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Current incentives for pharmaceutical research and development across Europe

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Current incentives for pharmaceutical research and development across Europe

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ABSTRACT: The cost of creating a new life-saving, breakthrough, and innovative drug is extremely high. Pharmaceutical research is not only complex and incredibly expensive, but it is also unpredictable. Researchers are constantly facing not only high development costs but the cost of failure as well. In such a complex scenario, the various incentives available to subsidize R&D become essential. My aim is to analyze some of the different and current mechanisms available in Europe. I will discuss the role of the European Union in funding pharmaceutical, I will take into consideration the patent law system, the Supplementary Protection Certificate as well as data and market protection. For each incentive, I will discuss both the benefits and the crucial aspects, together with the interaction between the different incentives in order to promote innovation. Even though more push and pull programs are currently available, I will discuss the ones that I believe that we can use both as incentives and a proper tool to leverage drug prices. Moreover, I will briefly analyze how some these well-intended incentives might be abused by companies to extend their legal monopoly and what are some proposals that could be advanced.

KEYWORDS: Incentives for pharmaceutical research; Pharmaceutical patents; Supplementary Protection Certificate, Pull and Push Incentives for R&D; Competition Law

1. Introduction

In 1946, the World Health Organization (WHO) was the first institution to formulate a general and universal right of health. In this regard, the WHO Constitution recognized that «the enjoyment of the highest attainable standard of health is one of the fundamental rights of every human being»[1]. Across the world, this right has been interpreted in many different ways, including the right to health, described by the Dutch National Ombudsman as a requirement for the health authorities to pursue scientific development in the field of health[2]. However, the right of health does not rise and fall within scientific advantage in medicine. In fact, in order to respect such right, scientific discovery must be accessible to society. In this scenario, we must place the delicate balance between incentives that offer legal protection to improve medicine and the universal right to healthcare, meaning the accessibility to new and advanced drugs.

New drugs introduced in the market are the result of lengthy, costly and risky research and development conducted by pharmaceutical companies. In 2016 a new study from the Tufts Center for the Study of Drug Development estimated that the cost of developing a new drug amounts to $2.7 billion[3]. Considering the

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[1] World Health Organization, *Constitution of the World Health Organization*, 1946.

[2] A. HENDRIKS, *The Right to Health in National and International Jurisprudence*, in *European Journal of Health Law*, 1998, 389-403.

[3] J.A. DI MASI, H.G. GRABOWSKI, R.W. HANSEN, *Innovation in the pharmaceutical industry: New estimates of R&D costs*, in *Journal of Health Economics*, 47, 2016, 20-33.

high cost of innovation, it becomes essential to aid research by providing different incentives. However, even though companies face high costs of R&D, the pharmaceutical industry is not facing a crisis. In fact, despite huge research and development costs, drug companies still have large profits: for example, Eli Lilly has increased its revenue by 6 percent and its net income by 14 percent[4]. Moreover, an important note must be made with regards to the current trend in which pharmaceutical companies are outsourcing R&D. In fact, companies are outsourcing research activities to academics and private small companies in order to be more flexible and more competitive in the market[5]. Nowadays, it is not an overstatement to say that pharmaceutical companies are among the most profitable businesses in the world, despite the high cost of innovation[6].

In this scenario, it becomes essential to balance the mechanisms that we need in order to incentivize research and the right to health of society. This balance is not so simple: while we want to provide incentives to have socially valuable drugs, these incentives are at risk of being abused by companies. In fact, even though the R&D incentives are supposed to help the drug company recoup their investment, «drug companies have proven extraordinarily adept at holding onto their protections»[7] to stay on the market with zero or almost zero competition for longer than the expected period, leading to extraordinarily high prices for drugs.

Today it is unlikely that we will get rid of the patent system or of the other legal protection mechanisms available for R&D. Consequently, in order to avoid unethical and abusive behaviors by drug companies, we need to analyze the mechanisms currently available so as to discuss possible solutions. For this purpose, I will discuss what these incentives are that drug companies are using to recoup their investment. Furthermore, I will briefly analyze how these well-intended incentives could be easily abused, resulting in drugs too expensive to be accessible. I will take into consideration not only intellectual property law, but also the role that push and pull programs play in incentivizing new research. Even though more push and pull programs are currently available, I will discuss the ones that I believe that we can use both as incentives and a proper tool to leverage drug prices.

As a final note, I want to point out that in a unique panorama, such as the European Union, even though Member States can provide their own incentives to R&D, the majority of these mechanisms are regulated by EU law. The European Union aims at harmonizing the current legal framework in order to avoid «heterogeneous development of national laws leading to further disparities which would be likely to create

[4] R. FELDEN, *Drugs, Money and Secret Handshakes,* 2019.
[5] A. BUVAILO, *Pharma R&D Outsourcing is on the Rise*, 2018, https://www.biopharmatrend.com/post/30-pharma-rd-outsourcing-is-on-the-rise/.
[6] L. CHEN, *The Most Profitable Industries in 2016*, 21 December 2011, https://www.forbes.com/sites/liyanchen/2015/12/21/the-most-profitable-industries-in-2016/#37e337095716.
[7] R. FELDEN, *Drugs, Money and Secret Handshakes,* cit.

obstacle to the free movement of medicinal products within the Community and thus directly affect the functioning of internal market»[8].

2. Current IP incentives

2.1. Patents

In Europe, as in most parts of the world, a patent grants an exclusive right for 20 years. During this time, a patent owner has the right to prevent a third party from making, using, selling or importing a patented technology without her consent. However, for new technology to be patented, it must meet certain requirements. First of all, the invention must fall within the requirement of the patentable subject matter. In this regard, article 52 para. 2 of the European Patent Convention (EPC) excludes discoveries, scientific theories, mathematical methods, aesthetic creations, schemes, rules and methods of performing mental acts, playing games or doing business, programs for computers and presentations of information from patentability[9]. After establishing that a certain technology meets the patentable subject matter requirement, other requirements such as novelty, inventive steps, and susceptibility of industrial application must be met for a patent to be granted.

Taking into consideration the role of patents in medical research, it is well-established that pharmaceutical products such as drugs fall within the patentable inventions under article 52 of the EPC. In fact, there is no doubt that it is possible to patent a drug if the invention meets all of the other requirements[10]. The patentability of a drug is a useful tool to incentivize research and further medical innovation. This has been clearly stated by the Italian Constitutional Court in 1978 when it held unconstitutional a law which excluded drugs from the patentable subject matter[11]. Part of the rationale of the decision was based on article 9 of the Italian Constitution which states that «the Republic promotes the development of culture and scientific and technical research»[12] and on article 32 that establishes a universal right of health by stating that «the Republic safeguards health as a fundamental right of the individual and as collective interests and guarantees free medical care to the indulgent»[13]. The Court interpreted the right of health care as not only the right of accessing a specific treatment but also as the right to have new and innovative pharmaceutical

[8] Regulation (EC) No. 469/2009 of the European Parliament and of the Council, 2009, May 6.
[9] Art 52 of the European Patent Convention (EPC), Administrative Council of the European Patent Organization. (1973).
[10] With this regard, it is important to note that the number of patents granted in the field of pharmaceutical research by the European Patent Office has been increasing. In 2016, the EPO has granted a total of 3,089 patents compared to the 2,106 patents granted in 2007. Study of the European Commission.
[11] Italian Constitutional Court Case n. 20 del 1978.
[12] C. CASONATO, J. WOELK (eds.), *The Constitution of the Italian Republic.* Faculty of Law, Trento, http://www.jus.unitn.it/dsg/pubblicazioni/costituzione/costituzione%20genn2008eng.pdf.
[13] *Idid.*

products on the market. In order to have new drugs, the Court notes, patents are essential to incentivize research[14].

In line with the reasoning of the Italian Constitutional Court, we can easily affirm that «patent law traditionally takes the lion's share of credit for motivating investment in drug development»[15]. To better understand the role of a patent in incentivizing R&D, we can also take into consideration the case of unpatentable drugs in which the lack of patent protection usually results in pharmaceutical companies not investing in research and developing of potential valuable drugs[16].

Nonetheless, a patent still constitutes a monopoly, and therefore, is accompanied by a classic side effect: no competition. In fact, «while the positive impact of the patents is the straightforward partial equilibrium effect of increasing the profits of the successful innovator to the monopolistic level, the negative one is the subtler general equilibrium effect of reducing everybody else's ability to compete while increasing for everyone the incentive to engage in socially wasteful lobbies effort»[17]. In this scenario, drug companies have engaged in anti-competitive behaviors that allow them to abuse the patent system in order to extend for a longer period of time their monopolistic position in the market.

First, companies have engaged in the so-called «evergreening problem», which can be defined as «artificially extending the life of a patent or other exclusivity by obtaining additional protections to extend the monopoly period»[18]. As a result of this practice in which companies are obtaining unmerited and dubious secondary patents[19], competition is therefore delayed, and prices are increased[20]. A well-known example is the Gilead patents on sofosbuvir, a cure for Hepatitis C[21]. In 2011, the pharmaceutical company Gilead purchased "Solvandi", and subsequently received approval by the FDA. Gilead managed to recoup not only the initial investment but to triple it in a little more than two years. However, a 2015 WHO study highlighted how out of 21 patents held by Gilead, only two patents were primary patents claiming the base chemical compound[22].

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[14] C. CASONATO, *I farmaci fra speculazioni e logiche costituzionali*, in *AIC*, 4, 2017.

[15] R. EISENBERG, *The Problem of New Uses*, in *Yale Journal of Health Policy*, 5, 2, 2005.

[16] B. ROIN, *Unpatentable drugs and the standards of patentability*, in *Texas Law Review,* 87, 2009, 503.

[17] M. BOLDRIN, D. LEVINE, *The case against patents*, in *Journal of Economic Perspective*, 27, 1, 2013, 3-22.

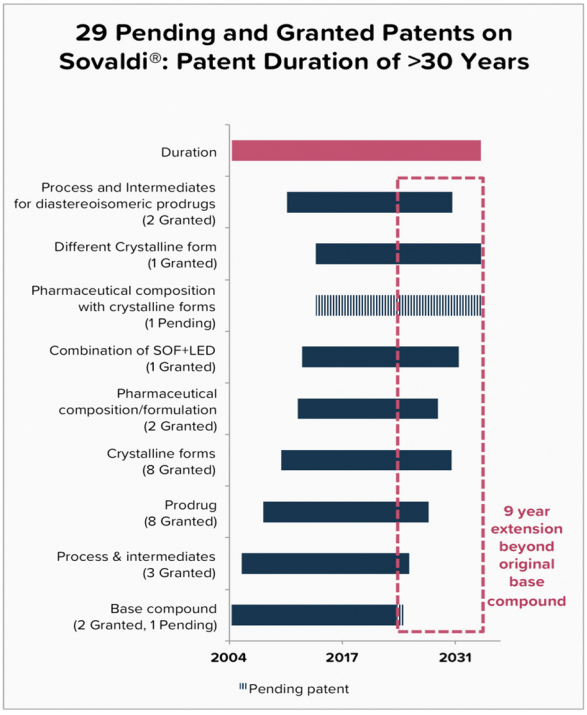
[18] R. FELDEN, *Drugs, Money and Secret Handshakes,* cit.

[19] Here, I find helpful to explain the difference between a primary and a secondary patent, and why secondary patents are often dubious. The term primary patent is usually referred to patents on the active ingredients while secondary patents refer to the patents that cover other aspects of active ingredients such as different dosage forms, formulations, production methods, etc. Secondary patents are often filed after the primary patent in order to extend the period of legal protection. Moreover, secondary patents usually do not meet all of the requirements for patentability, and may be, therefore, invalid.

[20] R. FELDEN, *Drugs, Money and Secret Handshakes,* cit.

[21] This example refers to the patent held by Gilead for sofosbuvir in the United States. The example is illustrative of the ever-greening problem. For more information on the patents held by Gilead with regards to sofosbuvir in different parts of the world *see* T. Reuters, *Patent Situation of Key Products for Treatment of Hepatitis C,* World Health Organization, 2005.

[22] *Ibid*.



Again, a more recent patent analysis conducted by I Mak, a US not-for-profit group, has shown not only that out of the 29 granted patents and filed applications, 26 are secondary patents but also that Gilead has been increasing the number of its secondary patents. Consequently, the combined patent protection for "Solvadi" will result in over 30 years of monopoly[23]. As far as the Gilead case, even though the company has already recouped the investment, the drug will still be marketed at an incredibly high price even after the patents on the original chemical compound expire.

In order to avoid this behavior of patent owners, the role of the patent offices in granting and upholding secondary patents becomes crucial. As far as Gilead's patents of Solvadi in Europe, in 2017 17 different organizations decided to challenge the patents held by Gilead. However, in 2018, the EPO has decided to uphold the patents but in an amended form[24]. The decision has been appealed, and it is currently pending[25].

Second, companies have patented drugs that have no social benefit; in fact, not every drug represents a major improvement in health care. For example, some patented drugs are merely the combination of two already existing drugs, as in the case of Treximent, a drug for migraine that simply combines an old migraine drug with naproxen[26]. Of course, as Robin Felden noted, rather than creating new medicines, pharmaceutical companies are recycling and repurposing old ones, and in this scenario, the patent and the exclusivity systems encourage this behavior[27].

Again, another anti-competitive behavior is represented by the "pay for delay settlements". The "pay for delay" is a strategy that sees brand-name companies transferring some values to generic companies throughout settlements in order to delay competitive entry and maintain high prices. This situation occurs when the patents of the brand-name company have expired or the secondary patents protecting the drugs are weak and likely to be invalidated, and a company who would like to enter the market can file for approval of the generic. Consequently, to extend its monopoly a brand-name company engages in this

[23] I. MAK, *America's Overspend: How the Pharmaceutical Patents Problem is Fueling High Drug Prices,* 2017, http://www.i-mak.org/wp-content/uploads/2017/11/Excess-Costs-Briefing-Paper-FINAL -2017-10-24.pdf.

[24] C. SAEZ, *EPO Upholds Gilead Patent on Hep C Medicine, But in Amended Form*, in *Intellectual Property Watch*, 2018, https://www.ip-watch.org/2018/09/13/epo-upholds-gilead-patent-hep-c-medicines-civil-society-says/.

[25] Intellectual Property Watch, *Brief: Health Advocacy Groups Appeal EPO Decision to Uphold Gilead Hepatitis C Patent*, December 5 2018, https://www.ip-watch.org/2018/12/05/health-advocacy-groups-appeal-epo-decision-uphold-gilead-hepatitis-c-patent/.

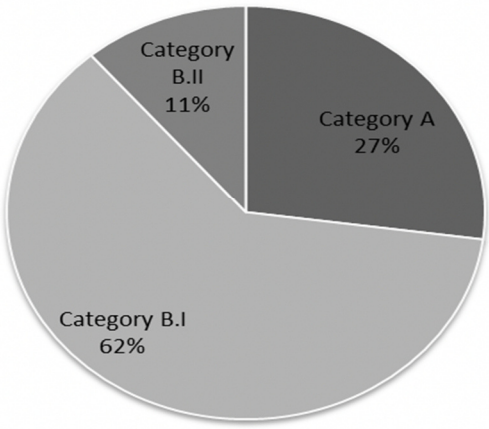
[26] J. FREILICH, *Patent Infringement and the Context of Follow-On biologics*, in *16 Stan. Tech. L. Rev. 9*, 42, n. 186, 2012.

[27] R. FELDEN, *Drugs, Money and Secret Handshakes,* cit.

strategy paying "monopoly rents"[28]. A recent study by the European Commission has shown that between January 2016 and December 2016, patent settlements continue to be used in the pharmaceutical sector. Out of a total of 107 settlements, 62% of them (66 settlements) limited generic market entry, but without value transferred from originator to generic while 11% of the settlements resulted in a limitation of the generic market entry with valued transferred from originator to generic[29]. These settlements should ring an "alarm bell" for the competent authority to investigate possible "pay for delay settlements".

In order to avoid such behavior from pharmaceutical companies, we should not eliminate the patent system, but rather think about competition law, and how it could help avoid such abusive behaviors. The enforcement of competition law helps to secure access to drugs. In fact, together with the European Commission, national authorities can enforce decisions in which pharmaceutical companies are held responsible for breach of antitrust rules (article 101 and 102 TFUE)[30]. Here it is important to note that between 2009 and 2017 the competent national authorities and the Commission have adopted 29 decision finding infringement of antitrust rules resulting in a fine 87% of the time for a total of more than 1 billion euros[31]. However, it must be kept in mind that pharmaceutical companies will probably always be more willing to pay a fine rather than to give up their monopolistic advantage on the market.

Figure 4: Patent settlements per category (January 2016 - December 2016)



Category A: Settlements without limitation of generic market entry (29)

Category B.I: Settlements limiting generic market entry, but without value transfer from originator to generic company (66)

Category B.II: Settlements limiting generic market entry showing a value transfer from originator to generic company (12)

Source: European Commission, 8th Patent Settlement Monitoring Exercise

[28] *Ibid.*

[29] European Commission, *8th Report on the monitoring of Patents Settlements,* 2018.

[30] In this situation, the competent authority can release an order to cease and desist from the anti-competitive behavior and impose a substantial fine.

[31] European Commission, *Antitrust*, retrived from Competition – Pharmaceuticals, 2019, http://ec.europa.eu/competition/sectors/pharmaceuticals/antitrust_en.html.

While some authors think that we should get rid of patents[32], I believe that patents are still needed in order to incentivize research. True, we risk abuse. However, the abusive and unethical conducts of pharmaceutical companies are a pathology of the patent law system, not its physiology. We should analyze the current situation in order to apply competition law to avoid the abuse of well-intended incentives. As a final remark, I want to point out that although it is true that patent abuse can lead to extremely high prices, this is not the only problem we should be concerned with. Especially in the field of pharmaceutical research, the time of patent protection is usually not long enough to let a company recoup the investment. Consequently, this situation has called for more legal protection. In fact, while the patent system might be one of the biggest incentives, it is not the only one. The pharmaceutical reward system is made by a plurality of mechanisms that work by integrating each other. This brings us to a discussion of what are the other legal protection mechanisms.

2.2. Supplementary Protection Certificate (SPC)

As I already explained, a patent lasts for 20 years. However, in the field of pharmaceutical industry, the exclusive rights granted through a patent are usually exploited only in the final years of patent protection. In fact, after a patent is granted, and in order to receive a market authorization from the European Medicine Agency (EMA), a company must go through a number of different phases, such as clinical trials, that are long and expensive. Consequently, before a drug can enter a market, a company may wait many years and face more costs. Of course, during these years, a company cannot derive economic benefits from the drug. This can lead to a number of consequences such as the lack of protection that penalizes pharmaceutical research[33]. In order to face this problem, the European Union enacted a regulation in 1992 granting a company an extended period of IP protection called the Supplementary Protection Certificate[34] which has been modified by the European Regulation No. 469/2009.

A supplementary protection certificate (SPC) is a mechanism that extends the period of patent protection up to five years[35]. The purpose of the SPC is to allow a pharmaceutical company to fully recoup its investment. For this purpose, under article 5 of the Council Regulation (ECC) no. 1768/1992 a medical product covered by an SPC enjoys the same exclusive rights conferred by the basic patent as well as the

[32] M. BOLDRIN, D. LEVINE, *The case against patents,* cit., 3-22.

[33] As the European Regulation No. 469/2009 recites in its preamble: «at the moment, the period that elapses between the filing of an application for a patent for a new medicinal product on the market makes the period of effective protection under the patent insufficient to cover investment put into research».

[34] ECC 1768/92, subsequently modified by EC 469/2009.

[35] Under article 13 of Regulation No. 469/2009 a SCP «shall take effect at the end of the lawful term of the basic patent for a period equal to the period which elapsed between the date on which the application for a basic patent was lodged and the date of the first authorization to place the product on the market in the Community reduced by a period of 5 years». Moreover «the duration of the certificate may not exceed five years from the date on which it takes effect».

same limitation and obligations[36]. In order for an SPC to be granted certain requirements must be met. First, a drug must be protected by a patent in force. Moreover, the pharmaceutical product for which an application is filed must already have a valid marketing authorization, it cannot already have had an SPC, and the valid marketing authorization must be the first authorization to place the product in the market as a medicinal product[37].

Although an SPC grants the same rights of a patent, it must be kept in mind that an SPC is not an extension of a patent, but it is an intellectual property right in itself. It is important to know that the two IP are different. The first difference concerns the subject matter of protection: while a patent is filed as regards to the chemical compound that is the active ingredient in a pharmaceutical product, an SPC is granted to a specific drug[38]. Moreover, while a patent is granted by a centralized procedure in the European Patent Office (EPO), an SPC is granted nationally. Even if the last one seems just a technicality, it is not. A recent report of the European Commission has shown that the situation often leads to contradictory outcomes[39]. In fact, while in Italy, Finland and the Czech Republic less than 5% of the applications are refused, in Germany, Sweden and Spain more than 15% of the filed applications are refused[40]. The European Court of Justice plays a crucial role in the grating or not of SPC. For example, in *Actvis v. Sanofi*, the Court established that a pharmaceutical company that has already filed and obtained a Supplementary Protection Certificate for one active ingredient cannot obtain a second SPC for a different drug that contains the same active ingredient in conjunction with another active ingredient[41].

Lastly, it is essential to understand the interaction between an SPC and a patent. In fact, a simple question can come to mind: if, as in the Gilead case, companies are already making enough profit through patents, why should they be allowed to have even more legal protection? In order to answer this question, we must keep in mind that the anti-competitive strategies adopted by brand-name companies are a pathology of the system. Moreover, in theory, if the company's concern is only to recoup the initial investment, the longer it has exclusive rights, the lower the prices should be. However, under the standard economic theory, a company does not aim only at recouping its investment, but also at maximizing its profits. This means that the company will market the drug at the highest price possible as long as it can. This situation could lead to an increase in the profit at the expenses of the payers[42]. Again, this situation is provided by the competitive

[36] Art. 5 recites of Regulation No. 469/2009 as follow: «Subject to the provisions of Article 4, the certificate shall confer the same rights as conferred by the basic patent and shall be subject to the same limitations and the same obligations».
[37] Article 3 of Regulation No. 469/2009.
[38] Article 4 of Regulation No. 469/2009.
[39] Economics, Copenhagen, *Study on the economic impact of supplementary protection certificates, pharmaceutical incentives and rewards in Europe,* European Commission, 2018.
[40] *Ibid.*
[41] European Court of Justice. (n.d.). C-443/12 - *Actavis v. Sanofi*.
[42] *Ibid.*

status of a drug on the market. In fact, high prices are usually a consequence of the lack of competition in the market. In this instance, two proposals for changing the SPC regulation could be advanced. First, as I already stated, in order to have a SPC a company has to have patent in force. This requirement could be changed from the generic locution "patent" to a more specific one requiring the valid patent to be the primary patent covering the chemical compound. In this manner, a pharmaceutical company could not apply for SPC at the expiration of secondary patents, which are usually the last patents to expire, but would have to apply earlier, at the expiration of its primary patents. Second, the current regulation could be amended to include a "manufacturing export waiver". This amendment would allow generic companies to manufacture the generics in the European Union for the purpose of exporting them to a non-EU country while the SPC is still in force. This waiver, even though it would not affect the brand-name companies' exclusive right directly, it would allow generics companies to enter in the maker as soon as the relevant IP expires. The latter amendment of the SPC regulation has been recently proposed by the European Commission and it currently under discussion[43].

3. Push Programs

Push programs provide financial incentives to reduce the costs of research and development. An example of these mechanisms are governmental funds. In the case of Europe, the best example of public funds available is given by the Innovative Medicine Initiative, a program divided into two phases that aims to support medical research among the different Member States.

3.1. European Union funds: Innovative Medicine Initiative (IMI)

The Innovative Medicine Initiative (IMI) is a partnership between the European Union, represented by the European Commission, and the European Pharmaceutical Industry, represented by the European Federation of Pharmaceutical Industries and Associations (EFPIA)[44].The aim of IMI is to facilitate «open collaboration in research to advance the development of and accelerate patient access to, personalized medicine for the health and wellbeing of all, especially in areas of unmet medical need»[45].

In order to achieve its objective, the IMI has established two funding programs: IMI1 and IMI2. The first program (IMI1) which ended in 2013 had a total budget of €2 billion, of which €1 billion came from the Health Scheme of the EU's Seventh Framework Programme for Research (FP7) and €1 billion was given by EFPIA companies. Today, the IMI is currently funding IMI2, its second program. This program was created by Council Regulation (EU) No. 557/2014 in order to support the development of research and innovation

[43] European Commission, *Press Release Database*. Retrieved from Pharmaceuticals: Commission refines intellectual property rules, 2018, May 28, http://europa.eu/rapid/press-release_IP-18-3907_en.htm.
[44] Innovative Medicine Initiative. (s.d.). *IMI mission and objectives,* https://www.imi.europa.eu/about-imi/mission-objectives.
[45] *Ibid.*

activities in the health industry[46]. This program, which will run between 2014 and 2020, has established a budget of €3.276 billion[47]. According to the provision of Council Regulation (EU) No. 557/2014, half of the funding is provided by EFPIA companies and the other half by taxpayers[48].

The benefits of these funds are indeed many. Public funds are a popular incentive not only for the "regular" pharma research but also for research for orphan and neglected diseases. As an example, the IMI has funded many projects including EBODAC, a program with the goal of creating a vaccine for Ebola[49]. With these funds, the European Union has the power to prioritize important research that otherwise would not be carried out due to the lack of strong patent protection or lack of an available market. In this setting, it is crucial to understand how funds are being allocated and what are the rights of the beneficiaries of these funds. For these purposes, I will first explain who the beneficiaries are and who is the designated owner of the technology invented. I will therefore briefly analyze, given the public nature of funds, what could be hypothesized in order to "pay back" society.

First, in order to understand how the IMI funds work, it is important to comprehend its aim: Article 2 of the Council Regulation establishing the Innovative Medicine Initiative (Regulation (EU) 557/2014)[50] in correlation with the Horizon 2020 regulation (Regulation (EU) 1291/2013)[51] states that the initiative aims to support the development and implementation of pre-competitive research and innovation in order to improve citizens' health and well-being. Secondly, beneficiaries can be both private companies and public research institutions. However, beneficiaries are required to be "independent" legal entities which fall within either of the three following requirements: (1) micro, small and medium-sized enterprises or other companies with an annual turnover of 500 million or less, (2) secondary or higher education establishments or (3) non-profit organization.[52] Consequently, big pharmaceutical companies are excluded from these funds[53]. Lastly, the owner of the invention is the beneficiary, meaning that the exclusive rights granted remain with the beneficiary[54].

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[46] The Council Regulation (EU) No. 557/2014, Article 2.

[47] Innovative Medicine Initiative. (s.d.). *IMI mission and objectives,* https://www.imi.europa.eu/about-imi/mission-objectives.

[48] Council Regulation (EU) No. 557/2014.

[49] Ebovac Projects (s.d.), *EBODAC*, https://www.ebovac.org/ebodac/.

[50] Council Regulation. (2014, May 6). Regulation (EU) No. 557/2014 establishing the Innovative Medicine Initiative 2 Joint Undertaking Text with EEA. *Official Journal of the European Union*. Official.

[51] European Parliament, Regulation (EU) No. 1291/2013 establishing Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020), December 11 2013.

[52] Innovative Medicine Initiative, *Summary of the most relevant provisions for participating in IMI2 actions,* 2014, https://www.imi.europa.eu/sites/default/files/uploads/documents/About-IMI/imi-funding-model/IMI2_provisions_for_participating_in_IMI2_actions.pdf.

[53] Here, it is important to report that even if big pharmaceutical companies cannot apply for funds through the IMI, big pharma could still merge or acquire start-ups and smaller companies. For more information see A. Giniatullina, M. Boorsma, G.-J. Mulder, S. Van Deventer, *Building for big pharma. Building a Business – bioentrepreneur,* 2013.

[54] Innovative Medicine Initiative, *Innovative Medicine Initiative 2 Joint Undertaking (IMI 2 JU),* 2017, November 28, retrieved from Multi-beneficiary Model Grant Agreement: https://www.imi.europa.eu/sites/default/files/uploads/documents/reference-documents/h2020-mga-imi_en_v5.pdf.

Second, as society is contributing to research, and in correlation with the aim of the IMI2[55], it is not absurd to advance a hypothesis of "paying pack" the general public. In order to do so, a solution could be found in amending the current Multi-beneficiary Model Grant Agreement which is required to be signed when a grant is provided. This Agreement already includes different provisions that are supposed to benefit the general public. First, the IMI2 initiative aims at establishing an open model innovation[56]. For this purpose, it is established that all scientific publications resulting from research need to be open access. Furthermore, article 29 of the Agreement already provides a requirement for the dissemination of results[57] However, the agreement clearly states that «unless it goes against their legitimate interests, each beneficiary must — as soon as possible — "disseminate" its results by disclosing them to the public by appropriate means (other than those resulting from protecting or exploiting the results), including in scientific publications (in any medium)». This article requires the sharing of information, other than the data already disclosed, for example through a patent application, to the general public. This requirement can be an incredibly useful resource for the development of subsequent technology, and for possible competitors once they are allowed to enter the market. However, this requirement risks becoming meaningless. Many beneficiaries will be able to hide behind the initial phrase that exempts them from disclosure if it goes «against their legitimate interests», and therefore, avoid disclosing information.

Again, under article 30 of the current Model Grant Agreement, beneficiaries may grant licenses[58]. However, the granting of licenses is at the discretion of beneficiaries. In this instance, we could perhaps advance the idea of a compulsory license to allow competitors to enter the market. Compulsory licensing is when a government allows someone else to reproduce the technology protected by IP. This mechanism is the flexibility that does not infringe or tear up the IP rights. In fact, the patent owner still has the exclusive right over the patents, and therefore the right to receive royalties[59]. If a compulsory license is granted to different companies, the market would be facing more competition and the prices for a specific drug would consequently be lowered.

As I already pointed out, while there are various benefits of the IMI funding, it is hard to justify the high prices of the pharmaceutical products marketed thanks to these funds. The Multi-beneficiary Model Grant Agreement could be modified to add a more compelling requirement for disclosure of data and a possible compulsory license scheme.

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[55]Innovative Medicine Initiative, *Summary of the most relevant provisions for participating in IMI2 actions*, 2014, https://www.imi.europa.eu/sites/default/files/uploads/documents/About-IMI/imi-funding-model/IMI2_provisions_for_participating_in_IMI2_actions.pdf.

[56]. Innovative Medicine Initiative, *Innovative Medicine Initiative 2 Joint Undertaking (IMI 2 JU),* cit.

[57] *Ibid.*

[58] *Ibid.*

[59] World Trade Organization (s.d.), *TRIPS and Health.* Retrieved from Compulsory licensing of pharmaceuticals and TRIPS: https://www.wto.org/english/tratop_e/trips_e/public_health_faq_e.htm.

4. Pull echanisms

As opposed to a push mechanism, a pull mechanism consists in a reward for specific outcomes. Currently, there are two main mechanisms used in Europe for pharmaceutical research and development: data protection and market exclusivity. These are two legal schemes that aim to protect the final medical product. The protection period provided by them is independent of any IP protection and it runs from the day of granting marketing authorization. Since both data and market protection have been established by the same regulation[60] to fulfill the same function of proving an extended period of the exclusivity, I will discuss their use as incentives together.

4.1. Data Protection and Market Exclusivity

Data protection and market protection are legal instruments that aim, like the SPC, to reinforce regulatory protection in the EU pharmaceutical legislation. As I have already explained, patents are usually issued when the drug is still far from being granted marketing authorization. Consequently, not only can a company benefit from its exclusive right for less time but also the disclosure required for patenting lacks complete data about the drug (e.g. data collected during clinical trials). To avoid incomplete data, and in order to obtain a valid market authorization, a company must disclose more data about the drug as stated in article 14 para. 2 of Regulation (EC) No 726/2004. The disclosed data are useful for various reason. One of these reasons is for a competitor to access an abridged procedure in order to market the same pharmaceutical product as generic. However, in order to incentivize research Article 14 para. 11 states that «without prejudice to the law on the protection of industrial and commercial property, medicinal products for human use which have been authorized in accordance with the provisions of this Regulation shall benefit from an eight-year period of data protection». Therefore, under the provision of this article, the data disclosed to the EMA is treated as trade secret. Consequently, competitors cannot use data for the abridged approval procedure for 8 years after the marketing authorization.

Furthermore, the same article also states that together with data exclusivity, it is possible to obtain a ten-year period of marketing protection which can be extended for an extra year. During this time of «market exclusivity», the competent authority cannot approve a marketing authorization for a generic product. An important aspect to note with regards to the competition is that both data exclusivity and market protection are not monopolies. In fact, the legal protection does not allow a competitor to use the originator's data, however, if the competitor is willing to gain its own data, nothing can forbid the competitor from getting into the market if the relevant IP rights have expired. In order to understand this

[60] European Parliament; European Council, Regulation No. 726/2004, *laying down Community procedures for the authorisation and supervision of medicinal products for human and veterinary use and establishing a European Medicines Agency*, 2004, March 31.

concept, it is helpful to use an example from the recent European Commission Report[61]. Imagine that Company A has placed product M on the market, containing molecule Z. Molecule Z is not protected by either a patent or an SPC. However, product M has data and market protection. Company B now creates its own product, called N containing molecule Z. Company B undertakes clinical trials and creates their own proprietary data on the efficacy and safety of product N. Company B now applies for marketing authorization for product N using its own data material. Marketing authorization is granted. Now there are two products on the market, both containing molecule Z, even though product M by company A is covered by data and market protection. This example shows how such incentives are much more flexible than exclusive rights granted by IP. However, as the European Commission report states, this example is just theoretical situation, and it does not seem to be a case that happens often in practice[62].

As final remark, it must be said that these mechanisms could provide an even stronger protection for pharmaceutical firms. In fact, while a pharmaceutical firm must invest its own resources to enforce a patent, both data protection and market exclusivity are enforced directly by the relevant authority who is not going to grant a market authorization until the expiration of the market exclusivity period. Furthermore, it must be kept in mind that at the end of the exclusivity period, companies can apply for a one-year extension if the medical product is approved for one or more new therapeutic indications[63]. This extension allows a company to stay on the market with no competition for a longer period. Consequently, the competent authority has a crucial role in granting rightfully both data and market protection in order to avoid ever-greening strategical behaviors.

5. Conclusion

Currently, in Europe, different mechanisms come into play to incentivize pharmaceutical research and development. First, I analyzed the available IP incentives. These incentives provide the company who wants to market a drug with an exclusive right that prevents third parties from entering the market. While both patents and the Supplementary Protection Certificate are well-intended incentives, they are both characterized by the downside of being monopolies. This situation is often a legal driver for unjustifiably high prices of drugs. I identified some of the anti-competitive strategies, such as the "evergreening problem" and the "pay for delay settlement", that brand-name companies are using in order to hold onto their monopoly for longer periods of time. In order to avoid unethical and abusive behavior, I believe that the role of the competent authority in granting patents and ensuring the respect of antitrust law is crucial.

[61] Example is taken from Economics, Copenhagen, *Study on the economic impact of supplementary protection certificates, pharmaceutical incentives and rewards in Europe*, cit.

[62] *Ibid.*

[63] Economics, Copenhagen, *Study on the economic impact of supplementary protection certificates, pharmaceutical incentives and rewards in Europe,* cit.

Second, I analyzed the IMI funds as a push mechanism for R&D. The IMI funds have proven to be a useful tool in order to support research, especially in the field of orphan and neglected diseases. However, some modification to the current Model Grant Agreement would be useful to help "pay-back" society.

Last, I have taken into consideration the pull programs available to reward innovation. Incentives such as data exclusivity and market protection, contrary to IP, do not provide an exclusive right that keeps competitors from entering the market. They are a useful tool in providing a good amount of legal protection while avoiding monopoly distortions. These mechanisms are not incompatible with competition. If another company has collected its own data and wants to market a drug with the same IP-free component, it is surely allowed to do so. However, as I already explained it is very unlikely that a company will enter the market before the expiration of these mechanisms. Moreover, these incentives might offer even a stronger protection to pharmaceutical firms. In fact, while companies must enforce IP rights through their resources, these mechanisms are self-enforced by the competent authority by deferring approval of a generic until the period of data protection and market exclusivity expires.

In conclusion, incentivizing R&D in the pharmaceutical industry is not simple. In a complex scenario, we need to balance new advances in medicine with the right to have accessible drugs. In order to have an effective system, we need to have both IP, as well as push and pull mechanisms. Exclusive rights such as IP may be a legal driver for the high prices for pharmaceutical products. To avoid abuse of a well-intended system, a new corrective mechanism such as competition law might be taken into consideration. Moreover, other mechanisms such as public funds could provide a helpful tool to leverage prices. Finally, the role of the competent authority in granting rightfully data protection and market becomes essential in order to avoid strategic evergreening exclusivity.