015: 5). For example, according to Ostwald, Zubrzycki, and Knippel (2015: 15) in 2012, about 4.4 million people were employed in the pharmaceutical sector globally (which corresponds to about the whole population of New Zealand in 2012 (The Worldbank 2016)).

Additional to its importance in economic trade, the pharmaceutical sector is one of the most important sectors in Research and Development (R&D) matters. This is consistent with the findings of Dubois et al. who conclude that the intensity of innovation grows with market size (2015: 848). The European Commission states that in 2015, more than five pharmaceutical companies were amongst the top 20 of the firms with the world's highest spending on innovation (2015: 43). With Novartis as number five, spending € 8.3 billion on R&D, and Roche (€ 7.4 billion), as well as Johnson&Johnson (€ 6.99 billion) following as number seven and eight, making the pharmaceutical industry one of the leading R&D sectors. In comparison to that, Volkswagen came in first, spending € 13.1 billion on R&D (European Commission 2015: 43). Even though no pharmaceutical company could reach number one of the most research intensive companies, the European Commission affirms that the pharmaceutical sector in total was the world's most research intensive sector in 2015 with more than € 100 billion spent on R&D. The automobile sector could only reach the second position with a spending of around € 90 billion (European Commission 2015: 50).

The R&D of new drugs is one of the main reasons why the pharmaceutical market is so important for many economies. The development of new drugs constitutes to the improvement of quality of life and the increase of life expectancy which both directly influence the welfare of an economy. At the same time R&D intensive manufacturers bare the risk of significant profit losses due to differences of profits before and after patent termination. Although there is high market potential in the pharmaceutical industry, many firms try to restrict other companies from competing for their market share by not only trying to develop differences to the goods offered by competitors but also paying the competitor to delay market entry (Kesselheim, Murtagh and Mello 2011: 1439). In order to comprehend why it is important for drug producing firms to reduce competition it is necessary to understand how the innovation process of pharmaceuticals works and how costs for development emerge, as presented in the following.

2.2 R&D Process and Cost Development

Before a newly innovated drug enters the market, it has to pass through several phases to prove that it does not endanger patients' lives because of side effects. It also needs to

be proved, that the drug offers additional benefits in comparison to other pharmaceuticals that are already available on the market (Grabowski and Wann 2008: 379). The phases before the market launch of a drug can be divided into five basic phases, as is shown in Figure 1.

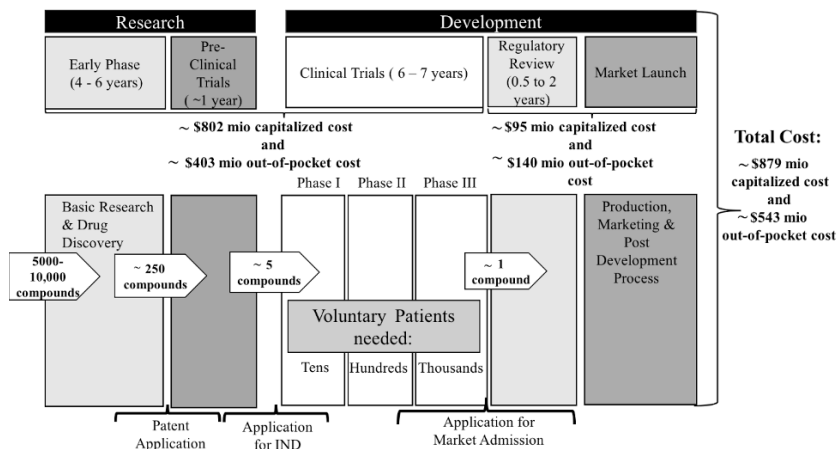


Figure 1: The Pharmaceutical R&D Process, own representation based on Center for Drug Evaluation and Research (CDER), 1998: 3; Phrma 2015: 45; DiMasi, Hansen, and Grabowski 2003: 173.

The first phase is the so-called “early phase”. In this phase the R&D lab searches for promising compounds. The recent method for this search is to examine diseases for their pathogens which trigger the diseases in the human body. The goal is to find targets that weaken the pathogens and create compounds to develop a new drug or an improvement to an existing drug (Swinney and Anthony 2011: 507). A plethora of promising compounds are collected through open-innovation processes, collaborations with public laboratories and private research work (Cockburn and Henderson 2001: 12-15). According to the International Federation of Pharmaceutical Manufacturers and Associations (IFPMA)³, it contains about 5000-10000 compounds (2014: 8). These compounds are screened for effectiveness and likelihood to become a successful medicine. At the end of the phase, after four to six years, about 250 compounds are taken under Intellectual Property Rights (IPR) protection for further development and finding of new pharmaceuticals. This means, producers get patent protection for their compounds (IFPMA 2014: 8).

³ Note: IFPMA is a pharmaceutical lobby organization. However, I refer to their publication as it gives a specific overview about development times of drugs which I was not able to find elsewhere.

After the early phase, there is a phase of pre-clinical testing. Within this phase, the compounds are tested for their efficacy to fight diseases. This examination is not yet performed on patients but rather on animals or in test tubes. The duration of this phase takes approximately one year and screens all compounds for clinical usage. At the end of the preclinical trials, there are typically around five compounds left, to apply for clinical trials. Those two early phases of pharmaceutical invention can be seen as the research part of the R&D process and together with the clinical trials amount to the greatest part of costs in the innovation process (Cockburn and Henderson 2001: 8; IFPMA 2014: 8; DiMasi, Hansen and Grabowski 2003: 173).

Following the phases of research is the phase of clinical trials. Clinical trials test the preparations for their effectiveness on the human body and examine if any other side effects concerning human health occur when using the compound (DiMasi, Hansen, and Grabowski 2003: 156). In order to perform the clinical trials, firms have to apply for Investigational New Drug (IND), to get permission for their test on patients. Since the clinical trials have to give proof for the safety and additional benefit of the new drug, independent physicians and researchers have to supervise the efficacy-tests on voluntary patients (Pharmaceutical Research and Manufacturers of America (Phrma) 2015: 46). The clinical trials can be divided into three sub-phases that are referred to as Phase I, Phase II and Phase III. The phases define the number of subjects tested on. If a compound is approved for the next phase, additional test subjects are required. Therefore, the number of voluntary patients required reaches up to thousands until phase three can be completed and the compound can apply for market approval (Grabowski and Wann 2008: 379). Overall, the clinical trials last for six to seven years on average. During the process, most of the compounds are eliminated because of safety issues for the human body and in the worst case scenarios there are no compounds left to apply for market admission. However, on average, there is one compound left that can apply for accreditation (IFPMA 2014: 8).

Before the drug can be launched on the market, a regulatory review board has to examine the drug's efficacy and cost-effectiveness. If the regulators give permission for market launch, which can take up to additional two years, the pharmaceutical can enter the market. Finally, after 12 to 14 years of R&D, the drug is available for patients and the main R&D investments are done (Cockburn and Henderson 2001: 8; IFPMA 2014: 8). Patent protections usually lasts 20 years (35 United States Code (U.S.C) § 154 (a) (2); Article 63 European Patent Convention). In addition, data exclusivity for marketing of the pharmaceutical is granted, meaning no other company can use data on clinical trials and compounds to start developing a similar product. This exclusivity amounts to 11

years in the EU, according to the 8+2+1 rule. The rule grants an eight-year data exclusivity period, additional two years for exclusively marketing and a possibility to one year of extension. This ensures that the innovating company is granted 11 years of exclusivity, even if the patent already expires shortly after the drug launch (European Union⁴). In the US, however, manufacturers who gain market approval for innovative pharmaceuticals are granted 5 years of data and market exclusivity before any other company can access clinical trial data, according to U.S.C. Title 21 §355.

Applications for patents are submitted approximately 6 years after the screening of compounds (IFPMA 2014: 8). Then, there are seven to eight years needed for R&D, i.e. preclinical trials and the development phase of the R&D process. Hence, after the product is launched, a drug manufacturer has about 14 years of patent protection left, which is consistent with the findings of Grabowski and Kyle (2007: 497-499). Following Scott Morton and Margaret (2012: 772), the R&D expenses constitute the greatest part of the drug production process, imposing a large scale of fixed and sunk cost for the innovating company. Production cost of the drug generally only adds a small amount of marginal cost to the total cost of production. In this context, DiMasi and Grabowski (2007: 477) found, that the pre-clinical R&D process approximately amounts to \$ 439 million capitalized cost on average and the clinical phases amount to about \$ 879 million capitalized cost on average, leading to sunk cost for innovation of about \$ 1318 million capitalized cost on average. Adams and Brantner (2006: 424), however, estimate total cost of innovation is about \$ 802 million capitalized cost on average and DiMasi, Hansen, and Grabowskis' (2003: 173) analysis finds capitalized cost to amount to \$ 897 million on average. This difference in estimates occurs due to the fact of different companies and drugs analyzed. Where DiMasi and Grabowski (2007: 477) analyze large US pharmaceutical producers, Adams and Brantner (2006: 424) examine pharmaceutical manufacturers with variations in size and value of drug. Nevertheless, both authors agree, that expenditures for R&D have risen over the past decades. This is consistent with the findings of DiMasi, Hansen, and Grabowski (2003: 162), stating that an increase in innovation costs can be observed due to the fact, that cost for clinical trials increased over the last decade, due to more treatments being available for patients. Therefore, more side-effects can occur because more than one or two drugs interact. Since the R&D process includes the largest part of production costs for pharmaceutical companies and profits can only be gained after the product is launched, firms have an incentive to keep the development time as short as possible in

⁴ See European Union (2004) 'Directive 2004/27/EC', *Official Journal of the European Union L 136/34*, URL: <http://goo.gl/0eTbFJ> (retrieved May 9, 2016).

order to gain as much patent protected time in the market as possible. After the patent protection has expired, other companies enter the market and competition starts, reducing profits for the innovating firm (Adriaen, De Witte and Simoens 2008: 176). Hence, the innovator has to generate as much profit as possible within the years of patent protection in order to compensate expenditures for R&D both, for the existing product and future products that may not ever make it to market and come at a loss to the firm. However, even if the basic process of pharmaceutical innovation is over, after the drug is launched, further costs arise for the life-cycle management of the good. Not only do firms need to advertise their product in order to raise their sales and refinance their investments spent on R&D (Brekke and Kuhn 2006: 103). But also due to pharmacovigilance, i.e. the monitoring of drug's side-effects and safeness, firms need to constantly adjust their products throughout the drug's lifetime. Pharmacovigilance has grown important for firms over the last few decades. It ensures that the intake and side-effects of drugs are monitored throughout the lifetime of a drug to ascertain safety and to detect Adverse Drug Reactions (ADR) that remain undetected during clinical trials (Grabowski and Wann 2008: 386). Even though there are three phases in pharmaceutical development that test the efficacy of the drug and its side-effects, some ADRs might not be discovered throughout the process of clinical testing (Sportiello et al. 2016: 731). In order to protect patients from suffering under unwanted and unknown side effects, firms have to strictly monitor possible harmful ADRs, which is supervised by the European Medicine Agency (EMA) in Europe and by the Food and Drug Administration (FDA) in the US (European Union 2010: 1⁵; European Union 2010: 74⁶; FDA 2007⁷). As a result, in the EU patients, physicians and other healthcare professionals, pharmaceutical companies, and regulatory authorities are obliged to report any sign of ADR. Those indications of ADR can be reported to the pharmaceutical firm, which then has to report it directly to the authorities. Thus, every company has to position a pharmacovigilance officer that monitors any announcement of ADRs and passes this information on to the authorities (Sultana, Cutroneo and Trifirò 2013: 77). The pharmaceutical firm has to examine their drug to ascertain if the reported ADR is caused by the drug itself or by some other trigger. If the side effects are a result of the drugs' ingredients, the compound has to be changed (Sportiello, et al 2016: 731).

⁵ See European Union (2010), 'Regulation (EU) No. 1235/10 (1)', *Official Journal of the European Union L 348/1-16*, URL: <http://goo.gl/XjnSlt> (retrieved May 10, 2016).

⁶ See European Union (2010) 'Directive 2010/84 EU', *Official Journal of the European Union L 348/74-99*, URL: <http://goo.gl/nVEB3k> (retrieved May 10, 2016).

⁷ See Food and Drug Administration Amendments Act 2007 'Section 801 FDAAA', *121 STAT. 904 Public Law 110-85*, URL: <https://goo.gl/L4Yvzm> (retrieved May 10, 2016).

Finally, it can be said that the cost for drug development and adjustment after market launch are the main reasons for high expenditures on innovative medicine in the healthcare sector. Pharmaceutical companies, therefore, often try to justify high market prices with their high sunk cost for pre- and post- R&D expenditures. These prices constitute to high costs for insurance companies. One example for these high expenses for insurance companies are Humira and Enbrel. In 2014, Abbvie's drug Humira (Adalimumab), a drug that treats rheumatoid arthritis and Crohn's diseases, caused the highest healthcare expenditures in the German market, with € 803.8 million net cost, followed by Pfizer's Enbrel (Etanercept), also treating rheumatoid arthritis and autoimmune diseases, with net cost of € 477.5 million (Schwabe 2015: 10). Schwabe (2015: 10), also states that 25 percent of the total pharmaceutical market expenditures in Germany are generated by the 30 highest cost evoking innovative drugs.

2.3 Pharmaceutical Supply Chain

Even though pharmaceutical innovation and production accounts for a sizeable portion of pharmaceutical costs and is therefore used as a justification for high drug prices, only about 66.5 percent of the drugs' market prices are caused by the pharmaceutical company itself. The additional 33.5 percent are raised by pharmacists, wholesalers and taxes (EFPIA 2015: 14). As a consequence, closer attention to the structure of the pharmaceutical market has to be paid, when explaining the reasons for high drug prices and why pharmaceutical firms have an incentive to deter market competition.

The pharmaceutical industry is different to other industries, in the effect that the market it serves, does not only consist of the two typical market sides supply and demand (Chin 2010: 623). Pharmaceutical manufacturers rather face the issue that the person who consumes the good is not the market participant who also pays for the good, as presented in Figure 2.

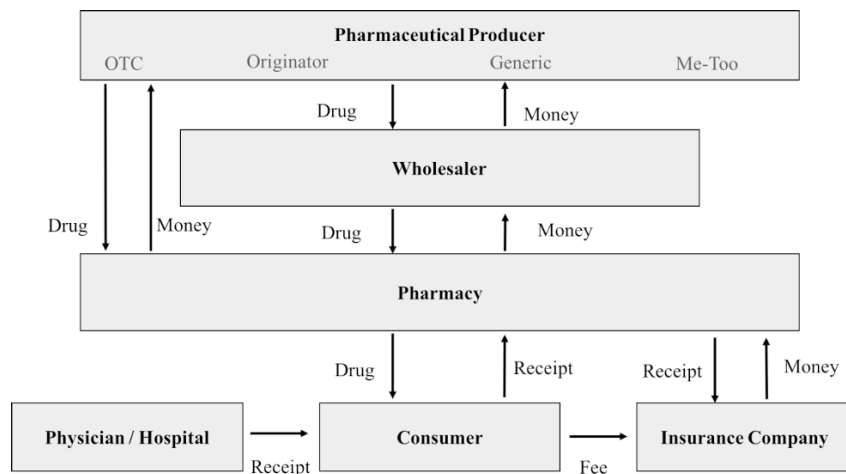


Figure 2: The Pharmaceutical Supply Chain, own representation based on Kanavos and Costa-Font (2005:755), and Pedrosa and Nakano 2009: 379.

Usually, insurance companies bear the medical costs, such as paying for medicines.⁸ Insurance companies in return negotiate with the producers to get discounts (Pedrosa and Nakano 2009: 378; Hosken and Wendling 2013: 187). If there is more than one prescription drug available, containing the same compounds and indication, the insurance company can decide on which drug the patient receives, unless the patients prefer to pay additional cost for another drug out of their own pocket (Puig-Junoy, 2010: 651). Consequently, the demand side is influenced by two participants: the patient who wants to get the best treatment possible and the insurance company that tries to save money by demanding discounts and the cheapest treatment possible.

In addition, consumers demanding the good do not necessarily know their demand and they are not able to directly influence it, respectively (Königbauer 2007: 286). The demand is driven by consumer health. Even if the consumers know what treatment is needed in order to satisfy their demand, they are not allowed to purchase the drug directly from the manufacturer. First, consumers have to reconcile with another market participant, the physician - either in a private practice or at a hospital - who examines the patients and then decides on the right treatment. The physician writes a prescription or directly hands out the drug, if it is an in-patient treatment at a hospital (De Frutosa, Ornaghib and Siotis 2013: 268; Pedrosa and Nakano 2009: 378). Consequently, the

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In the US most insurers, however, also impose so-called “deductibles” where consumers have to pay drugs “out-of-pocket” until they spent a certain amount of money and filled the “deductible”. Then the insurer covers the additional spending on drugs (Wharam, Ross-Degnan, and Rosenthal 2013: 1481).

physician is a third market participant who influences the demand side of the traded good by prescribing the active substance (Richard and Van Horn 2004: 525). Hence, there are three market participants that build the demand side of the market.

On the supply side, there are the pharmaceutical companies forming an upstream market. Pharmaceutical companies do not sell their drugs directly to consumers but rather sell them to wholesalers who sell the pharmaceuticals to pharmacists that retail the drugs to end-consumers (Pedroso and Nakano 2009: 378). This is described in more detail later in this chapter and in chapter 3.1. Pharmaceutical companies cannot all be viewed as perfect competitors, because some drugs they are producing are not necessarily homogenous products. This is due to the fact, that there are four different sub-markets within the pharmaceutical market.

One of the sub-markets is the “originator”, “brand name” or “pioneer” market. This market includes all products that are new to the market at point of entry and offer some new, innovated treatment of diseases (Bardey, Bommier and Jullien 2010: 304). The name “pioneer” or “originator” drug results from the way of production. These pharmaceuticals are new to the market without any other drug offering the same or similar treatment in the way they do. In most countries, copies of those originator drugs are not allowed to have their own brand name but rather have to display the drug-ingredients. The “original product”, in contrast, is allowed to wear a name of own choice. This is why new, patent protected drugs are also referred to as “branded” or “brand name” drugs (Puig-Junoy 2010: 650). All of the products belonging to this market are still or had been patent protected for offering innovative disease treatment. Other firms copy the compound after the patent protection runs out and the first drugs that have similar, or the same ingredients enter the market after the original product’s patent has terminated (Gonzalez et al. 2008: 247; Adriaen, De Witte and Simoens 2008: 176). Within the brand name products market there is no direct competition, because all drugs offered are heterogeneous drugs, as their compounds and efficacy are significantly different to other drugs offered in the market (Brekke and Kuhn 2006: 104). Therefore, the original product market can be viewed as monopolistic for every drug offered (Adriaen, De Witte and Simoens 2008: 176).

The second sub-market is the “generic” market. The generic market handles all drugs that are co-substantial to an original product, i.e. they feature the same active substances as originator products both in quantity and quality, without offering any additional benefit of disease treatment in comparison to the branded drug. This means, all drugs without patent protection, and being equipped with the same active ingredients as the brand name drug belong to the market of generics (Scott-Morton 2000: 1086).

Moreover, the generic market is the market that provides competition to the originator products, because it introduces homogenous products that are available for a smaller price, as generic manufacturers did not need to invest in R&D and entry barriers are abolished after patent termination (Puig-Junoy 2010: 650). One modification of generic pharmaceuticals is the so-called “biosimilar” drug. These pharmaceuticals are not bioequivalent copies of originator products, because their active substance contains biological produced proteins rather than chemical entities, that are produced differently to the active ingredients of branded drugs (Schwabe 2015: 25).

Another sub-market is the market for “me-too” drugs. The market for me-too drugs can be viewed as in-between the market for generics and the market for brand name drugs. Me-too drugs are innovative drugs, meaning they are not bioequivalent to branded drugs because they feature compounds or active substances different to the ones fabricated within originator drugs but treat the same disease (Bardey, Bommier and Jullien 2010: 304). Thereupon, they are under patent protection and could be viewed as competitors to original drugs, even though their active substance does not provide an additional benefit to an originator drug that is already available for consumers (Arcidiacono, Ellickson, Landry and Ridley 2013: 538).

The fourth sub-market is the market for Over-the-Counter (OTC) drugs. Those pharmaceuticals are different to the drugs explained above, because the drugs do not need to be prescribed by a physician. In all other sub-markets prescription by a physician is obligatory. The active substance of OTCs is viewed as not causing dangerous damage to the human body, therefore, patients can decide for themselves, if they want to purchase it, without consulting a physician (Guido et al. 2011: 207). This sub-market is the only one where the demand side is formed by patients only. Patients can decide on demand on their own, depending on their willingness to pay only (Bower, Landreth Grau and Taylor 2013: 228).

Even though all the above mentioned sub-markets feature essential differences in the goods they supply, when analyzing the competition issues of the pharmaceutical industry, all those markets can be pooled into one supply market, with only some exceptions concerning the OTC market. As the drugs are not sold directly to consumers, however, the supply side of the pharmaceutical market is divided into an upstream and a downstream-side (Pedroso and Nakano 2009: 378). The pharmaceutical producers represent the upstream market. On the downstream side of the market, there are wholesalers that distribute the drug through pharmacists. In other distribution methods, the pharmaceutical manufacturer sells directly to the pharmacy, but never to the end consumer (Chakrabarti, Ramos and Henneberg 2013: 360). Although pharmacists

represent the supply side of the market, they can also influence the demand side. With certain exceptions, in Germany for example, pharmacists are obliged by law to sell the drug with the lowest prices to the consumer, if there is more than one drug with the same active ingredients available (§129 Sozialgesetzbuch (SGB) V). This is also the case in most of the US-States, where pharmacists are allowed to substitute the prescribed originator drug with a cheaper generic drug (Scott-Morton 2000: 1087). Imported pharmaceuticals are handled the same way in Germany. Pharmacists are obliged to sell five percent of their total sales as parallel imported pharmaceuticals to consumers according to §129 SGB V. Therefore, pharmacists can influence consumer's demand, by handing them not necessarily the originator product, consumers might prefer due to risk-aversion and acquaintance with the product, but rather the drug that is cheapest in their stock (Chin 2010: 620; Scott-Morton 2000: 1088).

Since pharmacists and wholesalers have to purchase their stock from the producers and then resell it to the consumers, their only way to generate revenues is by achieving high mark-ups. Since the wholesalers and pharmacies are customers of pharmaceutical manufacturers, their revenues are generated through the difference between the price they pay to the pharmaceutical firm and the price at which the wholesaler sells to the pharmacy and the pharmacy to the end-consumer (Chakrabarti, Ramos and Henneberg 2013: 360).

This is possible by negotiating discounts with the manufacturers, because the prices consumers pay for the product are already set by the regulator and insurance companies that negotiate with the producers, respectively (Adriaen, De Witte and Simoens 2008: 176). As already mentioned above, 33.5 percent of drugs prices are charged by wholesalers, pharmacists and taxes (EFPIA 2015: 14). The higher the discounts, wholesalers get, the higher the mark-up they can charge. In order to achieve those discounts, wholesalers tend to cooperate as purchasing associations to gain a higher market share and buyer power. The more wholesalers build an alliance, the less possibilities a pharmaceutical manufacturer has left to sell its product. Therefore, the manufacturer loses bargaining power and the purchasing cooperation gains bargaining power, which increases the strain of pharmaceutical firms, to set prices high enough in order to be able to grant discounts (Chae and Heidhues 2004: 735). In the US for example, there are only about 20 wholesalers with the three biggest wholesalers covering about 90 percent market share (Jambulingam, Kathuria and Nevin 2009: 306). Garattini, Motterlini, and Cornago (2008: 313), however, claim that these wholesalers' buyer power is limited by regulators that determine the maximum margin a wholesaler is allowed to achieve. Moreover, Fisher Ellison and Snyder, (2010: 32) claim that the

intensity of competition between wholesalers influences their power of demand more intensively, than their market share does.

Consequently, there are five market participants determining the supply and demand side. R&D intensive firms have to generate enough revenues to cover innovation costs due to generic and parallel trade competition as well as bargaining power of downstream firms.

2.4 Different Regulatory Provisions

When analyzing the actions of pharmaceutical market participants that infringe perfect competition, it is also necessary to understand why the pharmaceutical market is different from other markets where goods are sold without any restrictions. One of the main aspects is the fact that the drug industry is a strictly regulated industry. Reference Price Regulation (RPR) and Price Cap Regulation (PCR) are the most commonly used regulation schemes within Europe and the US (Ruggeri and Nolte 2013: 16). Both regulation mechanisms aim to restrict pharmaceutical firms from charging high prices for their drugs, especially while their drug is still patent protected and does not have to face competition.

With PCR, the regulator restricts the drug company's ability from setting the market price for its patented drug higher than a certain maximum price defined by the regulator, i.e. the regulator sets a maximum price that is lower than the price, a profit maximizing firm would set (Brekke, Grasdal and Holmas 2009: 171). RPR, however, is becoming more established in European countries, replacing former PCR in the last decades because it does not restrict the firms in choosing the price for their drugs. Nevertheless, it restricts patients' rates of reimbursement, i.e. the price the insurer reimburses for the drug. Any difference between price for the drug and reimbursement rate has to be paid by the patient. This reimbursement rate is calculated by the regulator based on the price of drugs with similar ingredients that are sold in so-called reference countries (Brekke, Holmas and Straume 2011: 625). Chapter 3.2 will give a detailed overview about different methods of RPR and how pharmaceutical companies use them to prevent competition.

Another aspect, distinguishing the pharmaceutical market from other goods markets is the elasticity of demand of pharmaceutical products. Since prescription drugs are goods that consumers' health is highly dependent on, the demand for prescription drugs is highly inelastic when they are launched on the market (Brekke, Holmas and Straume 2015: 101). Meaning, an increase in prices does not directly affect the quantity demanded by consumers. However, this is only true for a specific group of drugs, displaying certain characteristic.

The elasticity of demand for originator products, for example, usually is inelastic when the drug is launched on the market. Nonetheless, only as long as the drug is patent protected and does not face any competition through other generics, the demand is inelastic (Brekke, Grasdal and Holmas 2009: 170). Ghislandi (2011: 1137) states that, when generic drugs enter the market, competition arises for the brand name product. Generic producers try to undercut originators' prices in order to capture market power, causing the original manufacturer firm to adjust its prices downward. Ghislandi (2011: 1137) as well as Arcidiacono, et al. (2013: 548) affirm that this is because the market entry of generic drugs offers consumers the opportunity to substitute the originator product by a generic drug and receive the same disease treatment for less expenditures, leading to high cross-price elasticities for the generic competitors and the originator product. The elasticity of demand depends on the level of reimbursement determined by the insurance companies. If there is no RPR, the price for a drug is reimbursed in total. Therefore, there exists inelastic demand in the market for drugs with no RPR and reimbursement of the total drug price (Bardey, Bommier and Jullien 2010: 306).

The pharmaceutical industry faces the problem of dynamic demand structures. Manufacturing firms have to adjust their drug's prices to the changing market conditions and simultaneously accommodate those prices to the predefined regulations. As regulation and demand vary in every country, the originator producers face the problem that their incentive is to gain high revenues to cover their cost of production and R&D and simultaneously keep their prices low enough to be able to compete with other low-cost generic companies.

2.5 Overview of Antitrust and Competition Issues in the Pharmaceutical Industry

The facts presented above about the pharmaceutical industry show the complexity of the pharmaceutical market. The cost for innovation of new pharmaceuticals are increasing each year (DiMasi, Hansen, and Grabowski 2003: 162). Knowing that generic market entry reduces their monopoly profits, originator drug manufacturers try to find ways to extend their market exclusivity and deter entry of competitors.

Market complexity can, in this case, help originator producers to thwart competition. Due to interaction of more than one company on the supply side, branded drug manufacturers can circumvent statutory provision and inhibit competition (Carrier 2014: 2). As there exist various ways to influence market entry of possible competitors which can also be used simultaneously to intensify the effect of staving of competition, figure 3 presents an overview that explains all possible ways to deter competition and shows interactions of such ways, I was able to find and analyze during my studies.

This overview gives an indication for chapter 3 and 4, how the anticompetitive actions interact and where they are situated in the market. The figure consists of two countries, 1 and 2. Country 1 is a high price country, where there are two branded drug companies, A and D, and one generic company E. Country 2 is a low price country, where A also supplies its products and there exists another originator drug producer C, and one generic manufacturer B. Parentheses indicate literature I refer to, and brackets show cases I was able to find where producers already used this method of thwarting competition. Each connection line between two manufacturers or a manufacturer and a wholesaler shows a different method for inhibiting competition. All thin broken arrows show the interaction of drug producers with drug distributors, where money is exchanged for the drug.

In order to understand why it is in some cases easier for drug manufacturers to circumvent statutory provisions in the context of the market complexity, the figure shows the supply chain of a drug in a summarized version, as was presented in chapter 2.3. Manufacturer A owns two branches, one in country 1 and one in country 2. Since demand usually differs between those countries and regulatory provisions lead to differences in reimbursement rates, prices vary between those countries. Hence, parallel trade occurs (Valletti 2006: 315). This imposes competition due to arbitrage for producer A, which I will explain in more detail in chapter 3.1. Producer A can, therefore, choose to vertically integrate with a wholesaler, i.e. obtain vertical price control (Birg 2015: 561).

As A is now able to influence parallel distributed drug prices, A is able to compete on the downstream level with parallel traded drugs and can secure market shares and prevent profit losses. In addition to that, producer A can align prices in the two countries (Danzon, Mulcahy, and Towse 2015: 240). This convergence of prices reduces the margin of wholesalers, preventing them from performing arbitrage. In this case prices do not have to be exactly equal in both countries due to transaction costs of parallel trade (Bart 2008: 999). Hence producers are still able to perform a version of price discrimination. Another possibility to deter competition by parallel trade is to change the product in one of the two countries to achieve a difference between the offered drugs. In this case, producer A offers the same pharmaceutical in both markets but different administration forms. If there are differences in market approved administration forms drugs cannot be imported. For that reason, parallel trade is not possible (Moore and Montagnon 2010: 688).

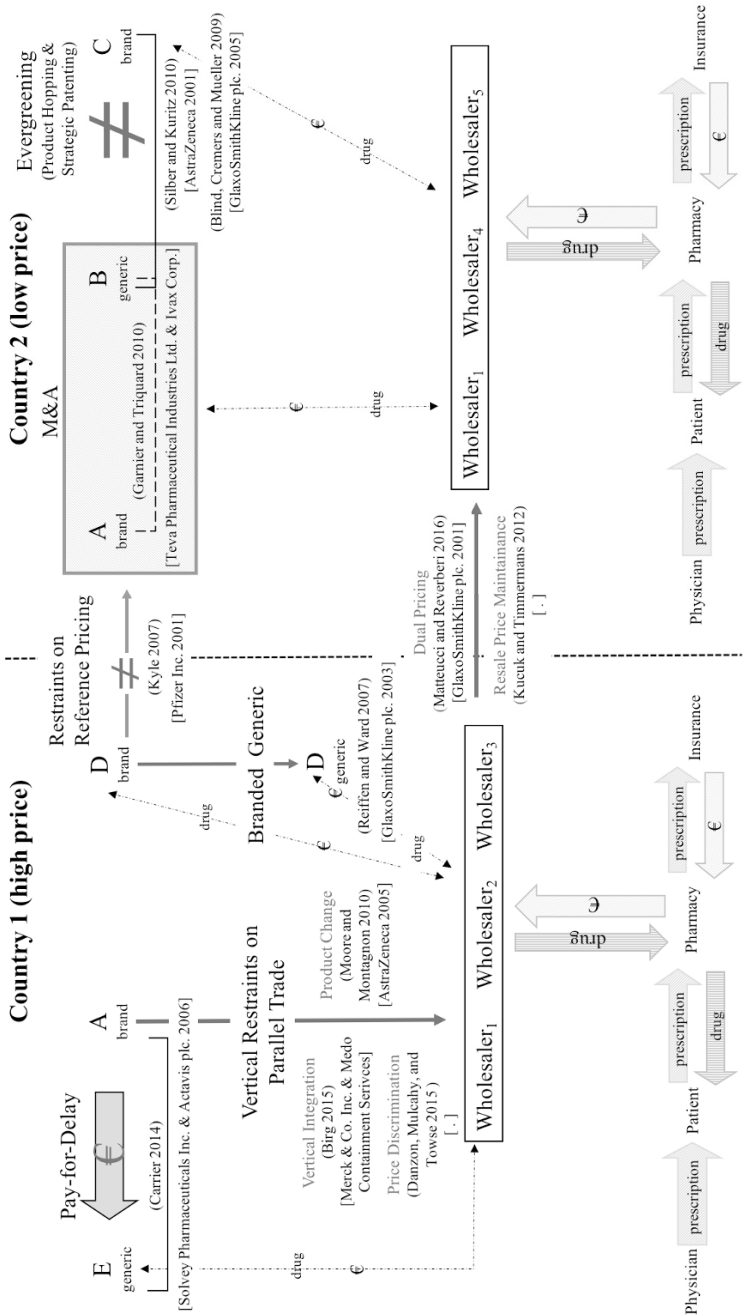


Figure 3. Model of Antitrust and Competition Violation in the Pharmaceutical Industry, own representation

If a change of the drugs administration form is not feasible, manufacturer A can alternatively induce a price floor, where wholesalers are obliged to sell the drug at the retail level for the price, the manufacturer induced. This is also called Resale Price Maintenance (RPM). It helps branded drug producer A to influence the price at retail level and ensures that parallel traded drugs are not sold at a lower price than the drug produced in the country of origin (Kucuk and Timmermans 2012: 537). As RPM often violates competition law and is only applicable in some exceptions, there is another way to prevent parallel trade. Producer A, can induce so-called “dual pricing”. In this case A sells the drug for a higher price to wholesalers in country 1 that want to export the drug to country 2. With this, firm A ensures that the distributors’ margins become low and they have less incentive to perform parallel trade (Matteucci and Reverberi 2016: 51). Along with parallel trade reducing profits of originator drug manufacturers, regulatory provisions can reduce drug prices and lead to a reduction in profits of brand name drug manufacturers. Especially external reference pricing, which is analyzed in more detail in chapter 3.2, induces competition to patent protected drugs as reimbursement rates are calculated with reference to similar pharmaceuticals in other countries (Valletti 2006: 315). Since prices for similar treatments vary across countries 1 and 2, drug producer D can circumvent lower reimbursement levels when not launching the drug in the lower price country 2. This is due to the fact, that there is no lower price, regulators can refer to when choosing a regulating scheme based on external reference pricing (Kyle 2007: 88).

Parallel trade and regulatory provisions, however, are not the only cases that induce competition to a branded drug. After patent termination, generic entry leads to competition. This competition does not only reduce prices but also takes away branded drug producer D’s market shares. Therefore, D’s profits decrease as firm D has to reduce prices and is not able to serve the whole demand (Grabowski and Kyle, 2007). Firm D can prevent significant losses of market shares by producing an own generic drug called “branded generic”. Manufacturer D sells the branded generic when D observes other generic drugs entering the market. This does not totally deter generic competition, but reduces profit losses, as D is able to compete with a generic product (Reiffen and Ward 2007: 254). Another form of generic competition deterrence is performed by brand name firm C in country 2. This action is the so-called “Evergreening”, where additional patents are filed for a changed product (product hopping) or a changed indication (Extending Indication Approval). The generic competitor B is then only able to offer a substitute for one product version and C can serve the whole market with the enhanced

product versions (Hemphill and Sampat 2012: 328; Silber and Kuritz 2010: 121; Blind, Cremers, and Mueller 2009: 428).

In addition to these actions, where only one firm deters competition, there are interactions between generic and branded drug producers to delay competition after patent termination. One of these actions is the “pay for delay” agreement. In the case of pay for delay, firm A, settled in country 1, pays firm E a certain amount of money. In exchange for the transaction, firm E delays its market entry by a specified amount of time that A determines. In some cases, this pay for delay happens related to product hopping or launch of branded generics, which will be explained further in chapter 4.1. (Carrier 2014: 6)

In contrast to pay for delay, where both companies only agree on a certain action, there exists the cooperation of a branded and generic drug manufacturer. This is the so-called Merger and Acquisition, where both firms build a new firm which is performed in country 2, where the branded drug manufacturer merges with (or acquires) the generic manufacturer (Garnier and Trinquard 2010). In this case the branded drug producer cannot only hinder the generic producer from launching the drug on the market but is also able to produce branded generics cheaply, as explained in chapter 4.2 (Cefis and Marsili 2015: 699). Figure 3, thus, gives an overview over the pharmaceutical industry, including actions branded manufactures can perform to weaken, delay or deter entry of competitors.

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