

Business Method Patents: Characters in Search of Legal Protection

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Abstract

The aim of this research is to investigate the phenomenon of business method patents in Europe. Not only the issue of patentability of business methods is discussed, but also the possible strategic use of these patents and patent applications is explored. For this purpose, a data set has been specifically created, including all the applications submitted in the class G06Q (namely data processing systems or methods, specially adapted for administrative, commercial, financial, managerial, supervision or forecasting purpose) at the EPO. A quantitative analysis of the data has been performed, revealing the huge volume of business method patent applications (more than 34,000) filed at the EPO over the last 20 years. Equally, a continued interest of large companies in patenting business methods has been demonstrated. However, these empirical observations seem to be inconsistent with both the legal framework (most notably Article 52 EPC 2000 establishes that business methods are not patentable) and the low rate of acceptance of applications (only a small fraction of patents have eventually been granted) in the category of business methods at the EPO. All of this supports the hypothesis that firm demand for business method patent protection can be driven by strategic purposes, often resulting in inefficiencies in the market and reducing in competition. Hence, the research presented intends to highlight overcoming inefficiencies, as well as possible antidotes provided by the EU competition law. On this purpose, some of the common practices, such as hold-up or tacit collusion, are identified. At the same time, the beneficial effects of mutual licensing agreements are highlighted. In particular, the research examines the European legal framework on the technology transfer agreements. Their effectiveness in contrasting business method patents' strategic uses is analysed, particularly regarding reduction on competition. Based on this, the thesis argues ultimately that a wider opening in granting patent protection to business methods will not result in discouraging new entries in the field.

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“Kindness and good nature unite men more effectually and with greater strength than any agreements whatsoever, since thereby the engagements of men's hearts become stronger than the bond and obligation of words.”

Thomas More, Utopia

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Introduction

In 1998, a relatively unknown company filed a patent application at the EPO seeking patent protection for a “Method and system for placing a purchase order via a communications network”.¹ Admittedly, the invention was not easy to be classified. Indeed, it looked like one of those business methods considered not to be patentable, according to Article 52 European Patent Convention (EPC). Nevertheless, the company argued that the method, which was computer implemented, represented an inventive technical contribution capable of simplifying and innovating the way to shop on the Internet. Facts proved that the company was right. The EPO, however, had a different opinion. Unlike other patent offices around the world (such as USPTO, for example),² the EPO decided that what Amazon described as a fundamental innovation in the way of trading was not an invention at all. Implementation by computer could not be enough, the EPO argued, to turn out a method already in use into an invention worthy of patent protection.³ The EPO believed that such a clear statement would have resolved the problem, discouraging other firms to seek patent protection for business methods even if computer-implemented. However, it did not. Conversely, patent applications similar to that of Amazon continued to be filed at the EPO, and not just a few of them were submitted. The EPO was flooded with patent applications regarding methods of doing business.⁴ How to deal with this situation? The EPO was on the horns of a big dilemma: favouring the new trend or maintaining a strict position? Eventually, the EPO worked out a compromise solution. A new reading of Article 52 EPC was offered. As such, patent protection was ultimately granted to business methods,

¹ EP0902381/1998 “Method and system for placing a purchase order via a communications network” that was withdrawn. However a divisional application (EP1134680 2001) has been examined and refused

² EPO Technical Board of Appeal, T 1244/07 (1-Click/AMAZON) of 27.1.2011 at <<http://www.epo.org/law-practice/case-law-appeals/recent/t071244eu1.html>> accessed 7th August 2017, para 27

³ Ibid. para 23

⁴ J Bessen, MJ Meurer, *Patent failure: How judges, bureaucrats, and lawyers put innovators at risk* (Princeton University Press 2008)

whereby technical considerations, which were required to carry out the method, resulted in tangible technical effects.⁵ Therefore, not every computer-implemented business method could be granted patent protection in Europe. However, some of them were ultimately patented.

Despite the fact that business methods are unlikely to receive patent protection at the EPO, companies have kept seeking patent protection for their business methods in Europe during the last 20 years. Data consistently reveals that patent applications relative to business methods have been profusely filed, even though it is almost sure that most of them will be refused. To further complicate the matter, the EPO has been left alone to deal with such a growing phenomenon. Over the years, neither the Conference of the EPC Contracting States nor the European Union, to which most of the Contracting States are Member States, have provided clear guidance or indications on the issue of business method patentability. Even the proposal of a Directive on the patentability of computer-implemented inventions has been rejected,⁶ especially due to raising doubts about the effect of granting patent protection to those subject matters. At that point the main question to answer became: could granting patent protection to business methods really spur innovation and implement economic growth, or rather it could ultimately result in strengthening market positions of some well-known companies? This question is indeed the starting point of this research.

Financial derivatives as well as on-line banking or computer-based auction systems are some of the most relevant innovative products burst on the scene with the digital revolution. Granting them patent protection has been presented as a fundamental step to secure development of these new technologies. Nevertheless, some influential

⁵ EPO, Case Law of the Boards of Appeal at <http://www.epo.org/law-practice/legal-texts/html/caselaw/2016/e/clar_i_a_1_4_2.htm> accessed 3rd September 2017

⁶ European Commission, *Proposal for a Directive of the European Parliament and of the Council on the patentability of computer-implemented inventions COM(2002) 92 (2002)* OJEU C 151 E129

voices have raised concerns about the actual effect of it.⁷ Mounting fears have been expressed on possible inefficiencies in the market of business methods due to patents and patent applications. Similarly, reducing in competition has been considered the potential negative consequence of a certain firms' strategic attitude towards business method patents. Trying to understand whether all these concerns are justified, this research addresses the issue of business method patents both theoretically and empirically. In the first chapters, the development of the EPO case law about the patentability of business methods is analysed. The discussion moves from the Vicom case to the recent conclusions of the EPO Enlarged Board of Appeal, via the up and down of the relevant US Supreme Court's decisions about business method patentability. Still using the doctrinal analysis approach, the thesis investigates then the possible economic effects of business method patents. According to the established point of view, patent protection is granted to spur innovation, encourage the spread of technical knowledge and facilitate transactions. Thus, granting monopolistic prerogatives to inventors is usually related to ensuring economic growth. However, as subsequently discussed, no clear evidence has been provided that business method patents have produced any of the above-described positive effects. Conversely, possible detrimental effects have been demonstrated referring to business method patents.

As suggested by Shapiro in his seminal work, granting patent protection to business methods has resulted in encouraging the building of patent thickets.⁸ As such, uncertainty is strategically created on what it is patent protected and what it is not. Indeed, business methods are quite obvious inventions, thus copying them, as well as developing similar technologies, is easy and not costly. Nevertheless, the threat of being

⁷ TB Lee, 'A Patent Lie' NYT (St.Louis, 9 June 2007) quoting Bill Gates ("If people had understood how patents would be granted when most of today's ideas were invented, and had taken out patents, the industry would be at a complete standstill today")

⁸ C Shapiro, 'Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting' (2001) 1 Innovation Policy and the Economy 119, 121 ("a dense web of overlapping intellectual property rights [especially of business method patents]...to hack its way through in order to actually commercialize new technology")

involved in infringement litigations can be an effective deterrent to rivals and potential ones. Hence, causing uncertainty about the boundaries of patents can easily result in deterring competitors from copying the invention, but not only. Indeed, patent thicket strategy can also affect competition in the market, whereby uncertainty is used to discouraging rivals to implement around a certain technology. Hence, Shapiro concludes suggesting that business method patents could be used strategically to impede rivals to enter the market, thereby reducing, or even worst, eliminating competition.

Based on Shapiro's insight on the rapid growth of interest for business methods, this research investigates whether patent thicket strategy is put in place also at the EPO, trying to understand what kind of inefficiencies affect business method patent arena in Europe. For this purpose, a database has been specifically created, including all the applications submitted in the class G06Q (namely data processing systems or methods, specially adapted for administrative, commercial, financial, managerial, supervision or forecasting purpose) at the EPO. In particular, the study utilizes a quantitative approach to investigate the extent of the phenomenon of business method patents and patent applications at the EPO. Both number of applications over time and names of major applicants were identified. Then, the network of citations between patents and its projection into the network of citations between firms were constructed and analysed, in order to explore whether some strategies could be hidden behind the popularity of business method patent applications at the EPO.

Without wanting to spoil the findings of the investigation, some of the results of the empirical analysis seem to confirm the main concerns on the possible development of patent thicket strategy in Europe. Nevertheless, is it sure that granting patent protection to business methods would fatally mean preventing or lessening competition? On the purpose of addressing this issue, the final chapters of the thesis are devoted to analyse the interface between patent protection and competi-

tion law. The possible clash between IP rights and antitrust rules have taken on particular interest in the EU context, according to the peculiarities of the European Union. In particular, the completion of the Single Market has been of critical importance both in the development of the EU competition law and in the recognition of IP prerogatives framed by the Member States and the EPC. As such, a specific set of rules has been established, namely the Technology Transfer Block Exemption Regulation (TTBER), which intends to balance pro-competitive and anti-competitive effects resulting from licensing agreements, specifically mutual licensing agreements. Based on the analysis of the TTBER and the Technology Transfer Guidelines (TT Guidelines), the thesis is ultimately aimed at understanding whether the European competition law provides useful means to contrast those detrimental effects, namely hold-ups, tacit collusion and raising rivals' costs schemes, which are common outcomes of practices such as patent thickets. If this is true, i.e. if the current EU legal framework on competition offers effective means to contrast the strategic use of business method patents and patent applications, then the conclusions of this thesis would be that there is no reason to be concerned about granting patent protection to business methods.

Chapter I

What is a business method?

1. Introduction

This introductory chapter aims to explain why business methods have long been regarded as non-patentable, despite the fact that they are one of the most popular and widely debated subject matters in the European Patent Office (as well as outside Europe).¹ Article 52 (2) EPC includes “schemes, rules and methods for doing business” in the list of what is outside the scope of patentability; nevertheless, business methods have regularly been granted patent-based protection. To understand what it is seems to be an explicable anomaly, the patentability of business methods needs to be put into an historical perspective. On this purpose, this chapter will briefly analyse some of the most relevant decision on this issue, thereby summarising the main argument typically advocated against the patentability of business methods.

An historical overview is indeed necessary to enhance the understanding of the phenomenon of business method patent in Europe and whether any doubts can be cast on the proper extent of granting patent protection to this subject matter. Although this study will focus primarily on the European Patent System, this chapter will draw heavily on the US literature and jurisprudence since the US patent system, as a result of its size and seniority, plays a crucial role in influencing the development of EU legal and technical understanding of what amounts to a patentable invention. Therefore, to examine the patentability of business methods against the backdrop of the relevant normative context,

¹ E Archontopoulos, ‘Spot the difference: a computer implemented invention or a software patent?’ (6th Annual Conference of the EPIP Association, Brussels, September 2011) <www.epip.eu/conferences/.../ARCHONTOPOULOS%20Eugenio.pdf> accessed 25 February 2014

both the US and the European law and practice will be taken into account.

The chapter is organized into three parts. The first part is concerned with the concept of business methods and will provide, motivate and discuss the definition that will be adopted throughout this work. The second part will explain why business methods had not been patented until about twenty years ago and to this end will place a special emphasis on the role played by the lack of physicality and technicality of business methods. The third part will then investigate the role played by recent computational and technological advances in the patent system, and particularly in the patentability of business methods.

2. Business methods: a definition

Even if the notion of “business methods” has a rather intuitive meaning and interpretation, finding a proper and widely accepted definition is a challenging task.² Broadly speaking, business activities can include all the economic, organizational, managerial and financial activities that normally take place within both the manufacturing and service industries.³ Thus, business methods can in principle refer to a number of modes for doing business, including methods of marketing, accounting and finance, methods of trading as well as creating, entering, and operating in new markets, and methods of advertising and organizing customer service.⁴ As a result of the vagueness of the concept, defining

² S Wagner S, ‘Business method patents in Europe and their strategic use : evidence from franking device manufacturers’ (2008) 17 Econ. Innov. New Techn. 173,173,

³ JR Allison, SD Hunter, ‘On the Feasibility of Improving Patent Quality One Technology at a Time: The Case of Business Methods’ (2006) 21 Berkeley Tech. L.J. 729, 731 (“The most obvious kinds of practices that fall within the common understanding of the term “business method” include those relating to advertising, shopping, sales, purchasing, financing, insurance, human resources activities, and specialized forms of communication within and between firms”)

⁴ IPO *Manual of Patent Practice* (2014) <www.ipo.gov.uk/practice-sec-001.pdf> accessed 25th February 2014, part I, 1.26; DF Spulber, ‘Should Business Method Inventions be Patentable?’ (2011) 3 Journal of Legal Analysis 265, 269 (“business method invention is the discovery of a commercial technique for firms to address mar-

whether an invention is a business method has been considered demanding⁵. Moreover, for this reason the lack of patentability of business methods, often documented either in the US or in Europe has made this issue even much more difficult to understand.

An attempt to overcome this problem was made by the U.S. Congress that, summarising the rulings of the US Patent Office and Courts on this subject matter, ⁶ suggested

business methods refers to [...] a method of: (a) administering, managing, or otherwise operating an enterprise or organisation, including a technique used in doing or conducting business [...] (b) processing financial data; [or] any technique used in athletics, instruction, or personal skills⁷

Thus, for example, it was considered business method either a method of book keeping for detecting and preventing tax evasion⁸ or a mode of keeping account for insuring against excessive losses for bad debts⁹. Also, among business methods were included the methods for cash registering and account checking for securing hotel and restaurant properties from losses by peculations of waiters¹⁰ and methods of ar-

ket opportunities, such as a transaction procedure, market microstructure, financial system, operational process, or organizational form.”)

⁵ BH Hall, ‘Business And Financial Method Patents, Innovation, And Policy’ (2009) 56 *Scottish Journal of Political Economy*, *Scottish Economic Society* 443, 445

⁶ DJ Kappos, JR Thomas, RJ Bluestone, ‘A Technological Contribution Requirement for Patentable Subject Matter: Supreme Court Precedent and Policy’ (2008) 6 *Nw. J. Tech. & Intell. Prop.* 152, 163; JJ Love, WW Coggins ‘Successfully Preparing and Prosecuting a Business Method Patent Application’ (2001) 2 <www.uspto.gov/web/menu/pbmethod/aiplapaper.rtf> accessed 25th February 2014

⁷ House Bill 5364 IH (106th Congress)- Business Method Patent Improvement Act of 2000 <www.techlawjournal.com/cong106/patent/bus_method/berman.asp> accessed 22 February 2014. Most recently, a new definition has been provided in the Obama’s American Invest Act (AIA), which has become law on September 16, 2011. “On the purpose of this Section “covered business method patent” (CBM) means a patent that claims a method or corresponding apparatus for performing data processing or other operations used in the practice, administration, or management of a financial product or service, except that the term does not include patents for technological inventions.” Section 18. Transitional program for covered business method patents.

⁸ *Ex Parte Abraham* 1869 Dec. Comm’r pat 59

⁹ *United States Credit System Co. v. American Credit Indemnity Co.* 53 F. 818, 819 (S.D.N.Y.), *aff’d*, 59 F. 139 (2d Cir. 1883)

¹⁰ *Hotel Security Checking Co. v. Lorraine Co.* 160 F. 467, 469-72 (2d Cir. 1908)

ranging automobiles for an unobstructed view of a drive-in screen or stage¹¹. Moreover, systems of fighting fires using standardized and interchangeable fire fighting apparatus¹² as well as methods of recording stock transaction were regarded as business methods.¹³ Finally, business methods also included the positioning of printed matter on bank checks and stubs¹⁴ and methods of pricing merchandise with a coded label.¹⁵

Similarly, useful clues about defining innovative business methods were provided by the European Patent Office and the European National Patent Offices. As suggested by the EPO, business methods are

concerned more with interpersonal, societal and financial relationships, than with the stuff of engineering - thus for example, valuation of assets, advertising, teaching, choosing among candidates for a job, etc.¹⁶

EPC Contracting State¹⁷ patent office and court practices have suggested that a business method could include a method of improving customer service by bar-coded banking materials¹⁸ or a scheme allow-

¹¹ *Loew's Drive-In Theatres Inc. v. Park-In Theatres Inc.* 174 F.2d 547, 553 (1st Cir. 1949)

¹² *In re Patton* 127 F.2d 324, 327-28 (C.C.P.A. 1942)

¹³ *In re Wait* 73 F.2d 982, 982-83 (C.C.P.A. 1934)

¹⁴ *In re Sterling* 70 F.2d 910, 911 (C.C.P.A. 1934)

¹⁵ *In Re Howard* 394 F.2d 869, 870 (C.C.P.A. 1968)

¹⁶ EPO 'Appendix 6 Examination of «business method» applications' (Report on Comparative Study Carried Out Under Trilateral Project B3b, 2000) <<http://ladoc.ffii.fr/appendix6.pdf>> accessed on the 23rd June 2017 ("Claims for business methods can be divided into three groups: (1) claims for a method of doing business in abstract, i.e. not specifying any apparatus used in carrying out the method; (2) claims which specify computers, computer networks or other conventional programmable digital apparatus for carrying out at least some of the steps of the business method ("computer-implemented business methods"); (3) claims which specify other apparatus (perhaps in addition to computers) e.g. mobile telephones")

¹⁷ On October 1977, the EPC contracting states were: Belgium, Germany (then West Germany), France, Luxembourg, Netherlands, Switzerland and United Kingdom. Nowadays, the EPC Contracting States are all member states of the EU plus Albania, Iceland, Liechtenstein, Monaco, Norway, Switzerland and Turkey. Here and in the following chapters "Europe" intends to refer to the countries where EPC has been entered into force.

¹⁸C Waelde, G Laurie, A Brown, S Kheria, J Cornwell, *Intellectual Property: Law and Policy*, (3rd edn, UOP 2013) 415, citing Good News Pty Ltd's Application (BL O/124/84)

ing prisoners to exchange sentence time for corporal punishment¹⁹. Business methods were also systems of collecting tax by delaying inheritance²⁰, a method of advertising by hooking leaflets on exterior door handles²¹ and a method for exploiting areas above train power lines.²² However, almost all of these methods were qualified as non-patentable. In what follows I will explain what motivated the decision.

3. How the story began: the non-patentability of business methods

As suggested in the Introduction, even if the subject of this research is the European Patent System, an overview of the non-patentability of business methods needs to examine the US patent law and practice. The US patent system, for seniority and size, plays a crucial role in the understanding of the subject matter. The analysis will start from the American patent system as both the USPTO practice and the Court's jurisprudence are crucial for understanding why business methods are non-patentable, or more precisely why they were not regarded as patentable for a long time. Then, the European Patent system will be investigated; especially the differences between Europe and the US on the non-patentability of business methods will be underlined.

3.1 A historical overview

It was Thomas Jefferson's opinion that

It would be curious then, if an idea, the fugitive fermentation of an individual brain, could, of natural right, be claimed an exclusive and stable property. If nature has made any one thing less susceptible than all others of exclusive property, it is the action of the thinking power called an idea²³.

¹⁹ Ibid. 415, citing Melia's Application (BL O/153/92)

²⁰ IPO (4) 1.26, citing Spedding's Application (BL O/96/99)

²¹ Corte App. Torino, 7 November 1988 [1989] Giur. Dir. Ind, 187

²² Cass. Civ sez.I, 2 April 2004 n.7597 [2006] Riv. Dir. Ind, 345

²³ T Jefferson, 'Letter to Isaac McPherson Monticello, 13 August 1813' <http://pwp.detritus.net/works/writings/no_patent_on_ideas.html> accessed 15 January 2014; A Mossoff, 'Who Cares What Thomas Jefferson Thought About Patents?

Drawing upon this principle, the U.S. Constitution granted the Congress the power

[...] to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries²⁴.

Hence, the US Code, chapter 35, section 101 declared

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.²⁵

As a matter of fact, the broad language used in the section reported above left the Courts with the responsibility to define the limits of using patents to secure protection and, in reality, a number of different arguments were suggested to draw a clear line between patentable and non-patentable subject matters.²⁶ Considering that the patent law was introduced to protect the invention incorporated in physical objects, the main conclusion of the Courts was that ideas or theories, like discoveries, ideas, or mathematical algorithms, were not patentable²⁷. Thus, from these perspectives²⁸, only machines and devices were patentable, as the patent system aimed to protect technology rather than mere abstractions. Up to no more than twenty years ago, business methods

Re-evaluating the Patent “Privilege” in Historical Context’ (2007) 92 Cornell Law Review 953

²⁴ U.S. Const. art. I, § 8, cl. 8.

²⁵ Patent Act 1952 - 35 U.S.C. § 101; also Patent Act of 1790, ch. 7, § 1 (1790) identified statutory subject matter as “any useful art, manufacture, engine, machine, or device, or any improvement therein not before known or used.”

²⁶ DL Hayes, ‘What the General Intellectual Property Practitioner Should Know about Patenting Business Methods’ (1999) Fenwick & West LLP 4 <www.fenwick.com/fenwickdocuments/general_ip_practitioner.pdf>accessed 15 January 2014

²⁷ GS Fine, ‘To Issue or Not to Issue: Analysis of the Business Method Patent Controversy on the Internet’ (2001) 42 BCL Rev 1195, 1199

²⁸ RP Merges, ‘As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform’ (1999) 14 Berkeley Tech. LJ577, 581

were also deemed pure concepts, and “vaporous and intangible”²⁹. Thus, they were excluded from patentability in the US,³⁰ and on the grounds of the same reasoning, also in Europe.³¹

3.2 Arguments against the patentability of business methods

Two main arguments were raised to support the claim that business methods are not a patentable subject matter.

3.2.1 Business methods as intangible abstractions

First, it was pointed out that business methods were no more than intangible abstractions, so that they could not fall within the “useful arts” in the sense contemplated by the US Constitution.³² Based on Jefferson’s opinion, it was strongly asserted in the US patent system to proscribe patenting of abstract ideas in view of the fact that exclusive property of ideas had to be accepted only when it was needed to ensure the progress of science and technology.³³ By this line of reasoning, a patent could have been granted only in those specific areas where the assignment of an exclusive right, i.e. the creation of a temporary monopoly, were the best way to ensure the development of the technique.³⁴

However, Courts and scholars soon realized the difficulties of identifying such areas. The expression “useful arts”, already mentioned in the Patent Act, was taken into consideration with the purpose to identify the technological area. But, what meaning could have been attributed to

²⁹ J Gleick, *Patently Absurd*, *N.Y. Times* (New York, 12 March 2000) <www.nytimes.com/2000/03/12/magazine/patently-absurd.html> accessed 16 January 2014

³⁰ [ie] *Hotel Security Checking Co* (10) 470, *In re Patton* (12) 327

³¹ C. Waelde et al. (18) 415

³² BC Wright, ‘Business Method Patents: Are There Any Limits?’ (2002) 2 *J. Marshall Rev. Intell. Prop. L.* 30, 40

³³ SJ Marsnik, RE Thomas, ‘Drawing a Line in the Patent Subject-Matter Sands: Does Europe Provide a Solution to the Software and Business Method Patent Problem?’ (2011) 34 *B.C. Int’l & Comp. L. Rev.* 227, 242; DL Burk, ‘The Role of Patent Law in Knowledge Codification’ (2008) 23 *Berkeley Tech. L. J.* 1009, 1010. More on this issue on Chapter 3

³⁴ See *O’Reilly v. Morse* 56 U.S. 62 (Supreme Court 1853), 133

the concept of “useful arts”? With regard to this issue, the United States Court of Patent Appeals (CCPA)³⁵ ruled that

All that is necessary, in our view, to make a sequence of operational steps a statutory ‘process’ within 35 U.S.C. § 101 is that it be in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of ‘useful arts.’³⁶

Moreover,

The phrase ‘technological arts,’ as we have used it, is synonymous with the phrase ‘useful arts’ as it appears in Article I, Section 8 of the Constitution.³⁷

The message was clear: the only arts that could be considered useful were the technological ones. Hence, the Court established a strict identity between what is useful and what is technological. However, it did not solve the problem entirely.³⁸ The attempt to identify useful arts as the technological ones, such as those that required an industrial implementation or the application of some technical devices, merely shifted the problem of the definition to another concept equally difficult to circumscribe³⁹; thus, doubts still remained on what was to be regarded as technological.

Forthwith, liberal arts, social sciences and theoretical mathematics were defined as non-technological arts and excluded from patentability for their lack of physical consistency. It made no difference if they were practical and useful⁴⁰. Nevertheless, the requirement of “technologicali-

³⁵ The Court of Customs and Patent Appeals is the predecessor of the Court of Appeals for the Federal Circuit (CAFC), which was established during the reform of the judicial system in 1982

³⁶ *In re Musgrave* 431 F.2d 882 (C.C.P.A. 1970), 893

³⁷ *In re Waldbaum* 457 F.2d 997 (C.C.P.A. 1972), 1003

³⁸ Wright (32) 40

³⁹ *Ibid.* 41; JR Thomas ‘The Patenting of the Liberal Professions’ (1999) 40 BCL Rev 1139, 1164

⁴⁰ Thomas (39) 1145

ty” was not strictly applied over the years. Since the 1940’s the US Supreme Court had ruled

While a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be⁴¹.

Over time, the Federal Courts adopted a permeable concept of technological arts by either adopting more expansive views of statutory subject matter, or drawing attention to the specificity of each case.⁴² As a result, a definition of technological arts was eventually adopted as those that involved the physical transformation or the creation of an object through the systematic manipulation of natural forces or other forms of human activity. In particular, the Patent Office Guidelines suggested the exclusion of patentability only for those claims, which were “devoid of any limitation to a practical application in the technological arts”,⁴³ and Examination Guidelines for Computer-Related Inventions added that “the claimed process must be limited to a practical application of the abstract idea or mathematical algorithm in the technological arts”.⁴⁴

According to this point of view, it was asserted that business methods were not statutory subject matters as they were an intangible and abstract methodology for managing a transaction. Hence, like fundamental scientific instruments, such as mathematical formulae or physical principles, business methods, even if fundamental for further inventions, were considered outside the scope of useful or technological arts⁴⁵. In conclusion, following the argument that useful arts could be

⁴¹ *Mackay Radio & Tel. Co. v. Radio Corp. of Am.* 306 U.S. 86 (Supreme Court 1939), 94

⁴² Marsnik et al. (33) 255

⁴³ USPTO, Manual of Patent Examining Procedure (Aug. 2001 ed.), § 2106 II.A, <www.uspto.gov/web/offices/pac/mpep/old/index.htm> accessed 18 January 2014

⁴⁴ Patent and Trademark Office, Examination Guidelines for Computer-Related Inventions (28 feb.1996) 61 Fed.Reg.7478, 7484

⁴⁵ SJ Shumaker, *Business Method Patents: Navigating the Sea of Controversy* (Shumaker & Sieffert Publications 2000) <www.ssiplaw.com/publications/busmethpat.pdf> accessed 18 January 2014, 7

identified with the technological arts related to physical transformations,⁴⁶ business methods, like all other mere abstractions, were excluded from patentability, at least until their physical side was eventually uncovered.

3.2.2 Business methods as mental processes

As previously mentioned, another argument was developed against the patentability of business methods: they were thought to be no more than a mental process. Since the US Patent Act of 1952 extended patentability to “any new and useful process”, the ban on patenting ideas became the problem of clarifying the meaning and boundaries of “process” as a statutory subject matter a crucial and pressing task.⁴⁷ In particular, the definition of process as “process, art or method[...] [that] includes a new use of a known process, machine, manufacture, composition of matter, or material” was viewed as incapable of clarifying the concept of process itself due to its circularity (i.e., the process is a process).⁴⁸

Furthermore, the broad meaning of the term enabled any action that could be articulated into a series of steps to be considered as a statutory process.⁴⁹ Considering that every process was no more than a planned series of steps leading to a creation or a transformation, it was argued that a useful process could also refer to a series of mental steps capable of producing something new without operating physically upon things. Thus, in principle, intangible processes were patentable.⁵⁰ The Supreme Court argued that it was true that, broadly speaking, a process could have been any detailed sequence of steps aimed to perform a predetermined task, even those that took place in the human mind.

⁴⁶ Wright (32) 42

⁴⁷ DS Chisum, ‘The Future of Software Protection: The Patentability Of Algorithms’ (1986) 47 U. Pitt. L. Rev. 959, 963

⁴⁸ WD Wiese, ‘Death of a Myth: The Patenting of Internet Business Models after State Street Bank’ (2000) 4 Marq. Intell. Prop. L. Rev. 17, 20

⁴⁹ Thomas, (39) 1141; P Samuelson, ‘Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions’ (1990) 39 EmoRY LJ. 1025, 1033

⁵⁰ *In re Prater* 415 F.2d 1393, 1401 (C.C.P.A. 1969)

Nevertheless, patents could be granted only to processes including “a series of acts performed on the subject matter to be transformed and reduced to a different state or thing”.⁵¹

Hence, in the Court’s view, only the physical implementation of the process, i.e. its connection with a device, could connect mental abstraction to concrete and tangible application, and, thus, allow the patenting of a process.⁵² In this sense, physicality still remained the criterion for differentiating non-patentable processes from those that are statutory subject matters. Not all processes could therefore have been patentable, but solely those capable of being incorporated into tangible products or capable of triggering some physical transformation even if no machine to do this actually existed. ⁵³ Thus, an “idea of itself is not patentable, but a new device by which it may be made practically useful is”.⁵⁴

Along this line, business methods were often taken as an example of non- patentable subject matter

[...] there is nothing peculiar or novel in preparing a sheet of paper with headings [...] and whatever peculiarity there may be about the headings in this case is a peculiarity resulting from the transactions themselves.⁵⁵

The necessity to have something physical - either in the inputs or in the end product - was still central in the patent system.⁵⁶ Therefore, business methods, with their congenital absence of mechanical devices and tangible results, were easily thought as a paradigmatic example of what had to remain in the public domain.

⁵¹ *Cochrane v. Deener* 94 U.S. 780, 788 (Supreme Court 1876)

⁵² R III Del Gallo, ‘Are “Methods of Doing Business” Finally Out of Business as a Statutory Rejection?’ (1998) 38 IDEA 403, 428

⁵³ RH Stern ‘Scope-of-Protection Problems with Patents and Copyrights on Methods of Doing Business’(1999) 10 Fordham Intell. Prop. Media & Ent. L. J. 105, 116

⁵⁴ *Rubber-Tip Pencil Company v. Howard* 87 U.S. 498, 507 (Supreme Court 1874)

⁵⁵ *Hotel Security Checking Co v Lorraine Co* 160 F 467,472 (2nd Cir1908)

⁵⁶ Del Gallo (52) 410

3.3 What was ruled without being ruled: The US Courts' decisions

A brief historical overview of US jurisprudence about the patentability of business methods will be undertaken in this subsection to shed light on what happened over the last twenty years, ultimately changing business methods into statutory subject matters. The first statement about business method non-patentability dates back to the end of the XIX century. It was held that 'it is contrary to the spirit of the patent law construed by the Office for years, to grant patents for methods or analogous systems of bookkeeping'⁵⁷ and, also, that the method of "transacting common business"⁵⁸ was not a patentable subject matter. Over that period, a widely popular decision was taken in *Hotel Security Checking Co vs. Lorraine Co*⁵⁹ that was advocated by most as the beginning of the so-called "business method exception" to patentable subject matters.

As the claims were about a "method [...] for cash-registering and account-checking' designed to prevent frauds [...], by waiters",⁶⁰ the Circuit Court ruled that a

[...] system of transacting business disconnected from the means for carrying out the system is not, within the most liberal interpretation of the term, an art. Advice is not patentable. As this court said in *Fowler v City of New York* 121 Fed 747, 58 CCA 113: 'No mere abstraction, no idea, however brilliant, can be the subject of a patent irrespective of the means designed to give it effect.'⁶¹

The Court did not invalidate the claim due to the presence of a business method though. The real reason was that

⁵⁷ *Ex parte Abraham* (8)

⁵⁸ *United States Credit System Co. v. American Credit Indemnity Co.* 53 F. 818, (S.D.N.Y. 1893)

⁵⁹ *Hotel Security Checking* (55)

⁶⁰ *Ibid.* 467

⁶¹ *Ibid.* 469

[...] the physical means described by [the inventor], - the sheet and slips, - apart from the manner of their use, [do not] present any new and useful feature [...]. The fundamental principle of the system is as old as the art of bookkeeping⁶².

Thus, the decision was not concerned with what could be a patentable business method as “ this question seems never to have been decided by a controlling authority and its decision is not necessary now”.⁶³ However, even if the issue of recognizing a business method as a patentable subject matter was *obiter dicta*,⁶⁴ the ruling was read as holding the principle that all business systems were *per se* non-patentable.

This position was not reviewed for almost a century, since courts avoided dealing with that issue. For example, in 1934 the CCPA (United States Court of Customs and Patent Appeals)⁶⁵ held *In re Wait* that

[...] it was suggested that an opportunity is here afforded this court to render a decision which might possibly clarify question growing out an applications for patents relating to what is called “methods of doing business”. However inviting this field may be, the court does not deem it proper to deviate from its usual practice of determining only the relevant question presented by the application actually before it, avoiding dicta insofar as possible.⁶⁶

Some 34 years later, *In re Howard*, the CCPA confirmed its propensity to decide cases on grounds other than patentability of business methods, stating that

⁶² Ibid. 469

⁶³ Ibid. 472

⁶⁴ Del Gallo (52) 408

⁶⁵ CCPA is the predecessor to the Court of Appeals for the Federal Circuit (CAFC)

⁶⁶ *In re Wait* (13) 982

Our affirmance of this ground of rejection makes it unnecessary to consider the issue of whether a method of doing business is inherently non-patentable.⁶⁷

Nevertheless, a new propensity to patent business methods started to be shown. “As early as 1942, *In re Patton* the Court held that

[...] a system of transacting business, apart from the means for carrying out such a system, is not within the purview of [...] patentable subject matter⁶⁸.

Moreover, in *Loew's Drive-In Theatres* it was held that

[...] a system for the transaction of business, such, for example, as the cafeteria system for transacting the restaurant business, . . . however novel, useful, or commercially successful is not patentable apart from the means for making the system practically useful⁶⁹.

Hence, without discussing the exception, the possibility emerged to grant patents also to methods of doing business. The stratagem devised by the Courts was to look not at the final intangible product, but at the *combination* of process and means that were reviewed for novelty and inventiveness of business method

Patentability does not turn on whether the claimed method does ‘business’ instead of something else, but on whether the method, viewed as a whole, meets the requirements of patentability as set forth in Sections 102, 103, and 112 of the Patent Act.⁷⁰

⁶⁷ *In re Howard* (15) 872

⁶⁸ *In re Patton* (12) 327

⁶⁹ *Loew's Drive-In Theatres v. Park-In Theatres*, 174 F.2d 547,552 (1st Cir. 1949)

⁷⁰ *In re Schrader* 22 F.3d 290 (Fed. Cir. 1994) 298

Thus, until the *State Street Bank's* decision,⁷¹ formally the business method exception continued to be declared, but the emphasis placed on the apparatus and on all tangible things utilised to carry out the methods, allowed to patent them although, in effect, it was not always easily understandable whether it was the apparatus or the method to be patented.⁷²

3.4 What was stated without being stated: The EPO Boards of Appeal's decisions

With regard to the European patent system, as suggested before, the excursus on the patentability of business methods is less dated, and probably less structured than the one on the American system. In Europe there was not a centralised patent system until 1973, when the Convention on the Grant of European Patents (EPC) was signed.⁷³ On the other hand, the EPC was not an instrument of the European Union.⁷⁴ Thus, it did not automatically replace Contracting State substantive patent laws, rather it constituted a measure of administrative rationalisation of the granting procedure.⁷⁵ Hence, the non-patentability of business methods, although generally accepted as a patent system principle,⁷⁶ was established as a rule in the Contracting States only when they changed their national laws as conforming to EPC.⁷⁷

⁷¹ *State Street Bank and Trust Company v. Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998). This decision was known as the one that abrogated the business method exception as an unwarranted limitation to statutory subject matter.

⁷² Del Gallo (52) 415-420

⁷³ EPC 1973

⁷⁴ Marsnik, Thomas (33) 267

⁷⁵ H Ullrich, 'Patent Protection in Europe: Integrating Europe into the Community or the Community into Europe?' (2002) 8 *European Law Journal* 433, 436

⁷⁶ Text to section a

⁷⁷ ie the 1977 UK Patent Act, section 1, subsection (2), the German Patent Law, Part I, § 1 (1980)

The EPC, unlike the US Patent Act, clearly indicated the method of doing business among the excluded subject matters.⁷⁸ Art.52 declares

(1) European patents shall be granted for any inventions which are susceptible of industrial application, which are new and which involve an inventive step. (2) The following in particular shall not be regarded as inventions within the meaning of paragraph 1: (a) discoveries, scientific theories and mathematical methods; (b) aesthetic creations; (c) schemes, rules and methods for performing mental acts, playing games or doing business, and programs for computers; (d) presentations of information. (3) The provisions of paragraph 2 shall exclude patentability of the subject-matter or activities referred to in that provision only to the extent to which a European patent application or European patent relates to such subject-matter or activities as such.

To understand the reason for the exclusions of article 52 (2), it is important to point out that these reflect the idea of invention developed in the European state patent laws and jurisprudence⁷⁹ before the ECP came into force:

Neither from the terms of Article 52 EPC, nor from the legislative history of that Article as appearing from the preparatory documents can it be deduced that these Contracting States would have intended to deviate from their national laws and jurisprudence in this respect. On the contrary, it seems to be borne out by the list of exceptions in Article 52(2)(a) to (d) EPC that they did not wish to do so.⁸⁰

Thus, as the EPC's aim was not to change Contracting State patent laws but rather to clarify and unify their patent systems, the list of ex-

⁷⁸ Marsnik, Thomas (33) 272

⁷⁹ G Paterson, *The European Patent System. The Law and Practice of the European Patent Convention* (2nd edition, Sweet and Maxwell 2001) 409

⁸⁰ *IBM/Document abstracting and retrieving* (T 22/85) (1990) E.P.O.R 100, 103

clusions was the *summa* of national general patent principles that had already formed the basis of the EPC. Consequently it can be useful to critically review the pre EPO case law ruled on this topic in the Contracting States and also those judgments declared soon after the EPC came into force, that formed an unbroken continuum in ruling that business methods were non-patentable. Before analysing the EPO Board of Appeal decisions, therefore, the UK and German law cases will be discussed, considering that the significance and the extent of both the UK and German Court decisions on the business methods patentability.

3.4.1 A starting point: the UK and the German case law

The analysis starts with the United Kingdom. A milestone on the subject matter is *Hickton's Patent Syndicate vs. Patents & Machine Improvements Co Ltd*,⁸¹ in which the ratio of patent protection was explained as

invention may lie in the idea and it may lie in the way in which it is carried out, and it may lie in the combination of the two; but if there is invention in the idea plus the way of carrying it out, then it is good subject matter for letters patent.

Similarly, the *Permutit Co. vs. Borrowmann*⁸² case suggested that

It is not enough for a man to say that an idea floated through his brain; he must at least have reduced it to a definite and practical shape before he can be said to have invented a process.

Moreover, Morton, J., *In Re GEC's Application*⁸³ clarified that

⁸¹ *Hickton's Patent Syndicate v. Patents & Machine Improvements Co.* [1909], 26 RPC 339, 348 per Fletcher-Moulton LJ

⁸² *Permutit Co. v. Borrowmann* [1926], 43 RPC 356 per Viscount Cave

⁸³ *In Re G.E.C.'s Application* [1942], 60 RPC1, 4

[...] a method or process is a manner of manufacture if it (a) results in the production of some vendible product.

Post the EPC was signed, in the *Merrill Lynch* decision,⁸⁴ the principal examiner affirmed that

If the task performed is non-technical, for example [...] a business method, then the mere fact that it is being performed by a suitable machine [...] does not of itself provide a technical feature. I consider this to be a logical extension of the generally accepted view that there is no invention in merely stating that a known manual function is performed automatically.⁸⁵

A similar analysis was conducted also in relation to the decision on *Fujitsu Limited's Application*.⁸⁶ After briefing about general principles stated by UK Patent Office and Courts, the UK Patents Court held that

The types of subject matter referred to in section 1(2) UK Act, following EPC, are excluded from patentability as a matter of policy. This is so whether the matter is technical or not.⁸⁷

Also in *Pintos Global Services Limited*,⁸⁸ the examiner reported that the invention was related to a business problem as it was not more than a quick and easy way to exchange information between lenders and borrowers, and informed the applicant that "a method of doing business is not patentable irrespective of whether or not there is a technical advance", thereby motivating his objection on the basis of what was issued in the judgment of *Merrill Lynch's Application*.⁸⁹ The review of the debate on "whole contents approach" and "contribution approach" arising from these decisions is postponed to the next section. In the

⁸⁴ *Merrill Lynch's Application* [1988], RPC 1 (Pat Ct)

⁸⁵ *Merrill Lynch's Application* (n. 81) 6

⁸⁶ *Fujitsu Limited's Application* [1996], RPC 511 (Pat Ct)

⁸⁷ *Fujitsu Limited's Application* (n. 83) 530

⁸⁸ IPO, *Pintos Global Services Limited, Patent decision O/171/01*, (2001), <www.ipo.gov.uk/p-challenge-decision-results-bl?BL_Number=O/171/01> accessed at 1st February 2014

⁸⁹ *Ibid.* para 15

meantime, what emerges from the UK experience is the centrality of the technical feature as the drawing line between patentable and non-patentable subject matters.

The German Courts also articulated a new approach to the patentability of business methods. Like the UK Courts, the German judges based the possibility to grant patent protection to business method to the availability of technical means in the invention.⁹⁰ After EPC was signed, in *Dispositionsprogramm* (Disposition Program),⁹¹ the BGH⁹² rejecting the application of a process for calculating certain commercial results using electronic data processing devices, argued that

The rule, which by itself constitutes a mental-logical instruction does not become technical by the fact that during its application technical means [...] are used [...] the use of these technical means must be an integral part of the problem solution itself. ⁹³

Years later, in *Automatische Absatzsteuerung* (Automatic sales control),⁹⁴ the BPatG⁹⁵ examined claims on a process that automatically controlled sales prices using a computer and consistently with previous decision concluded that

As the subject matter in the sales machine auxiliary claim is clearly a device rather than a mathematical model, the technical character is already given by the term 'sales machine.'⁹⁶

⁹⁰ RM Ballardini, 'Software Patents in Europe. The Technical Requirement Dilemma' (2008) 3 Journal of Intellectual Property Law & Practice 563; EPO, *10th European Patent Judges' Symposium Luxembourg, 19 to 23 September 2000* (OJ EPO 2nd Spec. edition 2001)

⁹¹BGH GRUR 1977, *Dispositionsprogramm*. Available in English in (1977) Int'l Rev. Indus. Prop. & Copyright L. 558

⁹² Bundesgerichtshof, the German Supreme Federal Court of Justice

⁹³ *Dispositionsprogramm* (91) 560

⁹⁴ BPatG GRUR 1999 - *Automatische Absatzsteuerung - Re IBM Corp.'s Patent Application ("Automatic Sales Control")* (2000) E.N.P.R. 309

⁹⁵ Bundespatentgericht, the German Federal Patent Court

⁹⁶ *Automatische Absatzsteuerung* (94)

Thus, according to the Court, only the presence of a technical device could have allowed for patenting claims even when purely commercial considerations were involved.

3.4.2 The EPO Boards of Appeal case law

As the above case law confirmed, the practice under patent law of the majority of Contracting State suggested the centrality of the technical nature as national courts and patent offices excluded from patentability all those activities that were not directly carried out by a technical device, and as a result that did not have a technical character. Thus, even if it was not mentioned by the EPC, the concept of “being technical” became fundamental for the definition of invention in the EPO system ⁹⁷

Although Article 52 EPC does not use the word "technical", neverthelessthe proper interpretation of the word "invention" as used in the plural in Article 52(1) EPC requires a claimed subject-matter or activity to have a technical character, and thus in principle to be industrially applicable.⁹⁸

Technical character, also, was essential to demarcate the boundaries of excluded subject matters, among which are business methods. In this line of reasoning the EPO Technical Board of Appeal stated

Such a method is part of a business operation. Of course, the claimed method does include steps which include a technical component ... But the presence of such technical components does not alter the fact that the claimed method is a business method as such, rather than a technical method (just as the

⁹⁷ RE Thomas, LA Di Matteo, *‘Harmonizing the International Law of Business Method and Software Patents: Following Europe’s Lead’* (2007) 16 Tex. Intell. Prop. L.J.1, 14 (“While there is no explicit requirement in the EPC for technical character or a ‘technical contribution,’ the patent courts initially interpreted the EPC as including such a requirement.”)

⁹⁸ *IBM/Card Reader* (T 854/90)(1994) E.P.O.R. 89, 94. See also, *IBM/Text clarity processing*(T38/86) (1990) E.P.O.R. 384, *FUJI/Coloured disk jacket* (T119/88) (1990) E.P.O.R. 395.

use of a typewriter to perform a business activity would not change such an activity into a technical method).⁹⁹

Scholars and judges have attempted to find a formal justification for the technical character.¹⁰⁰ For most of them,¹⁰¹ this extra requirement is conforming to rules 27 and 29 of the Implementing Regulations (1974 version)¹⁰², which introduced the requirements for the technicality of the invention, as they stated that

the description shall: (a) specify the technical field to which the invention relates;(b) indicate the background art which, as far as known to the applicant, can be regarded as useful for understanding the invention...;(c) disclose the invention, as claimed, in such terms that the technical problem ... and its solution can be understood

and

The claims shall define the matter for which protection is sought in terms of the technical features of the invention.

However, some commentators disagreed, arguing that the requirement was implicit in the meaning of "industrial" as it was expressed in Article 57 of the European Patent Convention.¹⁰³ At the same time, others noted that the requirement of the technical character of inventions could not be found in the Implementing Regulations, as those did not define substantive law and, hence, were incapable of modifying the EPC by setting an additional patentability requisite.¹⁰⁴

⁹⁹ *IBM/Card Reader* (98) 95

¹⁰⁰ See the next Chapter for all their arguments on technical effect test, technical contribution approach and any hardware approach

¹⁰¹ G Paterson (79) 409, ME Fink, 'Patenting Business Methods in Europe: What Lies Ahead?' (2004) 79 *Ind. LJ* 299, 306

¹⁰² Council of the European Patent Organisation, *Implementing Regulations to the Convention on the Grant of European Patents* (1974) 13 *I.L.M.* 310

¹⁰³ Thomas (39) 1179

¹⁰⁴ R Jehan, 'Economical with the Law. Is there a case for removing computer programs from the list of non-inventions?' (2001) *C.I.P.A.J* 78, 80

The EPO Boards continued stating that the technical character of the invention was an implicit requirement of the EPC, so that

according to the case law of the boards of appeal the use of the term "invention" in Article 52(1) EPC in conjunction with the so-called "exclusion provisions" of Article 52(2) and (3) EPC, which mention subject-matter that "in particular shall not be regarded as inventions within the meaning of paragraph 1", is understood as implying a "requirement of technical character" or "technicality" which is to be fulfilled by an invention as claimed in order to be patentable.¹⁰⁵

The dispute was eventually settled. The requirement of the "technical character"¹⁰⁶ is now clearly established in the European patent law as the phrase "in all fields of technology" has been added to Article 52 at the EPC 2000 Revision Conference to reflect the wording of Article 27.1 of the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS).

3.5 Concluding remarks

As the above analysis has suggested, the main reason advocated for justifying the non-patentability of business methods, both in the European and the US patent systems, was concerned with their intangibility and abstraction. However, there were nuances in the arguments underpinning the two systems. Indeed the US Patent Law did not explicitly decree on this subject matter, and the non-patentability of business methods arose from case law that emphasised, first, the concept of useful art, and subsequently, the need for "technologicality", thus the request of something physical either in the inputs or outputs. Instead, the EPC expressly includes business methods among the non-patentable subject matters, since either the Contracting State Courts or

¹⁰⁵ *PBS PARTNERSHIP/Controlling pension benefits system* (T931/95) (2002) E.P.O.R. 522, 527

¹⁰⁶ R Bakels, PG Hugenholtz, *The Patentability of Computer Programs: Discussion of European-Level Legislation in the Field of Patents for Software* (European Parliament, Comm. on Legal Affairs and the Internal Mkt., Working Paper, 2000) 54

the EPO Boards regard “technicality”, and therefore the technical features, as the fundamental character of inventions.

4. A fresh start: e-business methods

As discussed in the previous section, until about twenty years ago a business method developer could not be granted a patent since his or her invention was not carried out by physical means or, especially in Europe, due to the lack of technical character. Major changes occurred that affected the patentability of business methods as a result of the advent of computers and the computerisation of processes. The widespread use of computer software contributed toward an increase in the ambiguity of the concept of physicality (and that of technicality in Europe), since, even if computer software were simply numerical codes, they were able to solve practical problems, as was the case with physical tools.¹⁰⁷

As previously mentioned, theories of patentability exception were rooted in the opinion that inventions needed either physical manipulation and transformation or technical features. Thus, for many years, the requirement of “physicality” or “technicality” was certainly a useful criterion for patent eligibility. However, advances in computer technology changed this framework¹⁰⁸ as computer programs were abstract codes implemented by circuits and electricity and, thus, the confluence of ideas, as well as tangible and technical assets.¹⁰⁹ Therefore, to the extent that computer-based inventions were regarded as lying at the interface between physical hardware and virtual software, the emphasis on the technical or physical properties soon became too vague and inadequate to the purpose of informing coherent decisions as to what was patentable. Courts and Patent Offices were indeed puzzled by the task

¹⁰⁷ RP Merges, ‘As Many as Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform’ (1999) 14 Berkeley Tech. LJ577, 586

¹⁰⁸ Thomas (39) 1148

¹⁰⁹ Del Gallo (52) 429

of distinguishing matters that were technological from those that were not¹¹⁰.

In this context, new perspectives and opportunities opened up for the patentability of business methods when they were implemented by means of software. To this end, an illustrative example is the US Patent Office Examination Guidelines for Computer-related Inventions that in 1996 pointed out that

The utility of an invention must be within the “technological” arts. A computer-related invention is within the technological arts. A practical application of a computer-related invention is statutory subject matter. An invention that has a practical application in the technological arts satisfies the utility requirement.¹¹¹

In line with this, the case law held that

Since the process of manipulation of numbers is a fundamental part of computer technology, we have had to re-examine the rules that govern the patentability of such technology. The sea changes in both law and technology stand as a testament to the ability of law to adapt to new and innovative concepts, while remaining true to basic principles [...] As the technology progressed...some of the earlier limiting principles regarding § 101, announced more expansive principles formulated with computer technology in mind [...] this court (and its predecessor) has struggled to make our understanding of the scope of § 101 responsive to the needs of the modern world.¹¹²

Furthermore,

¹¹⁰ Thomas (39) 1165

¹¹¹ USPTO, *US Patent Office Examination Guidelines for Computer-related Inventions* (Federal Register Vol. 61 No. 40, 1996) 7479

¹¹² *AT&T Corp. v. Excel Communications, Inc.* 172 F.3d 1352, 1356 (Fed. Cir. 1999)

[...] the focus of analysis should be on the operation of the computer program and not on the product of the computer program [...] It stressed that the operation of the computer is within the "technological arts" and a computer program, which affects the operation of the computer is also patentable.¹¹³

Likewise, the use of computers for implementing business methods led the European patent system to critically reconsider their nature and their potential for being a subject matter of patents. In the famous *Vicom* case that will be examined in detail in the next Chapter it was stated that

Generally speaking, an invention, which would be patentable in accordance with conventional patentability criteria, should not be excluded from protection by the mere fact that for its implementation modern technical means in the form of a computer program are used.¹¹⁴

Regarding computer-implemented business methods, it was added that

The claimed apparatus is clearly technical in nature (cf. Decisions T 22/85 OJ EPO 1990, 12, T 854/90, OJ EPO 1993, 669), and has practical application to the service of "customers". The fact that one such practical application of such apparatus concerns the service of customers of "a business equipment" does not mean that the claimed subject-matter must be equated with a method of doing business, as such.¹¹⁵

Along the same line, the EPO Guidelines For Examination specified that

[...]a scheme for organizing a commercial operation would not be patentable. However, if the claimed subject matter specifies

¹¹³ *Paine, Webber, Jackson & Curtis Inc. v. Merrill Lynch, Pierce, Fenner & Smith Inc.* 564 F. Supp.1358, 1369 (D. Del. 1983)

¹¹⁴ *Vicom/Computer-related invention* (T 208/84)(1987) E.P.O.R. 74, 80

¹¹⁵ *Petterson/Queuing system* (T1002/92) (1996) E.P.O.R. 1, 8

an apparatus [...] for carrying outthe scheme, that scheme and the apparatus have to be examined¹¹⁶.

E-business methods¹¹⁷ thus marked the beginning of a new phase in the debate over patentability: methods of doing business became patentable because the scope of technological or technical activities was enlarged so as to embrace, over the course of the years, any slightest spark of technicality, regardless of the final aim of the methods.¹¹⁸ How this change in perspective took place will be examined in the next Chapter. In particular, the jurisprudence developed over the last twenty years that validated business methods as a legitimate subject matter for patentability will be analysed. On this purpose, the evolution of the European and US case law and how their interplay affected the current status of the subject matter will be discussed, thereby investigating how the two patent systems influenced each other over the years and in so doing eventually produced unexpected consequences.

¹¹⁶ EPO, 'Guidelines for Examination under the EPC 1973' (status June 2005), part C, p. IV - 3 <www.epo.org/law-practice/legal-texts/archive/guidelines-1973.html> accessed 9 February 2014

¹¹⁷ HJ No, Y An, Y Park, 'A structured approach to explore knowledge flows through technology-based business methods by integrating patent citation analysis and text mining' (2014) 97 *Technological Forecasting and Social Change* 181,182

¹¹⁸ M Likhovski, 'Fighting the patent wars' (2001) 23 *E.I.P.R.* 267, 269

Chapter II

How business methods became patentable?

1. Introduction

Since the 1980s, business methods have increasingly been claimed as patentable in the form of algorithms implemented by computer programs.¹ This tight relation among business methods, software and mathematical algorithms has been the key factor motivating the reshaping of the patent system in Europe and in the US, and the recognition of patent protection to business methods. This chapter summarises the related jurisprudence of the last thirty years, ranging from the assertion of software patentability up to the well-known *Bilski* case, the Enlarged Board decision, and some more recent cases. However, the analysis of the case law on both sides of the Atlantic will show that business method patentability is still an open issue and more than some doubts about their patentability still exist.

2. A hesitant start

2.1 The US Supreme Court patent-eligibility trilogy

As already discussed in the previous chapter, business methods were not qualified as patent subject matter at first. However, something changed when they started to be implemented by computer because of the link to technical means. Nevertheless, as soon as the distinction between software and hardware was cleared up, the debate about patentability of business methods arose again according to the difficulties to recognize patent protection to software *per se*.² Referring to this issue, the US Supreme Court patent-eligibility trilogy about the patent-

¹ For here on, “business methods” should be taken to mean “e-business methods”, i.e. computer implemented business methods.

² IEEE, *Standard Glossary of Software Engineering Terminology* (The Institute of Electrical and Electronics Engineers 1990)

ability of software, i.e. *Gottschalk v. Benson*, *Parker v. Flook*, and *Diamond v. Diehr* cases, was an emblematic portrait of the relationship between technological progress and need for legal protection.

In the first of these three cases, *Gottschalk v. Benson*,³ the Court noted that the pure conversion of one set of numbers to another, performed by a computer program, could not be considered a patentable subject matter as the process was not tied to a particular machine or apparatus or meant to change objects or articles into a “different thing or state”.⁴ Thus, in the Court’s opinion, the software was not a patentable process, considering that the claimed invention was not more than abstract mathematics. In the Court’s opinion, a physical transformation was always needed to obtain patent protection for those processes that were not linked to particular machines.⁵ However, the Supreme Court admitted that only the Congress could provide a final answer to the problem of software patentability.⁶

In the second case, *Parker v. Flook*,⁷ the Court held that the implementation of an algorithm in a particular industrial process was not able to transform a not-patentable principle into a patentable process. In the decision, the Court, underling that “form should not be exalted over the substance”,⁸ affirmed that the use of claimed computer program in a “post solution activity” was not able to justify “wholly” the pre-emption of an algorithm.⁹ Further, the decision emphasised on the nature of mathematical formulas as ‘they are the basic tools of scientific and technological work’¹⁰ and concluded that the invention was not a statutory subject considering, among all, that the claimed method used the algorithm for computerising calculations could have been made by pen-

³ *Gottschalk v. Benson* 409 U.S. 63 (1972)

⁴ *Ibid.* 70

⁵ *Ibid.* 70 -1

⁶ *Ibid.* 73

⁷ *Parker v. Flook* 437 U.S. 584 (1978)

⁸ *Ibid.* 590

⁹ *Ibid.* 589

¹⁰ *Ibid.*

cils and paper, indeed, for not more than a merely calculation purpose.¹¹

Nonetheless, in the last of the three cases, *Diamond v. Diehr*,¹² the Court finally decided

... when a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101.¹³

As such in the *Diehr* decision, the Court based its reasoning on the link between the computer implemented invention and the physical transformation, which ultimately result from the implementation of the algorithms. This statement was thought to be innovative and immediately capable of marking the beginning of a new era for patentability of computer software.¹⁴ Thus, the Court decided that an algorithm implemented in a computer program could be patentable when it was directly part of a process targeted to transforming or creating things. However, as some scholars suggested, the decision mainly emphasised the link between the claimed invention and the computer, which was described as a machine that collected the data generated by algorithms. As such, the software was directly part of the industry process, playing a role similar to the one played by an human controller. However, the software was intrinsically related to a machine. Therefore, it was suggested that there were no significant differences between this decision and the pre-

¹¹ Ibid. 586

¹² *Diamond v. Diehr* 450 U.S. 175 (1981)

¹³ Ibid. 192

¹⁴ ex multis PS Menell, 'Forty Years of Wondering in the Wilderness and No Closer to the Promised Land: Bilski's Superficial Textualism and the Missed Opportunity to Return Patent Law to Its Technology Mooring' (2010) 63 Stan. L. Rev. 1289,1290 - 91; AB Jaffe, 'The US patent system in transition: policy innovation and the innovation process' (2000) 29 Research policy 531,535

vious ones since the only remarkable diversity was in the applicant choice to claiming software inventions as part of hardware devices.¹⁵

Nevertheless, the *Diehr* decision definitely introduced the idea that claims related to processes built on mathematical formulas needed to be considered and examined in their entirety. From this point of view, "it is inappropriate to dissect the claims into old and new elements and then to ignore the presence of the old elements in the analysis"¹⁶ to determine eligibility of claimed invention for patent protection. On the other hand, the Court reasoned that

The "novelty" of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter...The question, therefore, of whether a particular invention is novel is "wholly apart from whether the invention falls into a category of statutory subject matter."¹⁷

Thus, after the so-called Supreme Court trilogy, it was eventually clear that

A claim drawn to subject matter otherwise statutory does not become non statutory simply because it uses a mathematical formula, computer program, or digital computer.¹⁸

Even if these decisions opened the door to software patentability, the Supreme Court seemed to be willing to confirm the necessity of a physical transformation of subject matter into a different state or thing even when the claimed process employed mathematical formula. Therefore, the CCPA (United States Court of Customs and Patent Appeals) applying what the Supreme Court had stated introducing a two-step test -

¹⁵ JE Cohen, MA Lemley, 'Patent Scope and Innovation in the Software Industry' (2001) 89 Cal. L. Rev. 1, 9 ("The *Diehr* decision and its appellate progeny created what might be termed "the doctrine of the magic words." Under this approach, software was patentable subject matter, but only if the applicant recited the magic words and pretended that she was patenting something else entirely.")

¹⁶ *Diehr* (12) 188

¹⁷ *Ibid.* 189 - 90

¹⁸ *Ibid.* 176

the *Freeman-Walter-Abele* test.¹⁹ To decide on the patentability of inventions involving a mathematical algorithm, the Federal Circuit, firstly, analysed if the claim, as a whole, was included among the categories of statutory subject matter and, subsequently, verified if the algorithm was applied to physical elements so that the process did not just seek to compute a pure number. However, the test was not applied consistently.²⁰

2.2 The Vicom case and the technical-contribution approach

Even in Europe, at the beginning of 1980s, software was excluded from patentability because it was declared unpatentable by art 52 EPC. However, a first signal of a change toward a different direction was represented by the 1980's reform of Guidelines for Examiners in the Field of Computer-Implemented Inventions. Inspired by the US Supreme Trilogy on software patentability, the Guidelines suggested

In considering whether the subject matter of an application is an invention within the meaning of Art. 52(1), there are two general points the examiner must bear in mind. Firstly, any exclusion from patentability under Art. 52(2) applies only to the extent to which the application relates to the excluded subject-matter as such. Secondly, the examiner should disregard the form or kind of claim and concentrate on its content in order to identify whether the claimed subject matter, considered as a whole, has a technical character. If it does not, there is no invention within the meaning of Art. 52(1).²¹

¹⁹ *In re Freeman* 573 F.2d 1237 (CCPA 1978), *In re Walter* 618 F.2d 758 (CCPA 1980), *In re Abele* 684 F.2d 902 (CCPA 1982)

²⁰ C King, 'Abort, Retry, Fail: Protection for Software-Related Inventions in the Wake of *State Street Bank & Trust Co. v. Signature Financial Group, Inc*' (1999) 85 *Cornell L. Rev.* 1118, 1138; J Park, 'Has patentable subject matter been expanded?- A comparative study on software patent practices in the European Patent Office, the United States Patent and Trademark Office and the Japanese Patent Office' (2005) *International Journal of Law & Information Technology* 336, 353

²¹ EPO, 'Guidelines for Examination under the EPC 1973' (2005) part C, IV 2.2 <www.epo.org/law-practice/legal-texts/archive/guidelines-1973.html> accessed 9th September 2014

The endorsement of a more liberal and permissive policy was clear.²² Since then, EPO stopped employing the analytical method. It introduced two major changes such as the assessment of patent applications as a whole and the “technical character” requirement. The first application of the new procedure, focused on identifying the technical contribution²³ in computerized data processing claims, was in the *Vicom* case²⁴ which proposed a new approach to assessing patent protection for computer programs and other excluded subject matters.²⁵ In *Vicom*, the Board considered that

even if the idea underlying an invention may be considered to reside in a mathematical method, a claim directed to a technical process in which the method is used does not seek protection for the mathematical method as such.²⁶

Hence, it was finally accepted that inventive content could also be found in excluded subject matter. The Board emphasised the difference between a computer program claimed “as such” and a method implemented throughout a computer program. In the latter case, the algorithm at the heart of the computer program could be examined in the light of technical contribution to the arts that the method implemented by computer was able to provide. Thus, patent protection should be granted once it was assessed the novelty of the technical contribution provided by the method. Conversely, a computer program ‘as such’ could not be checked from the point of view of the technical innovation because it was no more than a numerical sequence without links to technical arts. Accordingly, the Board stated

²² RJ Hart, ‘Application of Patents to Computer Technology – UK and the EPO Harmonization?’ (1989) 2 E.I.P.R. 42, 43

²³ M Likhovski, ‘Fighting the patent wars’ (2001) 23 E.I.P.R. 267, 269

²⁴ *VICOM/Computer-related invention* (T208/84) (1987) E.P.O.R. 74

²⁵ N Shemtov, ‘The Characteristics of Technical Character and the Ongoing Saga in the EPO and the English Courts’ (2009) 4 Journal of Intellectual Property Law & Practice, 506; RM Ballardini, ‘Software Patents in Europe. The Technical Requirement Dilemma’ (2008) 3 Journal of Intellectual Property Law & Practice 563, 565

²⁶ *VICOM* (24) 74

a claim directed to a technical process which process is carried out under the control of a program (be this implemented in hardware or in software), cannot be regarded as relating to a computer program as such within the meaning of Article 52(3) EPC, as it is the application of the program for determining the sequence of steps in the process for which in effect protection is sought.²⁷

However, the Board held that

an invention which would be patentable in accordance with conventional patentability criteria should not be excluded from protection by the mere fact that for its implementation modern technical means in the form of a computer program are used.²⁸

Thus, the Board confirmed that the mere fact that software was running on a computer was not sufficient on its own to give the invention a technical character as, instead, “decisive is what technical contribution the invention as defined in the claim when considered as a whole makes to the known art”.²⁹

The *Vicom* approach, then called “technical contribution” approach, was applied by the Board to other cases. In *Koch&Sterzel*,³⁰ some year after *Vicom*, for example, it was reaffirmed that

an invention must be assessed as a whole. If it makes use of both technical and non-technical means, the use of non-technical means does not detract from the technical character of the overall teaching... it does not prohibit the patenting of in-

²⁷ *VICOM* (24) 80

²⁸ *Ibid.*

²⁹ *Ibid.* 80 -1

³⁰ *KOCH & STERZEL/X-ray apparatus* (T26/86), (1988) E.P.O.R. 72

ventions consisting of a mix of technical and non-technical elements.³¹

Interestingly enough, this EPO Board approach was similar to the conclusions reached by the US Supreme Court in the “patent-eligibility trilogy cases”, i.e. the *Gottschalk, Parker, Diehr* cases. So as it stated in *Diehr*,³² patent was not granted to a mathematical algorithms but to a mathematical sequence direct to carry out and control an industrial process³³, i.e. the moulding of rubber in *Diehr* and the digital processing of images and X rays in *Vicom* and in *Koch*.

Furthermore, in *Vicom*, the Board underlined, like the Supreme Court had done in *Diehr*,³⁴ that claimed inventions should be considered as a whole thus they must not be excluded from patentability only for being implemented by a computer program.³⁵ Therefore not only in the US but also in Europe, the patentability of excluded subject matter was based on the idea that all the features of the invention and all patent claims must be considered as a “whole”. In the EPO’s approach, however, to grant a patent it was not sufficient that interaction between software and hardware produced physical changes, but the claimed invention needed also to produce a technical contribution to the known art.

3. The turning point

3.1 Towards the State Street decision

In the early 1990s, both the European and the US jurisprudence seemed to justify the patentability of computer programs, likewise the patentability of computer implemented inventions, even if, as already said, the argument advanced was partially different. Thus, at that time, the EPO looked for the technical contribution, whilst the USPO referred to physical transformation. In the US, the *Freeman-Walter-Abele* (FWA)

³¹ Ibid. 75-6

³² *Diehr* (12) 191-2

³³ *VICOM* (24) 79

³⁴ *Diehr* (12) 189

³⁵ *VICOM* (24) 81

test,³⁶ which was introduced after *Diehr*, was almost never applied considering that “it was not intended to be the exclusive test for determining the presence of statutory subject matter”.³⁷

In the *Alappat*³⁸ case, then, the physical-transformation test was completely ignored as it was stated that a software program implemented in a conventional digital computer could be qualified as a machine claim for statutory subject matter purposes.³⁹ In the Court’s opinion,

such programming creates a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software.⁴⁰

The *In re Alappat decision* strongly weakened the Supreme Court’s requirement for physical transformation, owing to the fact that it was stated that the tangible feature request could be satisfied by any programmed general purpose computer.⁴¹ Thus, the *Freeman-Walter-Abele* test was definitively emptied of all meaning as the Federal Circuit Court focused on a new test, whereby the claimed invention was a practical application of an abstract idea (a mathematical algorithm, formula, or calculation). Considering that

the plain and unambiguous meaning of Section 101 is that any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if it meets the requirements for patentability set forth in Title 35⁴²

³⁶ Text to para 2.1 of this Chapter

³⁷ *In re Meyer*, 688 F.2d 789, 796 (CCPA 1982)

³⁸ *In re Alappat*, 33 F.3d 1526 (Fed. Cir. 1994)

³⁹ RE Thomas, ‘Debugging Software Patents: Increasing Innovation and Reducing Uncertainty in the Judicial Reform of Software Patent Law’ (2008) 25 Santa Clara High Tech. L.J. 191, 205

⁴⁰ *In re Alappat* (38) 1545

⁴¹ WD Wiese, ‘Death of a Myth: The Patenting of Internet Business Models after State Street Bank’ (2000) 4 Marq. Intell. Prop. L. Rev. 17, 34

⁴² *In re Alappat* (38)1542

Thus, it was concluded that mathematical algorithms should be patented if they were embodied in “a specific machine to produce a useful, concrete and tangible result”.⁴³ Although *In Alappat* clarified that a practical useful application - even if a simply programming process - is needed to patent purely mathematical subject matter, the Federal Circuit did not clarify if the useful application must have pertained to technical arts.⁴⁴

This issue was subsequently analysed *In re Schrader*.⁴⁵ In that case, claims were about “a method for competitively bidding on a plurality of related items”⁴⁶ to increase seller profits. The Court denied a patent for the invention for lack of statutory subject matter under 35 U.S.C. Section 101 as it did not involve “a process of transforming or reducing an article to a different state or thing”.⁴⁷ Nevertheless, Judge Newman dissented arguing that

[A] statutory "process" is limited only in that it must be technologically useful.... All mathematical algorithms transform, data, and thus serve as a process to convert initial conditions or inputs into solutions or outputs, through transformation of information.... The test is simply whether the mathematical formula ... is all that is claimed, or whether the procedures involving the specified mathematics are part of a useful process. When the latter requirement is met the subject matter is statutory.⁴⁸

⁴³ Ibid. 1544

⁴⁴ R Del Gallo, ‘Are “Methods of Doing Business” Finally Out of Business as a Statutory Rejection?’ (1998) 38 IDEA 403, 426

⁴⁵ *In re Schrader*, 22 F.3d 290 (Fed. Cir. 1994)

⁴⁶ Ibid. 291

⁴⁷ Ibid. 295

⁴⁸ Ibid. 297

Indeed, Judge Newman thought that "transformation of information" would be a statutory subject matter, and in only few years moved from the dissent to the majority.⁴⁹

The turning point was the *State Street* case.⁵⁰ The ruling involved a patent about a computerized accounting system used to allocate returns for mutual fund shareholders.⁵¹ The District Court of Massachusetts found patent claims invalid at a first step.⁵² Relying on the *Freeman-Walter-Abele* test, the Court held that the patent disclosed nothing more than a non-patentable mathematical algorithm.⁵³ Additionally, the Court stated that "business 'plans' and 'systems' are not patentable even though they may not be dependent upon the aesthetic, emotional, or judgmental reactions of a human"⁵⁴ and ruled that the invention claims were so broad and generic as "to foreclose virtually any computer-implemented accounting method necessary to manage this type of financial structure"⁵⁵. In the District Court's point of view, patent could grant a monopoly over an idea⁵⁶ considering that

patenting an accounting system necessary to carry on a certain type of business is tantamount to a patent on the business itself. Because such abstract ideas are not patentable, either as methods of doing business or as mathematical algorithm, the '056 Patent must fail.⁵⁷

Nevertheless, deciding the subsequent appeal, the Federal Circuit⁵⁸ decided in favour of business method patentability.⁵⁹ According the

⁴⁹ JR Thomas, 'The Patenting Of The Liberal Professions' (1999) 40 B.C.L. Rev. 1139, 1155

⁵⁰ *State St. Bank & Trust Co. v. Signature Fin. Group, Inc.* 149 F.3d 1368 (Fed. Cir. 1998).

⁵¹ *Ibid.* 1370.

⁵² *State Street Bank & Trust Co. v. Signature Financial Group, Inc.* 927 F. Supp 502, (D. Mass. 1996)

⁵³ *Ibid.* 512-5

⁵⁴ *Ibid.* 515

⁵⁵ *Ibid.* 516

⁵⁶ FM Keeley-Domokos, 'State Street Bank & Trust Co. v. Signature Financial Group, Inc.' (1999) 14 Berkeley Tech. L.J. 153, 157

⁵⁷ *State Street Bank* (52) 516

⁵⁸ *State Street Bank* (50)

⁵⁹ Keeley-Domokos (56) 163

CAFC's opinion, both a method and a supporting structure were claimed in that specific case. As such, the claimed invention was without any doubt a machine.⁶⁰ The Federal Court, however, suggested that

the question of whether a claim encompasses statutory subject matter should not focus on which of the four categories of subject matter a claim is directed to --process, machine, manufacture, or composition of matter--but rather on the essential characteristics of the subject matter, in particular, its practical utility.⁶¹

Moreover, reviewing some of its prior cases, the Court affirmed that

mathematical algorithms are not patentable subject matter to the extent that they are merely abstract ideas...until reduced to some type of practical application, i.e., "a useful, concrete and tangible result."⁶²

Thus, based on this line of reasoning, the Court decided to employ the "useful, concrete and tangible result" test to evaluate if the mutual fund accounting method was a statutory subject matter⁶³ and, eventually, it drew the conclusion that

the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces a useful, concrete and tangible result.⁶⁴

Crucially, the decision validated the claimed invention underlying both the innovativeness of the investment package and the programmed ma-

⁶⁰ Keeley-Domokos (56) 157

⁶¹ *State Street Bank* (50) 1373

⁶² *Ibid.*

⁶³ SJ Marsnik, RE Thomas, 'Drawing a Line in the Patent Subject-Matter Sands: Does Europe Provide a Solution to the Software and Business Method Patent Problem?' (2011) 34 B.C. Int'l & Comp. L. Rev. 227, 260

⁶⁴ *State Street Bank* (50) 1375

chine used to implement the method, so that the rationale for patenting the claimed method was its usefulness in introducing a new process. Therefore, the *State Street* case marked the end of *Freeman-Walter-Abele* test and also the end of the physical requirement, and it definitively introduced another patentability requisite: the utility of the result of the process.⁶⁵ Furthermore, *State Street* also signed the end of the business method exception as the Court

take(s) this opportunity to lay this ill-conceived exception to rest. Since its inception, the "business method" exception has merely represented the application of some general, but no longer applicable legal principle. Since the 1952 Patent Act, business methods have been, and should have been, subject to the same legal requirements for patentability as applied to any other process or method.⁶⁶

In the *State Street* decision, the Federal Circuit ultimately rejected the argument that business methods were per se outside the scope of statutory subject matter and affirmed that they were proper objects of patent protection when implemented by computer programs and capable of producing a useful, concrete and tangible result.⁶⁷

3.2 The Pension Benefit System decision and the “any-hardware” approach

Meanwhile, in Europe the contribution approach introduced in *Vicom* was starting to be applied to business methods. In the *Patterson case*, the claimed invention involved a system for determining the queue sequence for serving customers at a plurality of service points.⁶⁸ The system, indeed, consisted both of a method of doing business and of technical items belonging to the category of an apparatus. Thus, the Board underlined that “ in such a case...a mix of technical and non-

⁶⁵ Thomas(49) 1160

⁶⁶*State Street Bank* (50) 1375

⁶⁷ Likhovski (23) 272

⁶⁸ *Petterson/Queuing system* (T1002/92) (1996) E.P.O.R .1

technical elements shall not be excluded from patentability under Article 52(2) and (3) EPC”⁶⁹ and it concluded by granting patent protection to the claimed subject matter considering the fact that even if one of the technical applications of the system involved customer service, it was not sufficient to qualify the invention as a method of doing business “as such”.⁷⁰

Similarly, in the *Sohei* decision,⁷¹ the Board recognised business methods patentability. The claim was a method of operating a general-purpose computer management system for processing, *inter alia*, inventory and financial management data. Although the overall purpose of the invention was managing a business, the Board granted patentability to the method considering that it satisfied the technical requirement.⁷² As such the Board stated

the implementation, in the claimed system and by the claimed method, of the said "interface" in the form of said "transfer slip" is not merely an act of programming but rather concerns a stage of activities involving technical considerations to be carried out before programming can start.⁷³

Hence, the *Sohei* decision gave no weight to the end-use of the hardware.⁷⁴ The Board ultimately indicated that the mix of technical and functional features had to be considered to find “contribution to that art either in a technical problem (to be) solved, or in a technical effect achieved by the solution”.⁷⁵ Therefore, after *Sohei* it became clear that

⁶⁹ Ibid. 9

⁷⁰ RJ Hart R, P Holmes, J Reid , *The Economic Impact of Patentability of Computer Programs: Report to the European Commission* (Intellectual Property Institute, 2000) <http://europa.eu.int/comm/internal_market/en/indprop/study.pdf > accessed 24 September 2014, 26

⁷¹ *SOHEI/General purpose management system* (T769/92) (1996) E.P.O.R. 253

⁷² Likhovski (23) 269

⁷³ *SOHEI* (71) 262

⁷⁴ ME Fink, ‘Patenting business methods in europe: what lies ahead’ *Ind. LJ* 79 (2004) 299, 308

⁷⁵ *SOHEI* (71) 259. Some years later, as specification of the technical contribution approach applied in *Vicom* and *Sohei*, the Board introduced the “further technical effect approach” as explained in *Computer Programs Product I/IBM* (2000) E.P.O.R. 219, 227 (“it could be found in the further effects deriving from the execution (by the hardware) of the instructions given by the computer program. Where the said further effects have

the technical character of the invention played a key role in reaching business methods patentability.⁷⁶

Further corroboration came from the *Pension Benefit Systems* case⁷⁷ where the claimed invention was both a method that processed data to control pension benefits for subscriber employers and, as apparatus, and a computer programmed to run the method.⁷⁸ In the decision, the Board of Appeals immediately confirmed that

if the method is technical or, in other words, has a technical character, it still may be a method for doing business, but not a method for doing business as such.⁷⁹

However, the Board distinguished between means conferring technical character to the claimed method from those that were not capable of that, thus

The feature of using technical means for a purely non-technical purpose and/or for processing purely non-technical information does not necessarily confer technical character to any such individual steps of use or to the method as a whole....in fact, any activity in the non-technical branches of human culture involves physical entities and uses, to a greater or lesser extent, technical means.⁸⁰

Hence, under this new approach, technical features themselves were not as relevant as was their use for a technical purpose. Indeed, the Board suggested that in *PBS*

a technical character or where they cause the software to solve a technical problem, an invention which brings about such an effect may be considered an invention, which can, in principle, be the subject-matter of a patent")

⁷⁶ Hart, Holmes, Reid (70) 55

⁷⁷*PBS Partnership/Controlling pension benefits system* (T931/95), (2002) E.P.O.R. 441

⁷⁸ Ibid. 524-5

⁷⁹ Ibid. 528

⁸⁰ Ibid.

All the features of this claim are steps of processing and producing information having purely administrative, actuarial and/or financial character. Processing and producing such information are typical steps of business and economic methods.

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Subsequently, the Board of Appeal concluded that the method claimed in *PBS* was a method for doing business “as such” and, thus, denied patent protection to invention. However, the *PBS* ruling revealed significant differences from the earlier decision in defining what an inventive apparatus could be.⁸² The Board, based on this line of reasoning, indeed affirmed that a claimed apparatus embodying a physical entity or concrete product suitable for performing or supporting an economic activity was an invention within the meaning of Article 52(1).⁸³ Thus,

in the Board's view a computer system suitably programmed for use in a particular field, even if that is the field of business and economy, has the character of a concrete apparatus in the sense of a physical entity, man-made for a utilitarian purpose and is thus an invention within the meaning of Article 52(1) EPC.⁸⁴

The Board, moreover, suggested that the distinction “between “new features” of an invention and features of that invention which are known from the prior art when examining whether the invention concerned may be considered to be an invention within the meaning of Article 52(1) EPC” was not based on EPC.⁸⁵ In the Board’s opinion, hence, the difference between new and known features of a claim would be relevant not for determining whether an invention is excluded from patentability

⁸¹ Ibid.

⁸² J Pila, ‘Dispute Over the Meaning of ‘Invention’ in Article 52(2) EPC: The patentability of computer-implemented inventions in Europe’ (2005) 36 IIC: International Review of Industrial Property & Copyright Law 173, 181

⁸³ *PBS Partnership* (77) 529

⁸⁴ Ibid. 530

⁸⁵ Ibid. 531

or not,⁸⁶ but for testing the requirements of "novelty" and "inventive step" within the meaning of Article 56EPC.⁸⁷ Thus, the Board concluded "there is no basis in the EPC for applying this so-called contribution approach"⁸⁸ since

the basic test of whether there is an invention within the meaning of Article 52(1), is separate and distinct from the questions whether the subject-matter is susceptible of industrial application, is new and involves an inventive step.⁸⁹

Therefore, just as with *State Street* in the US, the *PBS* decision represented the turning point in the European patent system, considering that, with this decision, the Board dismissed the contribution approach and stated that the use of any physical entity, such as a programmed computer, could bring the claim outside the Articles 52(2) and (3) exclusions, subsequently referred to as "any-hardware approach".⁹⁰

3.3 Harmonization

The changes outlined so far were not uniformly applied to all EPC Contracting States. In the previous chapter both the German and UK decisions have been investigated to understand how those decision had influenced the EPC conclusions on business method patentability, namely the solution adopted in the Article 52 EPC. On this basis, it could be interesting to understand how the EPO Board of Appeal decisions ultimately affected the business-method patentability issue in the UK and in Germany.

In Germany, as already mentioned in the previous chapter, the presence of a technical device was essential in determining whether claims were eligible for patent protection. However, a more liberal interpretation of what *technical* is started from the early 1990s when the BGH

⁸⁶ Ibid. 532

⁸⁷ Ibid.

⁸⁸ Ibid. 531

⁸⁹ Ibid.

⁹⁰ Marsnik, Thomas (63) 288

introduced the so-called “cumulative reflection theory”. In the opinion of the German Court, claimed invention has to be considered as a whole so that a device involving industrial application, including different controls and consuming energy, is technical regardless of the type of software running in the machine.⁹¹ Thus, the BGH held that when claimed inventions were on both software and hardware, the inherent technical character of the hardware was sufficient for granting a patent even if the claimed invention was implemented by non-technical software.⁹² Moreover, on business method patentability the German Courts did not exclude the possibility that business methods could have technical aspects so long as they involved any system with industrial applications.⁹³ Therefore, in the German patent system as happened in the EPO system, at the beginning of this century it was clearly asserted that business methods related to computer programs could be patentable when they had a technical nature and produced a technical solution to some technical problem. However, in the German jurisprudence, the technical requirement had been construed more generously than by the EPO.⁹⁴

Something different happened in the UK patent system as the UK Courts were unwilling to patent business methods even if they were implemented by software programs. In the *Merrill Lynch* case,⁹⁵ the Court of Appeal stated that it

cannot be permissible to patent an item excluded by Section 1(2) under the guise of an article which contains that item—that is to say, in the case of a computer program, the patenting

⁹¹ BGH GRUR Int. 2000 - *Sprachanalyseeinrichtung - R. v Re R Co.'s Patent Application* (“*Speech Analysis Apparatus*”)(2002) 2 E.N.P.R. 16

⁹²S Bechtold, ‘Software Patents in Germany-Current Developments’ (SSRN July 2000) <https://papers.ssrn.com/sol3/papers.cfm?abstract_id=240205> accessed 20th August 2017

⁹³ BPatG GRUR 1999 - *Automatische Absatzsteuerung - Re IBM Corp.'s Patent Application* (“*Automatic Sales Control*”) (2000) E.N.P.R. 309

⁹⁴ Ballardini (25) 572

⁹⁵ *Merrill-Lynch Inc's Application* [1989], RPC 561

of a conventional computer containing that program. Something further is necessary.⁹⁶

The decision, thus, citing the EPO's *Vicom* ruling, made the technical contribution approach part of the UK precedent⁹⁷ holding that "a technical advance over the prior art in the form of a new result"⁹⁸ was the necessary assessment for patenting any invention. However, this approach seemed soon to fall out of favour as the High Court held in the *CFPH* case⁹⁹ that

a patentable invention is new and non-obvious information about a thing or process that can be made or used in industry. What is new and not obvious can be ascertained by comparing what the inventor claims his invention to be with what was part of the state of the existing art. So the first step in the exercise should be to identify what it is the advance in the art that is said to be new and non-obvious (and susceptible of industrial application). The second step is to determine whether it is both new and not obvious (and susceptible of industrial application) under the description 'an invention' (in the sense of Article 52).¹⁰⁰

The major patentability requirement on this two-step method was novelty and non-obviousness, rather than the technical nature of the invention.¹⁰¹ Thus, it was suggested that the UK Courts were moving towards the EPO approach, and just as happened in the *PBS* decision, towards abandoning the technical contribution approach.¹⁰²

⁹⁶ *Ibid.* 569.

⁹⁷ Marsnik, Thomas (63) 304

⁹⁸ *Merrill-Lynch* (95) 569

⁹⁹ *CFPH LLC's Application* [2006], 5 RPC 259

¹⁰⁰ *Ibid.* 262

¹⁰¹ Ballardini (25) 568

¹⁰² D Bainbridge, 'Court of Appeal parts company with the EPO on software patents' (2007) *Computer Law and Security Report* 199, 202

Nevertheless, in the *Aerotel v Telco* decision,¹⁰³ the Court of Appeal of England and Wales marked the inconsistencies of the EPO “any-hardware approach” and confirmed the *Vicom* principles proposing a new test, named the “technical effect approach with the rider” test.¹⁰⁴ Lord Justice Jacob stated on the claimed business method

it is true that it could be implemented using conventional computers, but the key to it is a new physical combination of hardware. It seems to us clear that there is here more than just a method of doing business as such.¹⁰⁵

Therefore, the UK Court continued following the technical effect approach as it considered the EPO’s conclusion in *PBS* invalid.¹⁰⁶ Thus “a contribution which consists solely of excluded matter will not count as a technical contribution”.¹⁰⁷ Conclusively, the UKIPO continued to reject most of the claims directed to patent business methods, even if they were computer implemented.¹⁰⁸

3.4 Summing up

As already said, the business method exclusion was initially based on the mental steps doctrine so that, even if computer implemented, methods were not patentable subject matter because they were regarded as processes, and thus sequences of mental steps, that did not use technical means for the solution of a technical problem. *Vicom* and some other rulings introduced the contribution approach in the beginning of the 90’s, and subsequently the further technical effect approach, so that computer-implemented business methods were patentable as long as

¹⁰³ *Aerotel Ltd v Telco Holdings Ltd* [2007], 7 RPC 117

¹⁰⁴The test consisted into four steps included: “(1) properly construe the claim; (2) identify the actual contribution; (3) ask whether it falls solely within the excluded subject matter; (4) check whether the actual or alleged contribution is actually technical in nature.”

¹⁰⁵ *Aerotel Ltd* (103) 136

¹⁰⁶ *Shemtov* (25) 508

¹⁰⁷ *Aerotel Ltd* (103)135

¹⁰⁸ J Pila, ‘Software Patents, Separation of Powers, and Failed Syllogisms: A Cornucopia from the Enlarged Board of Appeal of the European Patent Office’ (2011) *The Cambridge Law Journal* 203, 209

the program, when running on a computer or loaded into a computer, brings about, or is capable of bringing about, a technical effect which goes beyond the 'normal' physical interactions between the program (software) and the computer(hardware on which it is run).¹⁰⁹

The *PBS* decision rejected this point of view as the Board held that any programmed apparatus could be granted a patent, even if used in a business field. Thus, in this scenario the presence of a physical entity, such as a programmed computer, turned into a sufficient criterion to achieve the technical requirement.

Therefore, in the last twenty years, changes occurred on the concept of technicality as patentability requirement. The Board, in this point of views, firstly suggested that

the technical contribution to the art rendering a claimed invention an invention in the sense of Article 52(1) and thus patentable, may lie either in the problem underlying, and solved by, the claimed invention, or in the means constituting the solution of the underlying problem, or in the effects achieved in the solution of the underlying problem.¹¹⁰

Then, as noted,¹¹¹ the *PBS* decision enlarged the concept of technicality and, finally, elevated the form of the claim over its substance owing to the fact that

the formal category of such a claim does in fact imply physical features of the claimed subject-matter which may qualify as

¹⁰⁹ *IBM/ Computer programs* (T1173/97) (2000) E.P.O.R. 219, 234

¹¹⁰ *IBM/ External Interface Simulation* (T833/91) (1998) E.P.O.R. 431, 437

¹¹¹ Marsnik, Thomas (63) 270

technical features of the invention concerned and thus be relevant for its patentability.¹¹²

Therefore, the *PBS* decision circumvented the major obstacle to the business methods patentability, bringing the EPO jurisprudence closer to the American one, and in particular, to the *State Street* conclusion that, based on “useful, concrete and tangible result” test, affirmed the equation between programmed computer and practical utility of the invention.¹¹³

Hence, at the beginning of the new millennium, the EPO’s conclusion on the patentability of business methods was very similar to the USPTO’s interpretation of 35 U.S.C. § 101, showing the newly established tendency to bring European practices closer to the US ones. Ergo, although the European technical requirement could be more appropriate than the American practical utility to deny patent protection to vague computer-implemented methods, the *PBS* case added elements of uncertainty to the EPO system, considering that the Board seemed to conclude that patent eligibility had to depend more on the formal category of the claim than the real purpose of the invention.¹¹⁴ Doubts, therefore, grew in Europe about granting patent to business methods, as was happening in the US.

4. Doubts

4.1 The Bilski case

In 1999, in the *AT&T* case,¹¹⁵ the Federal Circuit took the opportunity to strengthen the position taken in the *State Street* case pushing the principles announced in its earlier cases.¹¹⁶ Unlike the *State Street* and *Alappat* cases, the claims here were targeted at a method, not at a sys-

¹¹² *PBS Partnership* (77) 530

¹¹³ Hart, Holmes, Reid(70) 24

¹¹⁴ Ballardini (25) 563

¹¹⁵ *At&T Corp. v. Excel Communications, Inc.* 172 F.3d 1352 (Fed. Cir. 1999).

¹¹⁶ LJ Raskind, ‘The State Street Bank Decision: The Bad Business of Unlimited Patent Protection for Methods of Doing Business’ (1999) 10 *Fordham Intell. Prop. Media & Ent.* 61, 94

tem or a machine. The claims, in fact, were on a message record for long-distance telephone calls providing differential billing treatment, depending upon subscribers' long-distance carrier.¹¹⁷ The Federal Circuit, however, based on its ruling in the *State Street* case, only tested if the claimed invention determined a useful, concrete, and tangible result considering that "whatever may be left of the earlier test,¹¹⁸ if anything, this type of physical limitations analysis [Freeman-Walter-Abele test] seems of little value."¹¹⁹ Thus, in the Court's opinion, the physical transformation "is not an invariable requirement, but merely one example of how a mathematical algorithm may bring about a useful application".¹²⁰ Hence, in the *AT&T* case, the evaluation of utility was the criterion for scrutiny of the patentability of business methods as it was for all other subject matters, since the Court stated that no special treatment would be needed for them.¹²¹

Based on this line of reasoning, in 2005 the USPTO Guidelines¹²² quoting the *State Street* decision stated that

the claimed invention as a whole must be useful and accomplish a practical application. That is, it must produce a "useful, concrete and tangible result". The purpose of this requirement is to limit patent protection to inventions that possess a certain level of "real world" value, as opposed to subject matter that represents nothing more than an idea or concept, or is simply a starting point for future investigation or research.

Moreover the PTO in a memo clarified that

Based on the Supreme Court precedent and recent Federal Circuit decisions, the Office's guidance to examiners is that a §101 process must (1) be tied to another statutory class (such

¹¹⁷ *At&T Corp* (115) 1353

¹¹⁸ The Court referred to Diehr's physical transformation test.

¹¹⁹ *At&T Corp* (115) 1359.

¹²⁰ *At&T Corp* (115) 1358-59.

¹²¹ Marsnik, Thomas (63) 260

¹²² USPTO, *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility* (USPTO Official Gazette Notices, 22 November 2005)

as a particular apparatus) or (2) transform underlying subject matter (such as an article or materials) to a different state or thing. If neither of these requirements is met by the claim, the method is not a patent eligible process under Section 101 and should be rejected as being directed to non-statutory subject matter. An example of a method claim that would not qualify as a statutory process would be a claim that recited purely mental steps. Thus, to qualify as Section 101 statutory process, the claim should positively recite the other statutory class (the things or product) to which it is tie, for example, by identifying the apparatus that accomplishes the method steps, or positively recite the subject matter that is being transformed, for example by identifying the material that is being changed to a different state.¹²³

Nevertheless, doubts were raised about the validity of such reasoning process.¹²⁴ In *eBay, Inc. v. MercExchange*¹²⁵, *L.L.C.*, Justice Kennedy, concurring Justices Stevens, Souter, and Breyer underlined “the burgeoning number of patents over business methods”¹²⁶ and focused on the diffusion of those firms that used “patents not as a basis for producing and selling goods but, instead, primarily for obtaining licensing fees”.¹²⁷ Moreover, in *LabCorp v. Metabolite Laboratories*¹²⁸ Justices Breyer, Stevens, and Souter rejected the CAFC’s useful, concrete, and practical test and underlined that “this Court has never made such a statement.”¹²⁹

Echoing these concerns, the CAFC ruled on *In re Bilski*.¹³⁰ The claims were on a method for hedging the seasonal risk in commodity trading.

¹²³ USPTO, *Clarification of “Processes” under 35 USC 101* (Memorandum USPTO, 15 May2008)<www.uspto.gov/web/offices/pac/dapp/opla/preognotice/section_101_05_15_2008.pdf> accessed 24 September 2014

¹²⁴ JF Duffy, ‘Why Business Method Patents’ (2010) 63 *Stan. L. Rev.* 1247, 1260

¹²⁵ *eBay Inc. v. MERCExchange, LL*, 547 U.S. 388 (2006)

¹²⁶ *Ibid.* 397

¹²⁷ *Ibid.*

¹²⁸ *Lab. Corp. of America Holdings v. Metabolite Labs., Inc.*, 548 U.S. 124 (2006)

¹²⁹ *Ibid.* 136

¹³⁰ *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008).

Considering that the claimed system did not require any computer for execution,¹³¹ the Federal Circuit pointed out that the invention was not more than a method that “merely manipulates abstract idea and solves a purely mathematical problem”¹³². From this point of view, the Court showed concern about the possibility to patent the method, and the mathematical algorithms itself, as it “would pre-empt substantially all uses of that fundamental principle”¹³³. Hence, the Court stated that the machine or physical transformation test discussed in earlier cases¹³⁴ was successful in rejecting overreaching patent claims, so that, the CAFC concluded the machine or physical transformation test was valid law despite the Supreme Court’s refusal to explicitly adopt the test.

Nonetheless, the CAFC decision was appealed. Even though the non-patentability of the claimed invention was confirmed, in the *Bilski v. Kappos* case¹³⁵ the Supreme Court’s lengthy decision set out the court’s view on the physical transformation test validity issue, and on the patentability of business methods, too. Concerning the business methods, the Supreme Court confirmed their patentability, but Justice Stevens raised some doubts about that decision, and argued that “although a process is not patent-ineligible simply because it is useful for conducting business, a claim that merely describes a method of doing business” should not be patentable.¹³⁶ According to this line of reasoning, there was not textual justification for the patentability of business methods.¹³⁷ In particular, Justice Stevens argued that

the term ‘useful arts’ was widely understood to encompass the fields that we would now describe as relating to technology or

¹³¹ Ibid. 950

¹³² Ibid.

¹³³ Ibid. 954

¹³⁴ ex multis *Diehr* (12) and *Flook* (7)

¹³⁵ *Bilski v. Kappos*, 130 S. Ct. 3218 (2010)

¹³⁶ Ibid.. 3232

¹³⁷ *Duffy* (124) 1265

‘technological arts. Thus, fields such as business and finance were not generally considered part of the “useful arts”.¹³⁸

However, these arguments were ultimately dismissed and the Court stated that “ by no means foreclose the Federal Circuit's development of other limiting criteria that further the purposes of the Patent Act and are not inconsistent with its text”.¹³⁹ As such, the patentability of business methods was recognized, in accordance with the *State Street* decision.

Regarding physicality test, in *Bilski* the Supreme Court held in favour of the “machine or physical transformation” test. However, it was clarified that “is not the sole test for deciding whether an invention is a patent-eligible ‘process’”.¹⁴⁰ On this line of reasoning, the Supreme Court asserted that the test “is a useful and important clue, an investigative tool, for determining whether some claimed inventions are processes under 35 USC §101”.¹⁴¹ However, the Court underlined that, while it could have been sufficient for evaluating processes “similar to those in the Industrial Age”,¹⁴² it was not without doubt that the test was still useful in the “Information Age”¹⁴³ in which “new technologies may call for new inquiries”.¹⁴⁴ Therefore, without stating a new test, the Court concluded that “[t]he concept of hedging, described in claim 1 and reduced to a mathematical formula in claim 4, is an unpatentable abstract idea, just like the algorithms at issue in *Benson* and *Flook*.”¹⁴⁵ The Supreme Court’s decision in the *Bilski* case, thus, reopened the debate in the US about the patentability of business methods and created further uncertainty on the eligibility of the subject matter as the Supreme Court did not suggest if and how processes could be granted a

¹³⁸ *Bilski v. Kappos* (135) 3244

¹³⁹ *Ibid.* 3231

¹⁴⁰ *Ibid.* 3227

¹⁴¹ *Ibid.*

¹⁴² *Ibid.*

¹⁴³ *Ibid.*

¹⁴⁴ *Ibid.* 3227–28

¹⁴⁵ *Ibid.* 3231

patent when a claim did not provide a physical transformation of matter.¹⁴⁶

4.2 The EPO Enlarged Board decision

In Europe, during the same years in which the *Bilski* cases took place, the case law seemed to endorse different conclusions. Perhaps chasing the USPTO's practice, the EPO widened the subject matter that was patentable. The rationale expressed in the *Pension Benefit System* was, in fact, further revisited in the subsequent decision *Hitachi/Auction method*¹⁴⁷ where the "any-hardware" approach began to be shaped in a clearer way. In the *Hitachi* case, the claimed invention was about both a method of implementing an automated auction system (Dutch auction) and a programmed apparatus for running the auction via a network. Although the Examining Division refused to grant patent "on the grounds that its subject-matter, an auction method, was a business method as such",¹⁴⁸ the Board of Appeal underlined, following previous cases, that both technical and non-technical features had to be tested for the patentability of the claimed invention.¹⁴⁹ However, the Board held that

the verification that claimed subject-matter is an invention within the meaning of Article 52(1) EPC is in principle a prerequisite for the examination with respect to novelty, inventive step and industrial application since these latter requirements are defined only for inventions (cf Articles 54(1), 56, and 57 EPC). The structure of the EPC therefore suggests that it should be possible to determine whether subject-matter is ex-

¹⁴⁶ Marsnik, Thomas (63); RC Dreyfuss, JP Evans, 'From Bilski back to Benson: Preemption, Inventing Around, and the Case of Genetic Diagnostics' (2011) *Stan. L. Rev.* 1349; PS Menell, 'Forty Years of Wondering in the Wilderness and No Closer to the Promised Land: Bilski's Superficial Textualism and the Missed Opportunity to Return Patent Law to Its Technology Mooring' (2010) 63 *Stan. L. Rev.* 1289

¹⁴⁷ *Hitachi/Auction Method* T 258/03 (2004) 55 E.P.O.R. 550

¹⁴⁸ *Ibid.* 550

¹⁴⁹ *Ibid.* 556–57.

cluded under Article 52(2) EPC without any knowledge of the state of the art.¹⁵⁰

Thus, on this ground, it was concluded, as in the *PBS* case, that the “technical-contribution” approach was incorrect considering that technical features, rather than subject matter, needed to be regarded more appropriately for determining novelty and inventive step.¹⁵¹ Moreover, the Board indicated that

what matters having regard to the concept of "invention" within the meaning of Article 52(1) EPC is the presence of technical character which may be implied by the physical features of an entity or the nature of an activity, or may be conferred to a non-technical activity by the use of technical means...Hence, in the Board's view, activities falling within the notion of a non-invention "as such" would typically represent purely abstract concepts devoid of any technical implications.¹⁵²

Therefore, the *Hitachi* decision departed from the “technical-contribution” approach considering that technical requirement could be found already in the use of a technical feature such as “server computer”, “client computer” and “network” device. Thus, the Court confirmed the *PBS* rationale and the “any-hardware” approach.

Moreover, in the *Hitachi* case, the Board broadened the concept of invention¹⁵³ introducing a new test named “the problem-and-solution approach”.¹⁵⁴ In the Board’s opinion, the achievement of technical char-

¹⁵⁰ Ibid. 553

¹⁵¹ Marsnik, Thomas(63) 289

¹⁵² *Hitachi* (147) 555-6

¹⁵³ A Feros, ‘A comprehensive analysis of the approach to patentable subject matter in the UK and EPO’ (2010) *Journal of Intellectual Property Law & Practice* 577, 582

¹⁵⁴ EPO *Guidelines for Examination* <www.epo.org/law-practice/legal-texts/html/guidelines/e/g_vii_5.htm> accessed at 24th September 2014, part G, VII – 5 (“In the problem-and-solution approach, there are three main stages:(i) determining the "closest prior art", (ii) establishing the "objective technical problem" to be solved, and (iii)considering whether or not the claimed invention, starting from the closest prior art and the objective technical problem, would have been obvious to the skilled person”)

acter in the light of Article 52 EPC did not require consideration of possible novel or inventive contributions to the prior art.¹⁵⁵ The non-obviousness, the Board suggested, would be verified at a later stage when, according to Article 56, novelty and inventive assessment of the invention would be tested.¹⁵⁶ Thus, the analysis of prior art could take place only after testing the technical character of the claimed invention.

Therefore, owing to this new three-step test, the EPO would grant patentability to claimed invention that both used technical (or physical) features and was non-obvious to a skilled person starting from the closest prior art.¹⁵⁷

Hence, in the Board's view, activities falling within the notion of a non-invention "as such" would typically represent purely abstract concepts devoid of any technical implications.¹⁵⁸ The refinement of this new approach continued in the *Microsoft/Clipboard formats* case where the Board applied a reasoning process similar to *Hitachi*.¹⁵⁹ Examining the claimed invention both for a method and a computer program that performed the claimed system,¹⁶⁰ the Board confirmed "a method using technical means is an invention within the meaning of Article 52(1) EPC".¹⁶¹ Furthermore, the Board underlined that "a method implemented in a computer system represents a sequence of steps actually performed and achieving an effect."¹⁶² Hence, the Board concluded that

the claim category of a computer-implemented method is distinguished from that of a computer program. Even though a method, in particular a method of operating a computer, may be put into practice with the help of a computer program, a

¹⁵⁵ N Fox, A Rees, 'A European Perspective on Business Methods Patents' (2009) *Landslide* 30, 32

¹⁵⁶ *Hitachi* (147) 553

¹⁵⁷ C Laub, 'Software Patenting: Legal Standards in Europe and the US in view of Strategic Limitations of the IP Systems' (2006) *The Journal of World Intellectual Property* 344, 360

¹⁵⁸ *Hitachi* (147) 556

¹⁵⁹ *Microsoft/Clipboard formats* (T424/03) (2006) 39 E.P.O.R. 414

¹⁶⁰ *Ibid.* 416 -7

¹⁶¹ *Ibid.* 419-20

¹⁶² *Ibid.* 420

claim relating to such a method does not claim a computer program in the category of a computer program.¹⁶³

Therefore, the ruling seemed to validate “the problem-solution approach” even if something more was stated about mixed-type-claim-feature inventions.¹⁶⁴ The Board suggested that computer programs had “technical character since [they] relate[s] to a computer-readable medium, i.e. a technical product involving a carrier.”¹⁶⁵ According to this line of reasoning, computer programs - but not methods - satisfied both the technical character requirement and the non-obviousness requirement since they were implemented by a computer-reusable medium.¹⁶⁶ The *Microsoft* decision was therefore believed to eventually guarantee the patentability of computer programs in Europe.¹⁶⁷ Not the same occurred for business methods.¹⁶⁸

On this issue, in a ruling in connection with the *Duns Licensing* case¹⁶⁹ on a claimed business method invention, the Board of Appeal clarified the EPC Article 52(2) and (3) on the “technical-character” requirement

In order to be patentable, the subject-matter claimed must therefore have a “technical character” or to be more precise - involve a “technical teaching”, i.e. an instruction addressed to a skilled person as to how to solve a particular technical problem using particular technical means.¹⁷⁰

Moreover, in this holding, the Board underlined that

¹⁶³ Ibid.

¹⁶⁴ *Comvik/Two identities* (T 0641/00) (2004) 10 E.P.O.R. 102, 107 (“a mix of technical and “non-technical” features (i.e. features relating to non-inventions within the meaning of Article 52(2) EPC) appearing in a claim, even if the non-technical features should form a dominating part”)

¹⁶⁵ *Microsoft/Clipboard formats* (159) 420

¹⁶⁶ SV Steinbrener, B Best, ‘The European Patent Convention’ in G Stobbs (ed), *Software Patents Worldwide* (Kluwer Law International 2008), 66

¹⁶⁷ Ballardini (25) 567

¹⁶⁸ S Wagner, ‘Business method patents in Europe and their strategic use : evidence from franking device manufacturers’ (2008) 17 Econ. Innov. New Techn. 173,179

¹⁶⁹ *DUNS Licensing Associates/Estimating sales activity* (T154/04) (2007) 38 E.P.O.R. 349

¹⁷⁰ Ibid. 364

the examination whether there is an invention within the meaning of Article 52(1) to (3) EPC should hence be strictly separated from and not mixed up with the other three patentability requirements.¹⁷¹

Therefore, the Board confirmed that

Since only technical features and aspects of the claimed invention should be taken into account in assessing inventive step, i.e. the innovation must be on the technical side, not in a non-patentable field.¹⁷²

Thus, it concluded for the non-patentability of the claimed business method invention, stating that

interaction with and exploiting information about the physical world belongs to the very nature of any business and assuming those as technical would render the exclusion for business methods under Article 52(2)(c) EPC meaningless.¹⁷³

Hence, in the Board's opinion,

Gathering and evaluating data as part of a business research method do not convey technical character to the business research method if such steps do not contribute to the technical solution of a technical problem.¹⁷⁴

Therefore, the Board finally suggested that business methods were patentable but only when they were automated by technical means to solve a technical problem. However, even if recent holdings confirmed the EPO's course on the patentability of excluded subject matter, they did not appear capable of clarifying the criteria for determining whether

¹⁷¹ Ibid. 366

¹⁷² Ibid. 370

¹⁷³ Ibid.

¹⁷⁴ Ibid.

there was an invention and whether the invention was technical in nature.¹⁷⁵

Casting doubts on the patentability of computer-implemented inventions, the EPO's President referred under article 112(1)(b) EPC to the Enlarged Board of Appeal on four points of law.¹⁷⁶ The first question addressed was about computer programs and if they were statutory subject matter. On this issue, the Enlarged Board underlined that "the reference to a "computer program" intended to encompass claims to various matters which involve a computer program without necessarily literally being one."¹⁷⁷ Moreover, reconstructing the Technical Board's decisions, the Enlarged Board focused on the conclusion that "with regard to the exclusions under Article 52(2) and (3) EPC, it does not make any difference whether a computer program is claimed by itself or as a record on a carrier."¹⁷⁸

However, the Enlarged Board suggested that it did not mean that computer programs would have always been eligible for patent protection considering that

a claim which specifies no more than "Program X on a computer-readable storage medium," or "A method of operating a computer according to program X," will always still fail to be patentable for lack of an inventive step under Articles 52(1) and 56 EPC.¹⁷⁹

Thus, the Enlarged Board declined the Referral conclusion that

if one were to follow the reasoning of T 424/03 [*Microsoft/Chipboard format* decision] overcoming the exclusion of programs for computers would become a formality, merely re-

¹⁷⁵ Marsnik, Thomas (63) 296

¹⁷⁶ *Referral under Article 112 (1), lett. b) EPC to the Chairman of the Enlarged Board of Appeal* (2008) EPA GD3 < http://www.sipf.se/admin/photo/big/Remisser/G308_en.pdf > accessed 24th September 2014

¹⁷⁷ *Programs for Computers* (G3/08) (2010) 36 E.P.O.R. 349, 362

¹⁷⁸ *Ibid.* 367

¹⁷⁹ *Ibid.* 369

quiring formulation of the claim as a computer implemented method or as a computer program product.¹⁸⁰

Thus, the Enlarged Board seemed to confirm that technicality was always to be tested, even it was not be clarified how the technicality of claimed computer- implemented subject matter could be determined.

With the second and the third questions, the Enlarged Board was asked to clarify whether a computer program and a computer-implemented method were different, and furthermore, if technical character could be conferred merely by explicitly mentioning the use of a computer or a computer-readable data storage medium or if it was necessary to identify a technical effect brought about on a physical entity. The Enlarged Board indicated the existence of a logical distinction “between a method carried out by a computer and the sequential list of instructions which specify that method.”¹⁸¹ Moreover, the Enlarged Board confirmed, referring to the Board of Appeal’s case law, that all claimed features, both technical and non-technical, should be considered as a whole in evaluating the technical character of the invention. The Enlarged Board underlined the EPO’s consistency in applying the approach that

starts with a consideration of all the features together to determine whether the claimed subject-matter has a technical character. Only once this determination has been made can the Board turn to the question of which claimed features contribute to that technical character and therefore should be taken into account for the assessment of whether there is an inventive step. It is in fact a well-established principle that features which would, taken in isolation, belong to the matters excluded from patentability by Article 52(2) EPC may nonetheless contribute to the technical character of a claimed

¹⁸⁰*Programs for Computers* (177) 369

¹⁸¹ *Ibid.* 371

invention, and therefore cannot be discarded in the consideration of the inventive step.¹⁸²

Nevertheless, the Enlarged Board did not provide an answer to the main concerns of the EPO's President about what conferred technicality to the invention and how to test this requirement either by the "technical-contribution" approach or the "any-hardware" approach. The fourth question, at last, introduced the main issue on the patentability of computer-implemented invention, namely whether the activity of programming a computer - thus, the intellectual activity of working out what steps were to be included in a computer program - necessarily involved technical considerations. The Enlarged Board ruled that

although it may be said that all computer programming involves technical considerations since it is concerned with defining a method which can be carried out by a machine, that in itself is not enough to demonstrate that the program which results from the programming has technical character; the programmer must have had technical considerations beyond "merely" finding a computer algorithm to carry out some procedure.¹⁸³

However, the Enlarged Board refrained from discussing the technical nature of algorithms, and pointed out only that even if "the abstract formulation of algorithms" was not sufficient to regard them as "belonging to a technical field", ¹⁸⁴ computer programs could be patentable considering

the fact that fundamentally the formulation of every computer program requires technical considerations in the sense that the programmer has to construct a procedure that a machine can carry out, is not enough to guarantee that the program has a technical character ... by analogy one would say that

¹⁸² Ibid. 373

¹⁸³ Ibid. 375

¹⁸⁴ Ibid.

this is only guaranteed if writing the program requires “further technical considerations”.¹⁸⁵

Therefore, the decision of the Enlarged Board, finally confirmed the patentability of computer-implemented invention, including business methods. However, as was underlined by one scholar,¹⁸⁶ not all doubts were dismissed. The Enlarged Board, in fact, did not clarify the definite EPO’s approach to assessing the exclusion of subject matter as well as the criterion to be used for ascertaining whether the requirement of technicality was satisfied.

5. Alice vs. CLS Bank and the future of business method patentability

Four years after the *Bilski* decision, the theme of business method patentability reappeared on the list of the US Supreme Court arguments. The case, namely *Alice vs. CLS Bank*,¹⁸⁷ was about the patentability of a computer system tracking the balances of different trading parties in settlements in financial markets to reduce the risk of lack of funds. i.e. the system only allowed to execute the settlement if both parties to the trade had sufficient funds. The *Alice* decision, indeed, gave the Court the opportunity to reconsider its position on the “machine or transformation” test as already established in the *Bilski* decision.

Based on the conclusion drafted in the *Mayo* case,¹⁸⁸ the Court has focused in the *Alice* decision on the necessity of a double analysis to be conducted on claims regarding “judicial exception”, i.e. claims with abstract ideas and claims with laws of nature.¹⁸⁹ On one hand, the Court has clearly stated that ‘laws of nature, natural phenomena, and ab-

¹⁸⁵ Ibid. 375-6

¹⁸⁶ Pila (108)310

¹⁸⁷ *Alice vs. CLS Bank*, 573 US 134 S. Ct. 2347 (2014)

¹⁸⁸ *Mayo Collaborative Services v. Prometheus Laboratories*, 132 S. Ct. 1289 (2012). The case involved a medical diagnostic method and the Court ultimately argued on the difference between an invention and a law of nature.

¹⁸⁹ USPTO, Memorandum Preliminary Examination Instructions in view of the Supreme Court Decision in *Alice Corporation Pty. Ltd. v. CLS Bank International et al.* <https://www.uspto.gov/sites/default/files/patents/announce/alice_pec_25jun2014.pdf> accessed 25 May 2017

abstract ideas are not patentable.¹⁹⁰ Thus, a first step in the examination of an abstract idea, namely “Part 1” of the analysis, has been detailed, thereby aiming to identify whether an invention is more than just an abstract idea.¹⁹¹ On the other hand, the Court has imposed a further step in the analysis of abstract ideas, namely “Part 2” of the Analysis,¹⁹² which has to determine whether the invention has any “inventive concept”. Thus, according to the “two-part analysis”, computer-implement inventions will be patented when one element or a combination of elements are introduced in the patent claims that could ensure that the invention ‘amounts to significantly more than the abstract idea itself.’¹⁹³

In the light of arguments already discussed, the Court has decided on the invention challenged in the *Alice* case concluding

the claims at issue here amount to “nothing significantly more” than an instruction to apply the abstract idea of intermediated settlement using some unspecified, generic computer... the method claims, which merely require generic computer implementation, fail to transform that abstract idea [intermediated settlement] into a patent-eligible invention.¹⁹⁴

Hence, a new test, namely the “patent-eligibility” test, has replaced the “machine or transformation” test, according to the *Alice* decisions. Nevertheless, the new test is vaguely defined. Indeed, the Court does not give enough indication on what a patent eligible invention is. Only a negative definition is provided

¹⁹⁰ *Alice* (187) 2354, quoting *Association for Molecular Pathology v. Myriad Genetics* 133 S. Ct. 2107 (2013)

¹⁹¹ USPTO (189) (“Examples of abstract ideas referenced in *Alice Corp.* include: a) fundamental economic practices; b) certain methods of organizing human activities; c) an idea of itself; d) mathematical relationships/formulas.”)

¹⁹² *Ibid.*

¹⁹³ *Ibid.*

¹⁹⁴ *Alice* (187) 2357

Neither stating an abstract idea “while adding the words ‘apply it,’ ” ... nor limiting the use of an abstract idea “to a particular technological environment”..., is enough for patent eligibility. Stating an abstract idea while adding the words “apply it with a computer” simply combines those two steps, with the same deficient result. Wholly generic computer implementation is not generally the sort of “additional feature” that provides any “practical assurance that the process is more than a drafting effort designed to monopolize the [abstract idea] itself.”¹⁹⁵

The *Alice* decision as well as previously the *Bilski* decision, therefore, avoids saying clear words against the patentability of business methods or software. Conversely, the US Court seems to confirm its quite open approach to this kind of inventions.¹⁹⁶ As such, business methods are general patentable, whereby they are innovative, according to the conclusions drafted in the *Alice* case. Even if a tougher analysis is depicted, indeed, only methods that consist in ‘well-understood, routine and conventional activities previously known to the industry’ are ultimately excluded from patent protection ex 35 USC.¹⁹⁷ Furthermore, this approach has been empathized by some recent Federal Circuit’s decisions¹⁹⁸ that have confirmed that software and business methods are quite often patentable in the US.¹⁹⁹ Hence, the debate on this issue is expected to continue.

6. Some conclusions

The analysis conducted in this chapter has revealed more similarities than differences between the European and the US legal framework on

¹⁹⁵ Ibid. 2350

¹⁹⁶ Ibid. 2354

¹⁹⁷ USPTO (189)

¹⁹⁸ *Enfish, LLC v. Microsoft Corp.*, 2016 U.S. App. (Fed. Cir. May 12, 2016); *BASCOM Global Internet Services, Inc. v. AT&T Mobility LLC*, No. 15-1763 (Fed. Cir. June 27, 2016); *McRO, Inc. v. Bandai Namco Games America, Inc.*, No. 15-1080 (Fed. Cir. Sept. 13, 2016)

¹⁹⁹ PJ Sutton, ‘Patent eligibility after Alice’ (2017) World Intellectual Property Review <<http://www.worldipreview.com/contributed-article/patent-eligibility-after-alice>> accessed 25th May 2017

the patentability of business methods. Based on a consistent jurisprudence of the US Supreme Court on 35 USC § 101, business methods are usually patented at the USPTO. This is especially true when business methods are implemented by computer. And this is true also in Europe. However, the technical requirement ex Article 52 and ex Article 56 EPC is taken into particular account in testing business patentability in Europe. As such, business methods are patentable in Europe whereby based on technical considerations. Thus, business methods that are not computer-implemented, as well as those whose inventive step is not a technical feature, are not patentable in Europe. Conversely, in the US, business methods are patented even if the inventive step does not refer to some technical improvement.

Nevertheless, a more strict examination seems to be ultimately required with regard to the US Supreme Court decisions in the *Bilski* and *Alice* cases. As such, abstract methods, i.e. pure methods as well as mere algorithms, are not patentable anymore even in the US. Thus, a possible rapprochement has been suggested to be occurred between the more severe European point of view and the USPTO broad approach. However, differences remain. Lacking of a coherent regulations, the European policy on business method patents is not completely clear, as is evident from the decision of the EPO Enlarge Board of Appeal. Indeed, EPO is often more hesitant than USPTO in granting patent protection to business methods.

Such a hesitation has been often linked to the difficulties in identifying the effects of business method patents on innovation and especially on competition. In particular, concerns have arisen regard to the possibility that the EPO would develop a more positive attitude towards business methods, i.e. a wider interpretation of the technical requirements as that adopted in the US. All this considered, the economic effects of business method patents will be examined in the next chapter, namely Chapter 3. In particular, the chapter will be aimed at understanding if any of the traditional economic rationales can be applied to explain the patentability of business methods, or if a new point of view is necessary.

Chapter III

What economic and social effects can be expected from patenting business methods?

1. Introduction

The analysis on Chapter II has made clear that patentability of business method is now generally accepted both in the US and in Europe. According to the proper nature of this type of inventions, however, doubts have been expressed about the beneficial effects to society that could come from granting patent protection to business methods. In particular, business methods tend to be poor in technicality and rather quite abstract. As such, patent claims are often generic and inventions are broadly defined. Thus, business method patents tend to cover more than the real core of the innovative process behind the invention. As result, enlarged pieces of common knowledge can be excluded from the public use. Therefore, patent monopolistic privileges issued on business methods easily result in stifling innovation. Similarly, competition in the market could be affected whereby granting such a broad patent protection to processes and methods could prevent firms, specifically the small one, to implement similar technologies. Hence, it cannot be excluded that beneficial effects traditionally associated to patents could be overcome by detrimental effects in the case of business methods.

All this considered, this chapter mainly focuses on the debate on the possible and expected social and economic effect of business method patents. On this purpose, the traditional theoretical justifications for patent monopolistic privileges will be critically examined to ascertain whether one of them would be able to explain business method patents and what beneficial effects would result from offering exclusive rights to business method inventors. The chapter will be divided into three parts. In the first part, the literature on the economic rationales commonly

recognised to be served by patents will be synthetically reviewed. Specific focus will be given to incentive, disclosure, signalling and transaction rationale. Nevertheless, as will be explained in the second part, the business method innovation presents some peculiarities that make it difficult to understand what economic and social results can be achieved through business method patents, according to one of the four above rationales. My suggestion, in the third part, will be to place the phenomenon into context; thus, I will compare the generally recognized beneficial effects of patents to the suggested possible negative consequences of patenting business methods. A new perspective, hence, will be offered to explain, on one side, the firm's purpose in so keenly seeking patent protection for business methods and, on the other side, the economic efficiencies that can be ultimately achieved.

2. Possible economic rationales behind patent protection

The upshot of the issuing of a patent is the awarding of a temporary monopoly to the inventor. Thus, patent holders have exclusive rights to exploit their inventions. Nevertheless, these privileges could result in market distortions and other social costs such as high price, decline in consumption, decrease in gross domestic product and deadweight loss.¹ Consequently, achieving a fair balance between reducing in competition and a benefit to society is deemed indispensable when an invention, or rather a category of invention, is considered for patent protection.² This line of reasoning holds that patent restraints can be justified only if granting exclusive rights to inventors can result in some beneficial effects on the economy.³ Thus, ill effects, such as a reduction in the output or an increasing the prices of the final products, should be over-

¹ D Olson, 'Taking the utilitarian basis for patent law seriously: the case for restricting patentable subject matter' (2009) 82 Temp. L. Rev. 18, 183

² R Mazzoleni, R Nelson, 'The benefits and costs of strong patent protection: a contribution to the current debate' (1998) 27 Research Policy 273; R Eisenberg, 'Public Research and Private Development: Patents and Technology Transfer in Government-Sponsored Research' (1996) 82 Va. L. Rev. 1663; DL Burk, MA Lemley, 'Policy levers in patent law' (2003) 89 Va. L. Rev. 1575

³ F Machlup, E Penrose, 'The Patent Controversy in the Nineteenth Century' (1950) 10 The Journal of Economic History 1, 21; R Mazzoleni, R Nelson, 'Economic theories about the benefits and costs of patents' (1998) 32 Journal of Economic Issues 1031, 1034

come by positive effects on innovation and consumer welfare in order to provide patent protection to innovative technologies.⁴

From an economic perspective, a number of different theoretical frameworks have been developed to determine whether patent protection could achieve the predicted growth in the market and the wider benefit to the society. Regarding the literature on this topic, four rationales have been mainly presented in the attempt to provide support for granting exclusive use of inventions to patent holders. Namely, incentive, disclosure, signalling and transaction have been highlighted as positive and final economic outcomes of patents. Thus, each of these purposes is the reason for their focus in this part of the research on a principal reason monopolistic rights have been granted to inventors.

2.1 Incentive

According to most traditional economical theories on patenting, the main beneficial effect achieved by granting patent protection to inventions is the promotion of innovation.⁵ In particular, a firm's decision concerning how much to spend on research, i.e. to invest in innovation developing new products etc., is mainly based on the possibility of receiving lucrative economic rewards from marketing their inventions.⁶ However, competitors can easily copy inventions that are marketed. And, firms, who copy someone else's inventions, are able to reduce price significantly, as they do not have to cover costs for research and innovation.⁷ Therefore, if inventions were not patentable, their disclosure and general exploitation would drive prices down so low that costs to develop inventions could not be ultimately recouped by the inventor.⁸ Hence,

⁴ Burk, Lemley (2) 1580

⁵ KJ Arrow, 'Economic Welfare and the Allocation of Resources for Invention' in National Bureau of Economic Research, *The rate and direction of inventive activity: Economic and social factors* (Princeton University Press 1962) 609; WS Bowman Jr, *Patent and Antitrust Law: A Legal and Economic Appraisal* (University of Chicago Press 1973); R Eisenberg, 'Patents and the Progress of Science: Exclusive Rights and Experimental Use' (1989) 56 U. Chi. L. Rev. 1017, 1024-28; Mazzoleni, Nelson (2) 275

⁶ WF Baxter 'Legal Restrictions on Exploitation of the Patent Monopoly: An Economic Analysis' (1966) 76 Yale L J 267, 268-69; Besen, Riskind (6) 5

⁷ Machlup, Penrose (3) 12

⁸ Eisenberg (5) 1025

according to the traditional view, patent protection is essential in promoting innovation considering that firms are encouraged toward the development of new technologies by the confidence to grant monopoly rights on inventions; thereby, receiving high returns from their exclusive use.⁹ Indeed, the strong connection between exclusive rights and technological innovation is a key point according to this traditional approach.¹⁰ As suggested by Joseph Schumpeter, investments in innovation are made in the expectation of monopoly profits; thus, the social benefit of technical progress is assured by the presence of monopolistic players in the marketplace.¹¹

The Schumpeterian model has been elaborated in the Prospect Theory by Kitch.¹² In particular, from Kitch's point of view, firms have an incentive to innovate only if they have been assured of having the power to control all uses relating to the new technology by granting patent protection for it.¹³ Specifically, inventors have an incentive to make investments to improve new technologies only when they are sure to appropriate in advance, thus before their exploitation, all the technological uses that result from their innovations.¹⁴ Hence, according to Prospect Theory, preventing, or at least, reducing competition is essential for improving innovation and a strong patent protection is fundamental in serving this purpose.¹⁵ However, the idea behind the prospect theory that only "strong and broad patent rights are conducive to economic progress"¹⁶ has been rejected by some commentators, who

⁹ Machlup, Penrose (3) 21

¹⁰ FM Scherer, 'Schumpeter and Plausible Capitalism' (1992) 30 *Journal of Economic Literature* 1416, 1425

¹¹ Scherer (10) 1418; L Raskind, 'The State Street Bank Decision: The Bad Business of Unlimited Patent Protection for Methods of Doing Business' (1999) 10 *Fordham Intell. Prop. Media & Ent. LJ.* 61, 69

¹² Burk, Lemley (2) 1604; MA Lemley, 'Ex ante versus ex post justifications for intellectual property' (2004) 71 *U. Chi. L. Rev.* 129, 132 (Lemley explained "Ed Kitch famously analogized patents to mining claims, suggesting that we should grant patents in advance of an invention, making a patent a right to "prospect" a particular field for an invention")

¹³ E Kitch, 'The Nature and Function of the Patent System' (1977) 20 *J.L. & Econ.* 265, 276

¹⁴ *Ibid.* 276

¹⁵ Burk, Lemley (2) 1604

¹⁶ Mazzoleni, Nelson (2) 275; M Boldrin, DK Levine, 'The Case Against Intellectual Property' (2002) 92 *Am. Econ. Rev.* 209, 209

contend that monopolists are less interested in innovation than firms in a competitive market.¹⁷

According to Arrow's arguments, in a competitive market the development of innovative products can result in significant gains for the firm that decides to invest in innovation.¹⁸ Instead, the firm profit is cut if an innovation takes place in a monopolistic market. Specifically, the new product substitutes the previous one, according to the replacement effect.¹⁹ Thus, unlike firms in a competitive market, a monopolist can capture only a small part of the profits coming from the new invention because the new profits will simply replace the previous source of profits.²⁰ Recently, Arrow's conclusions that patent protection can result in reducing firms' investments in innovation have gained more support. In particular, looking at the digital revolution, the lack of patent protection has been put forward to explain the incredible growth of innovation in software technologies, especially at their very outset.²¹ Therefore, the idea has been promoted that innovation would be best encouraged in the absence of patent protection.²²

Notwithstanding the perspective above, recent studies have shown that conferring strong monopoly privileges to firms can still be useful in stimulating innovation.²³ Indeed, arguments both for and against patent protection have been made and peculiarities of each industrial sector have been stressed in order to justify the possibility of tailoring patent

¹⁷ Eisenberg (5) 1026

¹⁸ Arrow (5) 619 - 20

¹⁹ J Tirole, *The theory of industrial organization* (MIT press 1988) 390.

²⁰RJ Gilbert, 'Competition and Innovation' (2007) Competition Policy Centre Paper <<http://repositories.cdlib.org/iber/cpc/CPC07-069>> accessed 16 June 2017, 13

²¹ MA Lemley, L Lessig, 'The End of End-to-End: Preserving the Architecture of the Internet in the Broadband Era' (2001) 48 UCLA L. Rev. 925, 930-33

²² Burk, Lemley (2) 1606; Mazzoleni, Nelson (2) 275; J Bessen, MJ Meurer, *Patent failure: How judges, bureaucrats, and lawyers put innovators at risk* (Princeton University Press 2008)

²³ BH Hall, D Harhoff, 'Recent Research on the Economics of Patents' (2012) National Bureau of Economic Research Working paper n. 17773 <<http://www.nber.org/papers/w17773>> accessed on the 20th June 2017, 15; Y Qian 'Do National Patent Laws Stimulate Domestic Innovation in a Global Patenting Environment? A Cross-Country Analysis of Pharmaceutical Patent Protection, 1978-2002' (2007) 89 Review of Economics and Statistics 436; Besen, Riskind (6) 5

systems according to the specific of each industry.²⁴ In particular, doubts have been cast on the efficiency of property rights regarding those industrial sectors such as software whereby no large investment in R&D is required, and where being the first mover in the market is enough to produce satisfying returns.²⁵ Hence, no patent protection is thought to be ultimately needed to recoup the R&D investment in such a type of industries.²⁶ On the other hand, patents have been said to best promote innovation in those industries that are knowledge based and there is a low-cost to reverse engineering.²⁷ This is because investment in R&D is so high in such contexts that only the monopolistic use of inventions can get returns for the firms.²⁸ Therefore, the idea is commonly supported that patent protection can still produce social benefits in promoting innovation, but only in conjunction with those technologies for which companies would not stay in the market, developing their inventions, unless granted monopoly rights.²⁹ This is simply because only a long-term patent protection appropriate to the value of the invention can recoup the incurred costs.³⁰

2.2 Disclosure

To explain the economic rationale of patent systems, some authors have pointed out that the prospect of granting exclusive rights can encourage

²⁴ DL Burk, 'Tailoring patent policy to specific industries' (2003) *Marq. Intell. Prop. L. Rev.* 1; Burk, Lemley (2) 1630

²⁵Burk, Lemley (2) 1585

²⁶ AB Jaffe, J Lerner, *Innovation And Its Discontents: How Our Broken Patent System Is Endangering Innovation and Progress, and What to Do About It* (Princeton University Press 2004) 47

²⁷ P Aghion, U Akcigit, P Howitt, 'What Do We Learn From Schumpeterian Growth Theory? What Do We Learn From Schumpeterian Growth Theory?' (2013) NBER Working Paper 18824 <<http://www.nber.org/papers/w18824.pdf>> accessed on the 20th June 2015

²⁸ W Cohen, J Walsh, R Nelson, 'Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)' (2000) NBER working paper w7552 <<http://www.nber.org/papers/w7552>> accessed on the 20th June 2017

²⁹ Mazzoleni, Nelson (2) 276; J Lerner 'The Patent System in a Time of Turmoil' (2010) 2 *W.I.P.O.J.* 28, 30; FM Scherer, 'The Economics of Human Gene Patents' (2002) 77 *Academic Medicine* 1348, 1354

³⁰ PA Samuelson, WD Nordhaus, *Economics* (18th ed, McGraw-Hill 2005) 36

the disclosure of innovation.³¹ Since innovation is commonly built on previous technical knowledge, firms tend to keep their technical information secret as disclosure can result in reducing rivals' costs for improving innovation and the creation of new competitive products.³² However, being sure in the knowledge that no one can copy or use the technology without a licensing agreement makes firms keener on sharing their information and expertise, instead of keeping them secret. As such, granting temporary property rights to inventors could result in a fair exchange for disclosure of technical information.³³ Thus conceived, patents could be described as a contract between the inventor and society, so that IP rights are offered as result of diffusion of innovative knowledge.³⁴

According to the economic framework of the disclosure theory,³⁵ patents can serve the purpose of circulating knowledge and facilitating the widespread diffusion of innovation,³⁶ ultimately encouraging a growth in productivity.³⁷ Taking this view, certain social benefits can come about from granting exclusive rights to inventors according to the fact that disclosure allows other entrepreneurs to implement inventions around technologies already patented both during patent terms (paying royalties) and once the terms are expired (without paying royalties).³⁸ The spill-over effect resulting from patent disclosure has been presented,

³¹Machlup, Penrose (3) 10;F Machlup ,*An Economic Review of the Patent System - Study n. 15* (US Government Printing Office 1958); FM Scherer, 'A Half Century of Research on Patent Economics' (2010) 2 W.I.P.O.J. 20, 25; Hall, Harhoff (23) 16

³² S Scotchmer, J Green, 'Novelty and disclosure in patent law' (1990) 21 The RAND Journal of Economics 131, 144

³³ *Universal Oil Products Co. v. Globe Oil & Refining Co.* 322 U.S. 471 (1944), 484

³⁴ J Pila, P Torremans, *European Intellectual Property Law* (OUP, 2016), 95

³⁵ KW Dam, 'The Economic Underpinnings of Patent Law' (1994) 23 The Journal of Legal Studies 247, 262; Mazzoleni, Nelson (2) 278

³⁶ Machlup, Penrose (3) 26; V Denicolò, LA Franzoni, 'The contract theory of patents' (2003) 23 International Review of Law and Economics 365; see also, SM Maurer, 'Ideas into Practice: How Well Does US Patent Law Implement Modern Innovation Theory' (2013) 12 J. Marshall Rev. Intell. Prop. L. 644

³⁷ PS Menell, 'Tailoring legal protection for computer software' (1987) 87 Stanford Law Review 1329, 1338 ("the disclosure of new discoveries that is encouraged by protection further spurs inventive activity")

³⁸ JC Fromer, 'Patent disclosure' (2009) 94 Iowa Law Review 539, 544

indeed, as the evidence that improvement in innovation could emanate just as easily from other people than from the same inventor.³⁹ Moreover, disclosures, even better if earlier disclosures, have been linked to follow on effects on inventors and the fair distribution of profit among all the inventors, especially in those contexts where innovation comes from cumulative efforts.⁴⁰ Therefore, from an economic point of view, patent disclosure can serve in achieving goals such as overcoming the deadweight loss commonly associated with secrecy (such as the risks of duplications or involuntary discovery)⁴¹ or producing spill-over effects with beneficial consequences in those sectors where firms are not naturally willing to give assistance to other subjects in implementing inventions.⁴²

Nevertheless, some arguments have been advanced against the effectiveness of patents in inducing disclosure and in achieving the other stated goals. In particular, in several technologies, for example in pharmaceutical industries, trade secrecy represents a major output and patent applications can affect this confidentiality because the more patents companies apply for, the more information they reveal.⁴³ Additionally, the quality of disclosure and its usefulness is strongly affected when patent claims use unclear language and provide incomplete information, as studies have indicated.⁴⁴ Indeed, the use of unclear language and incomplete information usually reflects the aim of reducing the risk of disclosing confidential information.⁴⁵ This is particularly the case of software patent applications, where use of abstract language has

³⁹ Ibid. 556 (“certain information-sharing mechanisms or norms have arisen in particular industries leading to spill overs of privately held information about patented inventions from one entity to another”)

⁴⁰ S Scotchmer, J Green, ‘Novelty and disclosure in patent law’ (1990) 21 *The RAND Journal of Economics* 131,145

⁴¹ Denicolò, Franzoni (36) 368

⁴² Scherer (31) 32 (“Numerous studies suggest that knowledge spill overs are vitally important in encouraging economic growth, as people suggest improvements to others’ ideas. With secrecy instead of patents, this exchange of ideas is lost.”)

⁴³ Hall, Harhoff (23) 17

⁴⁴ Ibid.; BN Roin, ‘The Disclosure Function of the Patent System (Or Lack Thereof)’ (2005) 118 *Harvard Law Review* 2007, 2023; Bessen, Meurer (22) 56

⁴⁵ Fromer (38) 552

been highlighted.⁴⁶ Indeed, claims in the software sector are often drafted in such a way that more than one implementation can be covered by the same patent application. Rarely, if ever, it is the source code disclosed, whereas usually it is the functions instead of the structures of the invention that are described.⁴⁷ Thus, very little substantive information about the software is disclosed to the public, whereas patent protection is broadly granted to the technology underpinning the inventions. As such, software industry is commonly held up as an example of incapacity of disclosure theory in explaining the rationale for patent protection.⁴⁸

2.3 Signalling

A new perspective has been recently adopted to explain the rationale behind patent protection, which is mainly based on the correlation between the monopolistic use of inventions and the achievement of an appropriate allocation of resources.⁴⁹ In particular, in some industries such as biotechnology, the implementation of inventions often requires time and it is prohibitively expensive. Thus, the reality of getting some kinds of inventions into the market is extremely costly, and firms do not always have adequate resources to market their inventions.⁵⁰ As a result, disclosing the invention and receiving early patent protection can result in the possibility of firms raising venture capital. As such, patents allow the development and marketing of innovative technology that generate positive effects on economic growth.⁵¹

⁴⁶ MA Lemley, 'Software Patents and the Return of Functional Claiming' (2013) *Wis. L. Rev.* 905, 923; J Cohen, MA Lemley, 'Patent Scope and Innovation in the Software Industry' (2001) 89 *Cal. L. Rev.*, 47

⁴⁷ Lemley (46), 924; GR Vetter, 'Patent Law's Unpredictability Doctrine and the Software Arts' (2011) 76 *Missouri Law Review* 763, 774

⁴⁸ C Chien, A Karkhanis, 'Functional Claiming and Software Patents', (2013) Santa Clara Univ. Legal Studies Research Paper n.6

<https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2215867> accessed at 20 June 2017

⁴⁹ Mazzoleni, Nelson (3) 1040; Eisenberg (5) 1041; Kitch (13) 275

⁵⁰ S Hoenen et al., 'The diminishing signalling value of patents between early rounds of venture capital financing' (2014) 43 *Research Policy* 956, 957

⁵¹ Eisenberg (5) 1031

In terms of the start-up phase, the signalling purpose of the patent system is well established.⁵² According to recent studies,⁵³ patents and patent applications are considered to be important in securing access to the resource by new entrepreneurs. In particular, the relationship between inexperienced entrepreneurs and prominent venture capital investors seems to be brought about by patents.⁵⁴ Similarly, several inventions are believed to be made marketable in recent years by the meeting of inventors and investors made possible by patents.⁵⁵ Indeed, patent applications can serve as an indicator of the quality of innovative products and methods and can be used to draw attention to the profit potentiality of new technologies.⁵⁶

The wider benefits to the economy, other than the ones already mentioned, are thought to occur as a result of the role played by patent applications in signalling the developing of news technologies. Most evidently, in a competitive system, it can easily be the case that firms seek the same invention at the same time, thereby causing inefficiency such as *overfishing* effects.⁵⁷ Hence, according to some scholars, the role of the patent system would be to avoid the wasting of resources.⁵⁸ In particular, inefficiencies can result when two or more firms invest in the same innovation. Indeed, a duplication of effort can easily occur when the development of new products or technologies is not promptly announced. However, throughout the patent application process, firms advertise their inventions so other competitors can be made aware of developing research, and therefore decide to stop their inventive efforts

⁵² AS Rinehart, 'Patents as Escalators' (2011) 14 Vand. J. Ent. & Tech. L. 81, 111

⁵³ D Hsu, RH Ziedonis, 'Patents as quality signals for entrepreneurial ventures' in *Academy of Management Proceedings* (Academy of Management 2008)

⁵⁴ Ibid. 3

⁵⁵ Mazzoleni, Nelson (3) 1040

⁵⁶ C Long, 'Patent Signals' 69 (2002) U. Chi. L. Rev. 625

⁵⁷ RP Merges, RR Nelson, 'On the Complex Economics of Patent Scope' (1990) 90 Colum. Law Rev. 839, 870 (Discussing about the Kitch's prospect theory, Merges and Nelson describes the overfishing effect "In some, invention is analogized to fishing from a common pool. There are many competitive inventors, and the first to make an invention gets the patent on it. Each knows that as others catch (invent) there is less in the pool for her. The result is "overfishing": too many people seeking inventions at once.")

⁵⁸ Mazzoleni, Nelson (2) 279; Merges, Nelson (57) 871

in favour of cross licensing.⁵⁹ This will ultimately enable companies to avoid the overuse of resources for improving the same innovative technology.⁶⁰

Nevertheless, doubts have been cast on signalling role in explaining the economic rationale for patent protection. In particular, patents seem to be able to act as a signal to attract investors and capital only in specific technological area, namely in knowledge intensive industries where a long and costly research is needed for the development of innovative products.⁶¹ Furthermore, patents appear to be capable of attracting capital and investors only in the early stage of the development of this kind of invention. This is often because the more is known about a technology, the more investors and firms tend to have the same amount of information. As such the patent value of signals decreases because investors can based their decisions on a more large range of elements. These are the conclusions of a recent study on biotechnological start-ups.⁶² It has proved that venture capital firms are more prone to provide funds to star up in the first stages of invention, i.e. when a patent application have been just filed, than after a while when investors know more on the its development.⁶³ Therefore, the patent signalling rationale appears to be confirmed only with regard to some type of industries and in the early stage of invention development.

2.4 Transaction

Emerging industries, such as those engaged in software, have increasingly brought to the fore a different model of innovation. According to this model, “newness” results from an incremental improvement or a recombination of existing inventions rather than from a “moment of

⁵⁹ BM Frischmann, MA Lemley, ‘Spillovers’ (2007)107 Colum. Law Rev. 257, 265; Denicolò, Franzoni (36) 368 (“patenting prevents wasteful duplicative effort”).

⁶⁰ Hsu, Ziedonis (53) 6

⁶¹ FR Chaddad, JJ Reuer, ‘Investment dynamics and financial constraints in IPO firms’ (2009) 3 Strategic Entrepreneurship Journal 29, 35

⁶² Hoenen et al. (50)

⁶³ Hoenen et al. (50) 958

epiphany”.⁶⁴ Indeed, the cumulative nature of innovation has been remarked with regard to those products that basically embody existing technologies.⁶⁵ As such, in cumulative innovation novelty is no more than a minor implementation of what has already been patented.⁶⁶ In focusing on cumulative innovation and second-generation products, some concerns have been expressed about the effectiveness of patent protection in implementing innovation.⁶⁷ A major issue has been to determine what beneficial effects could result from granting patent protection to those inventions that do not have a significant value in their own right, but can, nonetheless, be a springboard for valuable second generation innovations.⁶⁸ Indeed, granting strong property rights to the first inventor could deter others from developing more useful products. Hence, according to the cumulative innovation theory, a fair balance of patent prerogatives between the original inventor and subsequent implementers needs to be brought about.⁶⁹ This is because

⁶⁴ Merges, Nelson (2) 280; Cohen, Lemley (46) 41; Maurer (36) 651; A Galasso, M Schankerman, ‘Patents and cumulative innovation: causal evidence from the courts’ (2014) 130 *The Quarterly Journal of Economics* 317, 318; S Scotchmer, ‘Standing on the Shoulders of Giants: Cumulative Research and the Patent Law’ (1991) 5 *Journal of Economic Perspectives* 29, 31

⁶⁵ Burk, Lemley (2) 1607 (Burk and Lemley assume that a cumulative innovation is the one “in which a final product results not just from an initial invention, but from one or more improvements to that invention.”); Hall, Harhoff (23) 11 (Hall and Harhoff differentiates *fragmented* inventions from *cumulative* inventions. As such fragmented inventions are described, as “the new setting is one where a single product involves accessing the technologies in hundreds of patents. This feature is really new, but it has assumed increasing importance in a number of technology areas such as information technology and biotechnology.”)

⁶⁶ S Scotchmer, ‘Protecting Early Innovators: Should Second-Generation Products be Patentable?’ (1996) 27 *The RAND Journal of Economics* 322, 329 (With regard to cumulative innovation Scotchmer differentiates the second-generation products in “improvements” and “accessories.” An “improvement” is a new version of the patented product with greater commercial value. For example, the first product could be wind-shield wipers, and the improved product could be wind-shield wipers with an intermittent wipe. An “accessory” is a product that is useful only with the first product and whose availability enhances the value of the first product, e.g., computer software written for a particular patented computer.”)

⁶⁷ Scotchmer (64) 28; Maurer (36)318

⁶⁸ Scotchmer (64) 39

⁶⁹ Merges, Nelson (57) 876; BN Roin, ‘The Case for Tailoring Patent Awards Based on Time-to-Market’ (2014) 1 *UCLA L. REv.* 672, 678; JR Allison, MA Lemley, DL Schwartz ‘Our Divided Patent System’ (2015) 82 *The University of Chicago Law Review* 1073

patent protection should be aligned to every single invention improvement, rather than the granting of broad patents to pioneers.⁷⁰

One of the merits of the cumulative innovation theory is that it highlights the significance of interactions among new and previous patented inventions in the development of new products, as well as the magnitude of sharing and transferring technologies; thereby, spurring innovation among firms.⁷¹ According to this theory, licensing and prior agreements - i.e. research joint venture- are presented as effective tools in developing technology improvement and promoting innovation.⁷² From this point of view, creating an environment where there is the possibility of enhancing licensing agreements should be the main objective accomplished by the patent system.⁷³ In particular, granting a proportionate level of property rights, i.e. a different level depending on the nature of the invention, is presented as the better way to enable the use of the same technologies by more than one company, and therefore ultimately fostering innovation and entrepreneurship.⁷⁴

According to this line of reasoning, the enlargement of patent protection to every little piece of innovation – albeit with differing treatment in relation to the respective technology- as well as the increase in the number of patents and patent owners, are important features in creating a fair competition in patent market and in encouraging patent licensing agreements.⁷⁵ Additionally, an organised patent system can result in the creation of harmonization in terms of registration procedures and

⁷⁰ Eisenberg (5) 1056-57; Burk, Lemley (2) 1610; MA Lemley, 'The Economics of Improvement in Intellectual Property Law' 1997 75 Texas Law Review 989, 1048-72

⁷¹ Burk, Lemley (2) 1624; DF Spulber, 'Should Business Method Inventions be Patentable?' (2011) 3 Journal of Legal Analysis 265, 297 (" Without adequate IP, the risk of imitation or expropriation reduces the expected returns that the innovator could obtain by attempting to transfer the technology to the existing firm. Better IP protections increase the expected returns to contracting, making technology transfer relatively more attractive in comparison with entrepreneurship, which reduces the supply of entrepreneurs").

⁷² Scotchmer (64) 32

⁷³ Mazzoleni, Nelson (2) 280

⁷⁴ Burk, Lemley (2) 1577; Roin (69) 678

⁷⁵ NT Gallini, 'The Economics of Patents: Lessons from Recent U.S. Patent Reform' (2002) 16 Journal of Economic Perspectives 131, 137; FS Kieff, 'Property: an unconventional approach to anticompetitive effects and downstream access' (2007) 56 Emory L.J. 327

fees, for example.⁷⁶ Furthermore, transaction costs can be reduced, thereby generating, according to this line of reasoning, an increase in negotiations made possible by such an enlarged patent protection.⁷⁷ This can be regarded as one of the most beneficial outcomes of the patent system on economic growth; especially in new, high-tech industries.⁷⁸

However, criticism has been made about using the increasing in transactions to explain the rationale behind patent protection.⁷⁹ In particular, it has been argued that the possibility to patent each and every small invention (from early versions to the subsets of products) leads to an excessive fragmentation of patent rights; thus, numerous licensing agreements need to be reached to complete broader developments so that transactions ultimately stifle innovation instead of implementing it.⁸⁰ In this vein, the aggregation of the different innovative contributions can be difficult and costly when several companies own those patents that are related to the same technology.⁸¹ Additionally, firms can struggle to develop new products when in the process of reaching agreements. This could be made particularly complicated by a rival's refusal of licensing or by a request of exorbitant fees. As such, the idea of an enlarged patent protection as the best way to improve innovation has been questioned. According to the *anti-commons* theory,⁸² the proliferation of patents can determine opportunistic behaviours when the access to multiple patented inputs is needed to create a sin-

⁷⁶ RP Merges, 'A New Dynamism in the Public Domain' (2004) 71 *The University of Chicago Law Review* 183, 194

⁷⁷ Spulber (71) 307 ("Patents provide transaction efficiencies by lowering the costs of transactions in markets for discoveries")

⁷⁸ Gallini (75) 141; see contra, Cohen, Lemley (46) 53

⁷⁹ RE Thomas, L Di Matteo, 'Harmonizing the International Law of Business Method and Software Patents: Following Europe's Lead' (2007) 16 *Tex. Intell. Prop. LJ* 1, 38-41; Burk, Lemley (2) 1610

⁸⁰ Burk, Lemley (2) 1611

⁸¹ MA Heller, R Eisenberg, 'Can patents deter innovation? The anticommons in biomedical research' (1998) 280 *Science* 698, 699

⁸² MA Heller, 'The tragedy of the anticommons: property in the transition from Marx to markets' (1998) 11 *Harvard law review* 621; S Scotchmer, *Innovation and Incentives* (The MIT Press 2004), 88 ("The anticommons is a play on words and refers to the 'tragedy of the commons' which is taught in freshman economics. In the tragedy of the commons peasants in early modern Britain overgrazed shared pastures ('the commons') because the absence of private property eliminated incentives to conserve.")

gle, useful product.⁸³ In particular, in cumulative innovation technologies, any restrictions on access to the patented discoveries is thought to impede the full development of new technologies and inventions are ultimately underused as is the case when resources are scarce and multiple owners have the right to exclude one another.⁸⁴ Therefore, the possibility that inventions can be underused has been put forward as well as the possibility that patent protection can be detrimental to the economical growth, based on the tragedy of anti-commons theory.

3. Invention, innovation and business method patents

As suggested in the previous section, incentive, disclosure, signalling and transaction refer to the main purposes that patent protection can serve with regard to innovations. However, none of the traditional rationale for patent protection seems to be clearly achieved by granting exclusive rights to software or other similar cumulative innovations.⁸⁵ Thus, offering patent protection to computer-implemented inventions, including business methods, might not provide enough beneficial effects to society, especially with regard to improve technological progress or competition. Admittedly, some beneficial effects have been pointed out as results of patenting computer implemented business methods. Both enhancing start up reputation, avoiding technology from being copied, increasing the opportunity to attract venture funding are positive outcomes identified in the US as result of granting patent protection to business methods.⁸⁶ However business methods are a rather atypical kind of invention in terms of their source, purpose and use. Thus, con-

⁸³ Heller, Eisenberg (81) 699

⁸⁴ Heller, Eisenberg (81) 701

⁸⁵ Text to n. 65

⁸⁶ SJH Graham et al., 'High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey' (2010) 24 Berkeley Tech. LJ1255; S Gabay, 'The Patentability of Electronic Commerce Business Systems in the Aftermath of State Street Bank & Trust Co. v. Signature Financial Group, Inc.' (1998) 8 The Journal of Law & Policy 179, 221 ("The legal monopoly over an aspect of e-commerce that a patent affords can provide a start-up with a significant advantage in operating and expanding its business. Patents on business methods are especially beneficial to Internet start-up companies by protecting them from larger competitors imitating their potentially successful methods. Moreover, patents can also be marketing tools to make it possible for start-up companies to attract capital, launch products, and compete with more established players"); Spulber (71) 329

cerns have been raised about the possibility that such beneficial effects could be outweighed by negative ones. In particular, doubts on the patentability of business methods have been cast according to some of the key features of innovation in these kinds of inventions. Most succinctly, innovation in business methods has been described in the following terms:

a) **Spontaneous and general**

“Valuation of assets, advertising, teaching, choosing among candidates for a job”⁸⁷ are all possible areas of business method patents. In particular, claims in business method patents relate to economic activities and financial relationships. Nevertheless, practices set out in business method patents are often no more than a codification of emulative and competitive behaviours, which have already been identified in the market arena.⁸⁸ Business method patents even embedded basic tools such as the business general rules that govern trader’s behaviours in the market.⁸⁹ Hence, the lack of novelty is considered one of the main issue in granting patent protection to business methods according to the fact that often practices codified in these types of patents are not the result of an innovative intuition.⁹⁰ In most cases business method patent applications intend to cover some well-known *modus operandi* generated and developed spontaneously in the market. Therefore, doubts have been cast about the necessity of patent protection for business meth-

⁸⁷ EPO ‘*Appendix 6 Examination of «business method» applications*’ (Report on Comparative Study Carried Out Under Trilateral Project B3b, 2000) < <http://ladoc.ffii.fr/appendix6.pdf> > accessed on the 23rd June 2017); see also, European Commission ‘The patentability of computer-implemented inventions’ (DG Internal Market 2000) < <http://www.steptoec.com/assets/attachments/1184.pdf> > accessed the 23rd June 2017

⁸⁸ LJ Raskind, ‘The State Street Bank Decision: The Bad Business of Unlimited Patent Protection for Methods of Doing Business’ (1999) 1 *Fordham Intell. Prop. Media & Ent. LJ* 61,81

⁸⁹ M Bitton, ‘Patenting Abstractions’ (2014) 15 *North Carolina Journal of Law & Technology* 153

⁹⁰ SJH Graham, D Mowery, ‘Intellectual Property Protection in the U.S. Software Industry’ in National Research Council *Patents in the Knowledge-Based Economy* (The National Academies Press 2003), 7-9 (“Tim Berners-Lee, developer of the HTML software code that is widely used for the creation of websites, argues that some of the Internet business methods patents “combine well-known techniques in an apparently arbitrary way, like patenting ‘going shopping in a yellow car on a Thursday.’”)

ods.⁹¹ In particular, the circumstances have been noted where innovation occurs automatically, alongside natural developments in trading behaviours. As such, business methods are viewed as products that would be invented in any case.⁹² Consequently, innovation does not need any incentive to be fostered in the business method arena, and consequently granting of exclusive rights to firms is needed. Hence, from this perspective, the rationale for business method patents cannot surely originate from incentive purposes.⁹³

b) **No cost**

Historically, patents have been put forward as one of the means to find the resource to ultimately reward the labour, skill and effort that were expended in producing new outcome.⁹⁴ However, business methods are often the formalization of recurrent behaviours and practices related to trade procedures already adopted in the market. Most of the times, therefore, no direct investment is needed to produce a new business method or, at least, the R&D costs are extremely low.⁹⁵ Unlike to other type of innovation requiring long and costly experimentation, hence, the development of a business method does not require that firms attract venture capital for commercialising new products.⁹⁶ Thus, there is a significant difference between business methods and other subject areas regarding patentability costs. This is evident in manufacturing or biotechnological industries, where the development of new products re-

⁹¹RC Dreyfuss, 'Does IP need IP? Accommodating intellectual production outside the intellectual property paradigm' (2010) 31 *Cardozo L. Rev.* 1437 2009-2010, 1467

⁹² Maurer (36) 659

⁹³ J Bessen, E Maskin 'Sequential Innovation, Patents and Imitation' (2000) 40 *The RAND Journal of Economics* 611; JE Grusd, 'Internet Business Methods: What Role Does and Should Patent Law Play' (1999) 4 *Va. J.L. & Tech.* 1, par 44

⁹⁴ *Sayre v. Moore* [1785] 102 *Eng. Rep.* 138, 140 n.6 (Lord Mansfield) ("We must take care to guard against two extremes equally prejudicial; the one, that men of ability, who have employed their time for the service of the community, may not be deprived of their just merits, and the reward for their ingenuity and labour, the other, that the world may not be deprived of improvements, nor the progress of the arts be retarded")

⁹⁵ R Hunt 'Business Method Patents and U.S. Financial Services' (2009) 28 *Contemporary Economic Policy* 322, 330

⁹⁶ R Hilty, C Geiger, 'Towards a new instrument of protection for software in the EU? Learning the lessons from the harmonization failure of software patentability' (2011) *Max Planck Institute for Intellectual Property and Competition Law Research Paper* n.11-01, 23; BH Hall, 'On Copyright and Patent Protection for Software and Databases : A Tale of Two Worlds' in *Economics, Law and Intellectual Property* (Springer US 2003)

quires a large amount of time and money, and firms tend to make significant investments in R&D. As such, patent protection is keenly sought to facilitate the possibility of attracting the capital necessary for implementing the new invention.⁹⁷ Mostly obviously, IP protection is sought to signal the value of the invention in cases like these.⁹⁸ Conversely, in business methods, innovation can frequently derive from a simple translation in binary code of practices that can be already observed among traders and consumers. Therefore, it does not seem that a rationale for patent protection of business methods can be provided by either a cost-recovery or signalling purpose.⁹⁹

c) **Benefiting from head starting**

Doubts on the need of patent protection for computer-implemented business methods have been raised according to the results of some studies about the software industry.¹⁰⁰ In particular, it has been shown that being the first mover in the software context has often allowed companies to make huge profits, even though the technology is only protected by copyright.¹⁰¹ Frequently, firms introducing new software have been able to establish strong relationships with customers that would remain intact even when competitors have begun to offer similar products.¹⁰² Hence, great advantages are thought to be gained from being the first, or early, mover in the market and the idea has been often expressed that a head start can be sufficient to enable firms to recover invention costs to the effect that property prerogatives are not necessary

⁹⁷ Qian (23)

⁹⁸ Scherer (29)

⁹⁹ RB Bakels, 'Should Only Technical Inventions Be Patentable, Following the European Example?' (2008) 7 *Nw. J. Tech. & Intell. Prop.* 50, 58

¹⁰⁰ R Bakels R, PB Hugenholtz, *The Patentability of Computer Programs: Discussion of European-Level Legislation in the Field of Patents for Software* (European Parliament, Comm. on Legal Affairs and the Internal Mkt., Working Paper, 2000); J Bessen, R Hunt, 'An Empirical Look at Software Patents' (2007) 16 *Journal of Economics & Management Strategy* 157

¹⁰¹ G Ghidini, E Arezzo, 'Patent and Copyright Paradigms Vis-a-Vis Derivative Innovation: The Case of Computer Programs' (2005) 36 *International Review of Intellectual Property and Competition Law* 159; Gallini (75)137-138

¹⁰² MA Lemley, DW O'Brien, 'Encouraging Software Reuse' (1997) 49 *Stan. L. Rev.* 255, 274-75

to address inventive efforts.¹⁰³ Moreover, in the a fast moving IT world, the *first-mover* effect appears to be particular significant according to the fact that lock-in and network effects usually secure clients and aligned them to the first inventor.¹⁰⁴ Henceforth, there has been scepticism about business method patentability since being the first to use a business method can be a more than sufficient reward for companies.¹⁰⁵ Factored into such scepticism is the idea that customers are not likely to change when it requires more work and implies losing created networks. Likewise, other IT products as well as business methods, when new to the market, are often able to get standardisation benefits and strong brand recognitions is established with consumers.¹⁰⁶ Accordingly, scholars have suggested that patent protection is not needed for business methods, considering that the first mover advantage assures firms returns that recoup costs, but can, and often do, generate net profit.¹⁰⁷

d) **Obvious**

As discussed in section 2.1, patent exclusive rights are granted to encourage the disclosure of technical knowledge and information. Nevertheless, business methods often consist of processes and procedures whose terms can be easily knowable, especially by experts in the sector.¹⁰⁸ In particular, business method patents tend to cover schemes and techniques of selling and buying that are already practised in the market and tend to incorporate basic elements that are already known.¹⁰⁹ Thus, the content of the invention can on many occasions be

¹⁰³ M Likhovski, 'Fighting the Patent Wars' (2001) E. I. P. R. 267,272

¹⁰⁴ MA Lemley (46) 935; RC Dreyfuss, 'Are Business Method Patents Bad for Business?' (2000) 16 Santa Clara Computer & High Tech. LJ 263, 271-273

¹⁰⁵ ME Fink, 'Patenting Business Methods in Europe: What lies Ahead?' (2004) 79 Ind. LJ 299, 303; Dreyfuss (104) 275 ("business methods are their own reward")

¹⁰⁶ Burk, Lemley (2) 1585

¹⁰⁷ Dreyfuss (104) 268; Likhovski (103)

¹⁰⁸ Spulber (71), 312 ("Another standard criticism of business method patents is that they are either obvious or not novel. A standard example is Amazon.com's one-click patent. Another standard example is Priceline.com's patenting of a Dutch auction for airline tickets."); Dreyfuss (104) 279

¹⁰⁹ *Bilski v. Kappos* 561 U.S. 593 (2010), (Steven) ("Business methods are similarly often closer to "big ideas," as they are the basic tools of *commercial* work. They are also,

known even without the publication of the patent application. As such, exclusive rights cannot be a pay-off for the disclosure of the inventions as supported by the patent disclosure theory.¹¹⁰

On the other hand, doubts have been cast about the aim of supporting the circulation of technical knowledge due to the lack of clarity of business method patent claims.¹¹¹ In particular, business method patent claims are often vague and, as already said above, applicants are used to describing business method inventions employing terms, expressions and words that ultimately have the effect of reducing any understanding of any precise ideas about the boundaries of the innovative process and the step sequences behind the process itself.¹¹² Additionally, it has been pointed out that the lack of clarity in the descriptions of inventions in business method patents results from a lack of technicality in language and the broadness of verbal expressions.¹¹³ Under these circumstances, argument is advanced that business method patents do not achieve the purpose of bringing about the disclosure of an innovation as well as widespread circulation of the technical knowledge embedded in those inventions.¹¹⁴

e) **Naturally competitive**

Sharing and transfer of knowledge are deemed essential to ensure economic growth. Thus, one of the purposes for granting patent protection to inventions is to create such certainty about an innovation's property

in many cases, the basic tools of further business innovation"); *Hitachi/Auction Method* T 258/03 (2004) 55 EPOR 4.8

¹¹⁰ Dreyfuss (104) 275

¹¹¹ Federal Trade Commission of United States, *'The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition.'* (Federal Trade Commission Report, 2011); Lemley (46) 940; Bakels, Hugenholtz (100)

¹¹² J Dratler, 'Alice In Wonderland Meets the U.S. Patent System' (2005) 38 Akron Law Review 299, 303 (Regarding to State Street Bank decision, Dratler argues " For all those claims revealed, the alleged "inventor" had done nothing more than write a pedestrian computer program for performing routine arithmetic calculations dictated by legal authority, using programming languages, techniques and computers invented—if at all—by someone else")

¹¹³ G Scellato et al., *Study on the quality of the patent system in Europe'* (OJ European Union, 2011)

¹¹⁴ Gallini (75) 137; Hilty, Geiger (96) 20; K Blind et al., 'Motives to Patent: Empirical Evidence from Germany' (2006) 35 Research Policy 655, 66

prerogative that inventors are encouraged to give others the right to use them.¹¹⁵ This, therefore, encourages transactions, namely licensing, cross-licensing and patent-pool agreements, and has been viewed as an essential rationale of patent protection. Ultimately, patent systems result in beneficial effects both on innovation and competition that are fostered from such an exchange of information and practicalities. However, it has been pointed out that business methods are commonly developed and implemented in competitive arenas due to the fact that they are often the codification of behaviours exhibited by rivals in the markets.¹¹⁶ In most cases, therefore, firms that implement business method patents are already engaged in economic competition.¹¹⁷ Hence, property prerogatives might not be so important in increasing competition in a business method context as in the case in less competitive sectors. Additionally, it has been underlined that the monopoly privilege is not only unnecessary in fostering innovation in the business method technical area, but that patent protection can even produce some detrimental effects.¹¹⁸ These are particular evident in cumulative innovation. It has been pointed out that often several patents are needed to manufacture a valuable product. Consequently, a certain number of licensing agreements are needed. However, individual entrepreneurs or start-ups cannot often bear the costs associated with processing and licensing several patents at the same time. Thus, granting exclusive rights can result in deterring firms, small ones in particular, to enter

¹¹⁵ PJ Heald, 'A Transaction Cost Theory of Patent Law' (2005) 66 *Ohio State Law Journal* 473, 481

¹¹⁶ Lemley, Burk (2) ("companies have ample incentives to develop business methods even without patent protection, because the competitive marketplace rewards companies that use more efficient business methods")

¹¹⁷ NA Smith, 'Business Method Patents and their Limits: Justifications, History, and the Emergence of a Claim Construction Jurisprudence' (2002) 9 *Mich. Telecomm. Tech. L. Rev.* 171, 178 ("In essence, this objection to business method patents calls for recognition that science is different from business, and that innovation in science and innovation in business depend upon different incentive structures. Patent protection promotes invention in science because the time and resources required for scientific invention are difficult to recover in the open marketplace without limiting the ability of competitors to appropriate and market the new invention. Business innovations, however, provide a competitive advantage in the market, and thus by their very nature create economic incentives adequate to encourage creativity and development in business")

¹¹⁸ Lemley, Burk (2) 1605

the market when innovation is cumulative as is often the case of business methods implemented by computers.¹¹⁹

4. Detrimental effects of business method patents

Based on the previous observations, traditional economic theories appear to fail to provide an economic foundation and rationale for granting patent protection to business methods.¹²⁰ According to the particular features of innovation in business methods, side effects that outweigh positive effects can result from granting patent protection to this subject matter. By placing the phenomenon in context, it is possible to provide clues for understanding what kind of negative consequences can come from patenting a business method. Especially, in the sections below certain detrimental effects commonly associated to business method patents will be analysed alongside the beneficial ones that are commonly linked to patents. All this would assist in understanding the underlying reason that has made business methods such a popular subject matter at the EPO and in other patent systems around the world.

4.1 Restraining competition vs. spurring innovation

As pointed up in the previ section, in a business method context, innovation is not costly and large investments in R&D are often not required.¹²¹ Thus, in most cases, firms that apply for business method patents are not seeking exclusive rights to recoup their investment in innovation. Additionally, business method firms are not commonly thought to be interested in using their property prerogative to attract

¹¹⁹ BH Hall, 'Business and Financial Method Patents, Innovation, and Policy' (2009) 56 *Scottish Journal of Political Economy* 443

¹²⁰ National Research Council, *The digital dilemma: Intellectual property in the information age* (National Academies Press, 2000), 25 ("The emergence of possible patent protections for business methods in the IT industry offered both enormous new opportunities and substantial challenges to the current model of intellectual property.")
Contra, Smith (117) 183

¹²¹ V Chiappetta, 'Defining the Proper Scope of Internet Patents: If We Don't Know Where We Want to Go, We're Unlikely to Get There' (2001) 7 *Mich. Telecomm. & Tech. L. Rev.* 289, 322

capital to implement innovation.¹²² As matter of fact, recent investigations into the phenomenon of business methods patents have shown that firms filing patent applications are not mainly driven from a desire to develop and implement their inventions; instead, firms seem to be more focused and interested in creating a large patent portfolio per se.¹²³ There is clear evidence of this approach. This is demonstrated most obviously by significantly high number of applications that are filed each year in the category of business method patents and the lack of novelty as well as the obviousness of claims, which is often interpreted as an indication that firms do not seek patent protection for business methods to spur on innovation. Conversely, the practice of filing numerous applications in the category of business methods has been correlated with a firm's high-risk chance of being engaged in expensive lawsuits. It has been pointed out that in the business - method technological area the chances of future infringement lawsuits is perceived as highly probable, and thus proceeds with a genuine threat of costly compensation hanging over both firms already in the market, which could have to defend suits for invalidity, and new comers which could be sued for infringement. However, the probability of being sued for infringement is believed to be lower when several patents are held because, an alleged infringer can, effectively, counter by alleging infringement of its own patents. Thus, firms tend to build large patent portfolios, irrespective of the quality and the validity of the patents, to avoid litigation. Therefore, it appears that patent applications are mainly filed in the attempt to create a bundle of property rights that can be used to discourage rivals to file an infringement lawsuit rather than for securing future innovation.

Additionally, the filing of numerous patent applications can result in preventing new and small firms from entering the market, especially in

¹²² Hall (119) 454

¹²³ R Bakels et al., 'Study of the effects of allowing patent claims for computer-implemented inventions. Final Report to the European Commission' (UNU-MERIT,2008) <<http://www.merit.unu.edu/patentclaims/deliverables/D10-FINAL-REPORTv3.pdf>> accessed on the 20th June 2017, 13

those markets related to the digital economy.¹²⁴ In particular, the perspective of prohibitively expensive highly costly licensing can discourage competitors, specifically start-up ones, to use the same technology or develop similar technologies.¹²⁵ Indeed, patent examiners have been often accused to validate assertions of inventiveness in business method applications even if novelty was not completely proved, according to the difficulties in searching the prior art.¹²⁶ As such, business method patents are considered to be likely to be challengeable by competitors. On the other hand, the cost of filing a lawsuit is great. Thus, patents tend to remain granted even when they are invalid. The result is the grantee gains unmerited licence fees that new comers in the market need to pay, increasing their costs. The combined effect of all this is to distort the market.

Therefore, instead of promoting innovation, business method patents seem to be ultimately used by firms to restrict competition and block competitors off.¹²⁷ As will be discussed in the following chapters, concerns have been expressed about this strategic use of business method patents considering the role that start-up firms have had in the spread of new technologies in the last two decades.¹²⁸ In particular, a possible decrease in inventiveness has been stressed as result of granting patent

¹²⁴ Scellato (113) 16; Grusd (93) 60 ("There is good reason to believe that the costs associated with competition blocking will be particularly amplified with regard to the Internet. This is so because patents on Internet business methods may signal the end of the barrier-free entry to commerce that has been the hallmark of the Internet. Not only can the existence of patents on Internet business methods impede new entrants from entering the marketplace, but it can ultimately bar existing parties from the market. This leads to reduced competition and ultimately market inefficiency")

¹²⁵ Bitton(89) 223

¹²⁶ MA Lemley, 'Rational Ignorance at the Patent Office' (2001) 95 Nw. U. L. Rev. 1495, 1495 ("The PTO has come under attack of late for failing to do a serious job of examining patents, thus allowing bad patents to slip through the system.' The criticism is particularly strong in specific industries, notably software and Internet "business method" patents, in which the PTO has arguably failed to respond quickly enough to changing legal circumstances.")

¹²⁷ AB Jaffe, 'The US Patent System in Transition: Policy Innovation and the Innovation Process' (2000) 29 Research policy 531; Lemley (126) 1497-1500; Bessen, Meurer (22)

¹²⁸ B Stone, 'Factory of the Future?' *Newsweek* (22 November 2004); J Lerner, 'The New Financial Thing: The Origins of Financial Innovations' (2006) 79 *Journal of Financial Economics*, 233

protection to business methods together with the risk that big portfolios could be used to ward off competitors from entering the market.¹²⁹

4.2 Quantity vs. quality

Empirical observations show that business method represent a very popular subject matter at patent offices around the world when viewed from the constant growth in number of application in this category over the last twenty years.¹³⁰ Since the mid – 1990s, the volume of patent applications filed in computer industries has significantly increased, including the patent applications referring to business methods. Further, the number of claims for each patent application has grown significantly in the same time frame, as Lemley and Allison have indicated.¹³¹ Thus, patent offices around the world have been literally inundated by new computer-implemented inventions. Notably, thousands of applications have been submitted over the recent decades, which refer to this new type of innovation, namely the digital; naturally, applications have needed to be examined to assess their eligibility for patent protection. This phenomenon has been labelled as a “patent flood” capable of pushing several patent offices to breaking point, thereby casting doubts about the feasibility of granting protection to these new products.¹³²

As a matter of fact, business method patents, as well as most of computer-implemented inventions, are widely perceived to have dubious quality.¹³³ Commonly, quality in patenting has been identified as the

¹²⁹ Scellato (113) 16; Dreyfuss (104), 272; EH Tiller, JR Allison, ‘The Business Method Patent Myth’ (2003) 18 Berkeley Tech. LJ987, 1011 (“business method patents work to the disadvantage of small businesses by imposing additional legal expenses that they can ill afford.”)

¹³⁰ Hall (119), 553; Bessen, Hunt (100) 162

¹³¹ JR Allison, MA Lemley, ‘The growing complexity of the United States patent system’ (2002) 82 BUL rev 77, 79

¹³² MJ Meurer, ‘Business Method Patents and Patent Floods’ (2002) 8 Wash. UJL & Pol’y 309, 309 (“The decline of the business method exception to patentability will increase the frequency of patent floods. By patent flood, I mean a dramatic jump in the number of patents filed covering a specific class of inventions, as we now observe in e-commerce.”); Bessen, Meurer (22) 69; Spulber (71); D Burk, MA Lemley, *Patent Crisis and How the Courts Can Solve It* (University of Chicago Press, 2009)158

¹³³ JR Allison, RJ Mann ‘The disputed quality of software patents’ (2007)85 Wash. UL Rev 297; Allisson, Tiller (129) 1104 .

‘capacity of a granted patent to meet (or exceed) the statutory standards of patentability – most importantly, to be novel, non-obvious, and clearly and sufficiently described’.¹³⁴ It has been argued that in terms of business method patents, applications submitted in these contexts have tended to be poor quality ones because of their low levels of novelty and inventiveness.¹³⁵ The poor quality of business method patents in particular has been associated with the difficulties that patent officers have to ascertain the novelty.¹³⁶ In point of fact, the locating of the previous art has been one of the main difficulties in the area of computer-implemented inventions.¹³⁷ Indeed, the lack of reliable and complete databases in the field has been often highlighted.¹³⁸

Additionally, the lack of resources has been linked to the growth in the number of applications and the difficulties for patent offices to cover the consequent increase of search costs. In this light, the non-obviousness requirement as well as the novelty one, has been often diminished due to the so-called *pro-applicant approach*. The latter assumes invention patentability until proven otherwise.¹³⁹ Above all, the incapability of patent officers to prove the obviousness and lack of novelty has resulted in the granting of patent protection also to *weak* applications. The resultant uncertainty over the breadth and the validity of exclusive rights has been a source of complaint.¹⁴⁰ Ultimately, a growing number of lawsuits

¹³⁴ RP Wagner, ‘Understanding Patent-Quality Mechanisms’ (2009) 157 U. PA. L. REV. 2135, 2138

¹³⁵ Bakels, Hugenholtz (100) 37; MA Lemley et al., ‘Life After Bilski’ (2011) 63 Stan. L. Rev. 1315, 1331

¹³⁶ CA Cotropia, MA Lemley, B Sampat ‘Do applicant patent citations matter?’ (2013) 42 Research Policy 844

¹³⁷ F Rentocchini, ‘Sources and Characteristics of Software Patents in the European Union: Some Empirical Considerations’ (2011) 4 Information Economics and Policy 141, 144; Bakels et al. (123)

¹³⁸ Bakels, Hugenholtz (100) 29; Lemley (126) 1495-1497; RP Merges, ‘As many as six impossible patents before breakfast: Property rights for business concepts and patent system reform’ (1999) Berkeley Tech. LJ577, 589-590;

¹³⁹ BH Hall, G von Graevenitz, C Rosazza-Bondibene, ‘A Study of Patent Thickets’ (The Intellectual Property Office, 2013) <<http://www.ipo.gov.uk/ipresearch-thickets.pdf>> accessed 20th June 2017, 22

¹⁴⁰ Hall, Harhoff (23) 28; GS Lunney, ‘E-Obviousness’ (2000) 7 Mich. Telecomm. & Tech. L. Rev. 363, 392 (Referring to the USPTO experience, Lunney affirms, “the border between obvious advances and nonobvious inventions remains more a large grey area than a bright-line.”).

in business method patents have been witnessed, as a direct result of the low quality.¹⁴¹

4.3 Monopoly vs. open innovation

As mentioned above, business methods implemented by computers provide examples of cumulative inventions. Thus, patent fragmentation is one of the main features of this kind of invention. Indeed, business methods typically rely on technical advances, i.e. some piece of computer software or hardware, which have already been patented.¹⁴² As such, the possibility of using and implementing some components of the technology without paying fees can promote innovation, whereas strong patent protection can easily inhibit it.¹⁴³ As a result, open innovation is often preferred to exclusive rights in a cumulative invention context.¹⁴⁴ Particularly in view of this, granting patent protection to business methods has been a hotly debated issue, especially when the method is a computer-implemented one. Indeed, offering exclusive rights to every piece of innovation, i.e. every piece of software that is implemented in the innovative methods, can involve a tenfold increase of costs for future development since subsequent inventors need to license all the previous inventions on which the new method will be based.¹⁴⁵ Additionally, the possibility of leveraging rivals and gaining extra profits by demanding high royalties has been pointed up.¹⁴⁶ Hence, patent protection in cumulative inventions, including business methods, is often associated with an increasing in cost of implementation and production, and ultimately towards curtailing the development of new technologies and final products. Additionally, monopolistic rights have been held responsible for discouraging innovation in business methods due to another side effect that patents can produce. In monopolistic markets

¹⁴¹ Bessen, Meurer (22)

¹⁴² Text to n. 65

¹⁴³ H Chesbrough, W Vanhaverbeke, J West, *Open innovation: Researching a new paradigm* (OUP,2006); J West et al 'Open Innovation: The next Decade' (2014) 5 Research Policy 43

¹⁴⁴ Bessen, Maskin(93) 612; Gallini (75) 146

¹⁴⁵ Bessen, Maskin(93) 612-614

¹⁴⁶ MA Lemley, AD Melamed, 'Missing The Forest For The Trolls' (2013) 113 Colum. Law Rev. 2117, 2174; Hall et al. (139) 25

revenues gained from patenting could prevent companies undertaking other research and developing second-generation products, whereas in the absence of patent protection, the urgency to safeguard first-mover privileges could encourage firms to constantly strive towards more innovation.¹⁴⁷

4.4 Implementation vs. exploitation

In computer- implemented inventions, patent implementation can result in lower than expected profits due to the ease for competitors to imitate a successful product.¹⁴⁸ Moreover, the rapid evolution of consumer preferences and tastes of can strongly affect the capacity of computer- implemented inventions to maintain consumer loyalty. The effect is that patents are eventually implemented for less than 20 years. Thus, patents tend to be too costly for patentees as the amount of maintenance fees, i.e. that which is to be paid to maintain a granted patent in force over the years, ends up as a loss; a loss which revenues are not able to cover.¹⁴⁹ On the other hand, as suggested above, business method patent claims are often broadly described and lacking in inventiveness. These circumstances increase both the risk of infringement and the costs - sometimes extremely high - paid by firms to defend the legality of their products.¹⁵⁰ Therefore, the implementation of business methods patents is often thought to be incapable of securing net earnings against the amount of costs that are likely to arise from maintenance and legal disputes.

This incapacity of business method patents to secure profits has coexisted with a new phenomenon that has been observed in the recent years. This is that more and more entities are inclined to seek patent

¹⁴⁷ S Scotchmer, 'Standing on the Shoulders of Giants: Cumulative Research and the Patent Law' (1991) 5 *The Journal of Economic Perspectives* 29, 30

¹⁴⁸ M Abramowicz, JF Duffy, 'Intellectual Property for Market Experimentation' (2008) 83 *N.Y.U. L. Rev.* 337, 340 ("[L]ate-entering competitors obtain two important second-mover advantages against early market experimenters. First, they do not have to bear the cost of investing in market development. Second, they can copy the first experimenter's market success and avoid repeating its failures."); Hunt (95) 332

¹⁴⁹ R Gilbert, C Shapiro, 'Optimal Patent Length and Breadth' (1990) 21 *The RAND Journal of Economics* 106

¹⁵⁰Bessen, Meurer (22),187,214; Cotropia, Lemley, Sampat (136)

protection for business methods to collect royalties and earn through licensing and patent infringement suits rather than directly implementing inventions and developing products.¹⁵¹ Hence, patenting has started to be thought of as an economic activity in itself. Studies have shown that innovative firms, especially in business methods, are targeted in patent infringement lawsuits by entities that do not produce innovative products themselves but simply obtain patents for new products invented by others.¹⁵² Initially, such entrepreneurs were pejoratively reported as “patent trolls”. It suggested that these entities acted like brigands jumping out from under the bridge to demand a toll to those that bring their products to market.¹⁵³ Now, and less pejoratively, those entities are defined as “non practicing entities” (NPEs) or as “patent assertion entities” (PAEs), and represent a new and important front in the patent arena. This includes in a single category a wide range of applicants - from universities holding their researcher patent portfolios to firms applying for patents exclusively for speculative purposes¹⁵⁴ - that purchase patents and assert them not to implement invention but purely and simply to exploit them by collecting payments from royalties and licensing fees.¹⁵⁵

5. Patent thickets: a different point of view

The analyses in the previous sections have investigated both the main features of innovation in business methods and the ill effects commonly cited in business method patents. Thus conceived, it appears to confirm the inadequacy of the traditional economic rationale in explaining the patentability of business method. Therefore, this inadequacy needs to

¹⁵¹Raskind (88) 82

¹⁵²Allison, Lemley (131), 134-140; JR Allison, MA Lemley, J Walker, ‘Extreme Value Or Trolls On Top? The Characteristics Of The Most-Litigated Patents’ (2009) 158 University of Pennsylvania Law Review 1

¹⁵³J Bessen, J Ford, MJ Meurer, ‘The Private and Social Costs of Patent Trolls’ (2011) Boston University School of Law Working Paper n.11-45
<<https://www.bc.edu/content/dam/files/schools/law/doc/patconpapers/Meurer%20Costs%20of%20Patent%20Trolls.pdf>> accessed on the 20th June 2017

¹⁵⁴S Fusco, ‘Markets And Patent Enforcement: A Comparative Investigation Of Non-Practicing Entities In The United States And Europe’ (2013) 20 Mich. Telecomm. Tech. L. Rev.439, 443

¹⁵⁵T Klein, ‘eBay v. MercExchange and KSR Int’l Co. v. Teleflex, Inc.: The Supreme Court Wages War Against Patent Trolls’ (2007) 112 Penn St. L. Rev. 295, 295-6

be examined from a different perspective so as to address the question concerning the possibility of balancing both beneficial and ill effects of granting patent protection to this subject matter. On this note, it is thus essential to understand the underlying reasons for such a growing demand for patent protection for business methods. As discussed above, business methods, such as software, have not revealed a strong correlation between patent protection and incentive to innovate.¹⁵⁶ The software industry has provided evidence that its rapid growth in the 1980s occurred without any patent protection whatever.¹⁵⁷ Moreover, when referring to IT industries, studies have suggested that the faster and wider the use of new technologies is, the more significant is the development of new products due to the considerable rewards reaped by first-mover inventors.¹⁵⁸ Therefore, traditional theories, such as the “prospect theory”, cannot explain why so many firms decide to apply for a business method patent.

Attempts have been made to find an alternative rationale that can explain why business methods are one of the most popular patent subject matters at the EPO and, indeed, at most other patent offices around the world. Accordingly, the different behaviours exhibited by US and European companies can provide useful clues. US companies, in particular, tend to apply rapidly and widely for business method patents compared to European counterparts that file less and often defensively to retain their position in the market.¹⁵⁹ Such different behaviour has been explained as the consequence of differences in litigation costs and in amount of awarded damages: legal costs are lower in Europe than in

¹⁵⁶ RP Merges, *Patent Law and Policy: cases and materials* (2d ed., Michie 1997) 155; Dreyfuss(104) 263 (2000) 274

¹⁵⁷ SJH Graham, DC Mowery, ‘Software Patents: Good News Or Bad News?’ in *Intellectual Property Rights in Frontier Industries* (Robert Hahn Ed., 2005); BH Hall, T Grid, S Torrisi, ‘Financial patenting in Europe’ (2009) 6 *European Management Review* 45, 48 (Referring to business method patents “In general, however, the lack of legal protection has not prevented the introduction of important product innovations (such as a multitude of financial instruments) and process innovations (such as trading platforms and pricing algorithms) in the financial industry, similar to the situation in the software industry prior to 1994/1995”).

¹⁵⁸ LC Thurow, ‘Needed: A New System of Intellectual Property Rights’ (1997) 75 *Harvard Business Review* 94, 95-100

¹⁵⁹ Likhovski (103) 273

the US.¹⁶⁰ This, the effect of litigation on US firms, is more onerous and, in order to prevent lawsuits, US companies tend to amass a larger number of patents than European companies. As such, US firms tend to devote a larger amount of resources in developing big patent portfolios compared to European firms.¹⁶¹ This behaviour has been regarded as a classic example of the *prisoner's dilemma*.¹⁶² In particular, firms' decisions to apply for patents are not based on the value of the invention and the expected profits, but instead on the possibility of deploying patents for both offensive and defensive purposes. In other words, firms are driven by strategic purposes such as preventing rivals to file patent application on related inventions, i.e. patent application are used to block rivals to implement similar technologies, or forcing rivals into costly negotiations, i.e. competitors are compelled to agree on licensing several patents if they want to implement a certain technology.¹⁶³ As a result, decisions relating to patenting are no longer a question about the quality of innovation and the recouping of costs. Indeed, filing patent applications is seen as a way of creating a protective barrier against competitors.

This phenomenon has been captured and explained by way of so-called *patent thickets*. The expression was coined by Carl Shapiro to describe patent overlapping caused by the granting of broadly termed patents.¹⁶⁴ Examples of this attitude towards patents has been observed in certain technological industries, such as semiconductors and software, where claims are built to cover as many achievable goals of the invention as

¹⁶⁰ SJH Graham, N van Zeebroeck, 'Comparing Patent Litigation Across Europe: A First Look' (2014) 17 *Stan. Tech. L. Rev.* 655

¹⁶¹ Cohen et al. (28) 27; Hilty, Geiger (96) 21

¹⁶² Likhovski (103) 273-274

¹⁶³ Cohen et al. (28) 2

¹⁶⁴ C Shapiro, 'Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting'

(2001) 1 *Innovation Policy and the Economy* 119, 120 (Shapiro describes a patent thicket as "A dense web of overlapping intellectual property rights that a company must hack its way through in order to actually commercialize new technology."); Meurer (132) 309-310 ("a thicket of patents may stultify development of technology because of the cost of securing patent licenses from the large numbers of patent owners.")

possible.¹⁶⁵ Seen from a wider perspective, this approach brings about overlap among patent applications to the extent that several patents cover the same technology. Hence, competitors seeking to improve that technology should agree on licensing all the related patents, thereby increasing costs. Indeed, the boundaries of each patent will be unclear and a certain degree of uncertainty will be created on what is covered by each patent.¹⁶⁶ At the same time, the created uncertainty can act as a deterrent to competitors, discouraging them to develop around that technology to avoid to be sued for infringement.¹⁶⁷ Ultimately, a barrier is built around invention that is more powerful than temporary monopoly privileges. Competitors, indeed, are restricted from using and implementing not only the single invention but also the entire technology.

As will be discussed in detail later, namely in Chapter V and Chapter VII, patent thickets are often created through choice in order to reduce or eliminate competition. In particular, the high costs needed to build these patent barriers has been indicated as one of the main reasons behind the reluctance of small companies to apply for patents.¹⁶⁸ Similarly, the uncertainty created by patent overlapping is used to force rivals to licence more patents than those genuinely necessary to implement the technology, increasing their transactional costs considerably.

¹⁶⁵ C Schneider, 'Fences and Competition in Patent Races' 26 *International Journal of Industrial Organization* 1348, 1349 ("Firms patent for different reasons in "discrete" product industries, in which an invention can be protected by a limited number of patents and in "complex" product industries, where a single patent is not enough to protect an invention. More precisely, firms will patent a coherent group of inventions, which form what is sometimes called a patent "bulk", aimed at protecting one product. The "bulk" can either be a "fence" of substitute patents or a "thicket" of complementary patents... In complex product industries, where innovation is highly cumulative, firms use patents to force rivals into negotiations and, as a consequence, they create "thickets" of complementary technologies. ... In discrete product industries, firms use patents to block the development of substitutable technologies by rivals. We say that firms create "fences". Firms wishing to protect some patented core invention, may patent substitutes to keep rivals from doing this.")

¹⁶⁶ Lemley (46) 907-909

¹⁶⁷ Bessen, Meurer (23)

¹⁶⁸ Hilty, Geiger (96) 23; Hall et al. (139); P Tang, Adams, and D Paré 'Patent protection of computer programmes' (Report submitted to the European Commission-Directorate-General Enterprise, 2001) < <http://www.ictlex.net/wp-content/sofstudy.pdf>> accessed 20th June 2017.

¹⁶⁹ As such, patent thickets have demonstrated their usefulness in strategically avoiding the entrance of new subjects in certain arenas by establishing strong bargaining positions.¹⁷⁰ Additionally, patent uncertainty created by overlapping can easily result in rising firms' concerns of being sued for infringements;¹⁷¹ thus, firms are more prone to reach agreements that they would not have otherwise agreed to avoid legal actions. Therefore, competitors can be forced into paying high royalties increasing their costs.¹⁷² Hence, it can be concluded that patenting in certain technological area, i.e. cumulative innovation context, is no longer aimed at improving innovation, but rather firms use patents for other purposes. All this considered, it couldn't be excluded that hindering the entrance of new competitors could be the underling motivation behind seeking patent protection for business methods in Europe.¹⁷³

6. Some conclusions

Some conclusions can be drawn based on the analysis conducted in this chapter and the previous ones. First, firms have shown a growing interest in granting patent protection for business methods. Indeed, the Court's rulings of business method patentability have met the strong demand for securing property prerogatives raised by firms that, at the beginning of the 1990s, started to develop computer technologies. At the outset, granting patent protection for a firm's own business methods was deemed an effective means to provide economic incentives to

¹⁶⁹ BH Hall, RM Ham, 'The Patent Paradox Revisited: Determinants of Patenting in the US Semi-conductor Industry 1980-94' (1999) NBER Working Paper 7062 <<http://www.nber.org/papers/w7062>> accessed on the 20th June 2017

¹⁷⁰ J Bessen, *Patent Thickets: Strategic Patenting of Complex Technologies* (SSRN, March 2003)

< <https://ssrn.com/abstract=327760> or <http://dx.doi.org/10.2139/ssrn.327760>> accessed on the 7th July 2017; MA Lemley, C Shapiro, 'Probabilistic Patents' (2005) 19 J. Econ. Persp. 75, 93–95.

¹⁷¹ Hilty, Geiger (96) 28

¹⁷² Bakels, Hugenholtz (100) 24.

¹⁷³ Hall et al (139); S Wagner, 'Business method patents in Europe and their strategic use: evidence from franking device manufacturers' (2008) 5 Econ. Innov. New Techn 1; I Cockburn, MJ MacGarvie, 'Patents, Thickets and the Financing of Early-Stage Firms: Evidence from the Software Industry' (2009) 18 Journal of Economics & Management Strategy 729

innovate and signal the value of the new technologies.¹⁷⁴ Patent protection was, then, mainly sought to adapt to the inherent changes in industrial policies and productions sparked by the Information Technology revolution. Nevertheless, later developments have shown that the patentability of business methods has complicated rather than simplified company business, creating a cold-war environment where patents were thought as weapons for offending and defending, for neutralising the threat of infringement suits, and for strengthening bargaining positions in licensing agreements.¹⁷⁵ Therefore, in current time, it seems that neither securing further implementation nor recouping investment in innovation are the main driving force behind firms' demands for computer-implemented business method patentability.

The other conclusion that can be drawn is that business method patentability does not harmonize with any of the traditional economic theories developed to support patent protection. Indeed, neither innovation improvement nor knowledge disclosure has appeared to be encouraged by patents in the field of business methods. Instead, a strategic use of patents and patent applications has been the result turned out in the business method sector. In particular, firms in this technological area tend to file several patent applications to cover the same piece of invention, thereby overlapping patents themselves. Thus, intentional uncertainty is created on the contents of each patent. As such, the boundaries of the inventions are often not clear and the threat of infringements can be used to discourage rivals to enter the market. Therefore, concerns about reducing in competition as consequence of business method patentability have been raised. The cause for such concerns will be the topic of the following chapters. Patent thickets and patent portfolios will be analysed in the chapter V, whereas in the following chapter, I will perform a quantitative analysis of a database including all the patent applications referring to G06Q

¹⁷⁴ FM Keeley-Domokos, 'State Street Bank & Trust Co. v. Signature Financial Group, Inc.' (1999) 14 Berkeley Tech. L.J. 153, 168

¹⁷⁵ CV Chien 'From Arms Race to Marketplace: The Complex Patent Ecosystem and Its Implications for the Patent System' (2010) 62 Hastings L.J. 297, 333

classification, examining features and numbers of business method patents at the EPO.

Chapter IV

Who applies for business method patents at EPO?

1. Introduction

As discussed in the first two chapters, business methods are now a patentable subject matter under the umbrella of the Europe Patent Convention (EPC). Ultimately, a legal framework - probably not the most clear and stable - has been developed regarding this type of invention by referring to the EPO Board of Appeal decisions together with the general principles set out in the EPC and in the EPO Guidelines. In particular, the stratification of the decisions of the EPO Board of Appeal has led to the development of practices that have provided patent protection to business methods, specifically, when computer-implemented. Hence, the EPO has to deal with patent applications for business methods, and possibly has to grant patent protection to them, even if the article 52 EPC clearly states that business methods are not patentable. But, what is the extent of this phenomenon? Are only a few applications involved, or are they a significant number as it has happened in the USPTO? ¹ Could the volume or the temporal patterns in the number of patent applications suggest some strategic uses of business method patents? In the attempt to answer these questions, a quantitative empirical analysis has necessarily to be added to the doctrinal research carried out in the first chapters. All this will help to provide a complete overview of the phenomenon of business method patents at the EPO.

Nowadays, socio-legal research is often used to address legal issues.² In socio-legal researches, methods that are commonly adopted in the social sciences are applied to legal researches to investigate social

¹ J Bessen, MJ Meurer, *Patent failure: How judges, bureaucrats, and lawyers put innovators at risk* (Princeton University Press 2008)

² T May, *Social Research Issues, Methods and Process* (4th Ed., Open University Press, 2010)

phenomena generated by legal rules. As such, empirical data referring to the investigated field are collected and used either for a qualitative or a quantitative analysis. In the first case, the attention is brought to small samples so that motivations or opinions are mainly focused, whereas in quantitative analyses a considerable amount of measurable data are usually collected, then to be transformed in statistic surveys. Hence, socio-legal researches result in a multidisciplinary approach that combines together statistical techniques and analytical methods for understanding the effects of rules already enforced or to be applied. Thus, this type of investigation moves away from the doctrinal analysis, based on a ‘stand and stare approach’,³ and tries to find out possible solutions to social concerns by “ a law reform research”.⁴

Over the years, patents as well as other IP rights have attracted a great deal of attention from socio-legal researchers. Especially, the effect of patents on innovation and competition has been often investigated in the attempt to assess the economic consequences of patent regulations. Some of the conclusions drafted by these analyses will be briefly focused in the next section of this chapter. However, this chapter will mainly report the results of the original quantitative analysis that has been performed in this thesis to understand the extent of business method patent phenomenon at the EPO. For this purpose, the chapter will be divided into three parts. As already said, the first part will offer a brief overview on some socio-legal researches that have been conducted on business method patents. The second part will discuss the research methods employed in the quantitative analysis performed in this thesis, and the following sections will report and discuss the results obtained. Both the number of business method patent applications filed at the EPO over the years, and the key features of the applicants will be highlighted.

³ R van Gestel, HW Micklitz, ‘Revitalizing Doctrinal Legal Research In Europe: What About Methodology?’ (2011) EUI Working Papers LAW 2011/05 <http://cadmus.eui.eu/bitstream/handle/1814/16825/LAW_2011_05.pdf?sequence=> accessed on the 24th June 2017

⁴ J Hogg, M McConville, WH Chui *Research methods for law* (Edinburgh University Press 2007)

2. Socio-legal researches on business method patents

In last decades, the socio-legal approach has gained ground in examining the effects of patent legislations. In particular, both quantitative and qualitative researches have been performed in attempt to understand the potentials of patents in improving innovation.⁵ In this field, the Yale Survey (Yale I Survey)⁶ and the Carnegie Mellon Survey⁷ are seminal works. Conducted between 1980 and 2000, both surveys were based on questionnaires administered to US firms, from a few hundreds in the first one, until more than one thousand in the Carnegie Mellon Survey. In particular, the two surveys have succeeded in collecting a large amount of data regarding not only IP rights but also investments in R&D. Thus, a full picture of the interaction between patents and innovation has been provided with regard to small and big firms in the US, ultimately casting doubts on the effectiveness of patent system in protecting investment in R&D and providing appropriate financial rewards.⁸

Also in Europe, the interaction between patents and innovation has been investigated by socio-legal analyses.⁹ Increasingly, surveys per-

⁵ ex multis, BH Hall, D Harhoff, 'Recent Research on the Economics of Patents' (2012) National Bureau of Economic Research Working paper n. 17773 <<http://www.nber.org/papers/w17773>> accessed on the 20th June 2017; SJH Graham et al., 'High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey' (2010) 24 Berkeley Tech. LJ1255; BH Hall, RH Ziedonis, 'The patent paradox revisited: an empirical study of patenting in the US semiconductor industry, 1979-1995' (2001) 32 The RAND Journal of Economics 101

⁶ R Levin, 'Appropriating the Returns from Industrial Research and Development' (1987) 3 Brookings Papers on Economic Activity 783

⁷ W Cohen, J Walsh, R Nelson, 'Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)' (2000) NBER working paper w7552 <<http://www.nber.org/papers/w7552>> accessed on the 20th June 2015

⁸ Hall, Harhoff (5), BH Hall et al., 'The Choice between Formal and Informal Intellectual Property: A Review' (2014) 52 Journal of Economic Literature 375

⁹ N van Zeebroeck, B van Pottelsberghe de la Potterie, D Guellec, 'Claiming More: The Increased Voluminosity of Patent Applications and Its Determinants' (2009) 38 Research Policy 1006; E Archontopoulos et al., 'When small is beautiful: Measuring the evolution and consequences of the voluminosity of patent applications at the EPO' (2007) 19 Information Economics and Policy 103; D Harhoff, 'The battle for patent rights' in C Peeters and B Van Pottelsberghe De La Potterie (eds), *Economic and Management Perspectives on Intellectual Property Rights* (Palgrave Macmillan UK, 2006); D Harhoff, 'Patent Quantity and Quality in Europe – Trends and Policy Implications' in

formed in the IP field have examined relations among patent protection and economic growth and possible consequences on competition.¹⁰ In particular, a comprehensive analysis of patents at the EPO has been performed by Harhoff et al.¹¹ Based on a large-scale patent databases provided by the EPO, the study focused on patent features, patent examination and on opposition proceedings in order to verify possible changes in firm approach to patent protection. The study draws specific attention to the “escalation mechanism”,¹² i.e. the process of escalating expenditures on patent applications, which has resulted in a significant increase in the number of patent applications at the EPO.¹³ Particularly, the work of Harhoff et al. correlates this propensity to patent with some long-term strategic plans, recently adopted by firms applying for patents at the EPO.¹⁴ With regard specifically to firms in cumulative innovation areas, the work suggests that firms exacerbate the proper nature of this type of innovations by patenting separately every small pieces of the technology. In point of fact, the value of patents holding jointly is greater than the sum of the individual patents, especially when several patent are necessary to implement a technology.¹⁵ Holding several pa-

B. Kahin and D Foray (eds.) *Advancing Knowledge and the Knowledge Economy* (MIT Press 2006); RJ Hart, P Holmes, J Reid, *The Economic Impact of Patentability of Computer Programs: Report to the European Commission* (Intellectual Property Institute, 2000)

¹⁰ Ex multis, A Arundel, I Kabla, ‘What Percentage of Innovations Are Patented? Empirical Estimates Form European Firms’ (1998) 27 *Research Policy* 127 (based on the data collected by the Community Innovation Survey (CIS) and the KNOW survey); A Arundel, ‘The Relative Effectiveness of Patents and Secrecy for Appropriation’ (2001) 30 *Research Policy* 611; D Hsu, RH Ziedonis, ‘Patents as quality signals for entrepreneurial ventures’ in *Academy of Management Proceedings* (Academy of Management 2008) <<http://www.management.wharton.upenn.edu/hsu/inc/doc/papers/david-hsu-signals.pdf>> accessed on the 20th June 2017; M Noel, M Schankerman, ‘Strategic Patenting and Software Innovation’ (2013) 61 *Journal of Industrial Economics* 481; HR Ziedonis, BH Hall, ‘The effects of strengthening patent rights on firms engaged in cumulative innovation: insights from the semiconductor industry’ in S Hoskinson, D Kuratko (eds) *Entrepreneurial Inputs and Outcomes: New Studies of Entrepreneurship in the United States* (Emerald Group Publishing Limited, 2001)

¹¹ Harhoff et al., ‘The strategic use of patents and its implications for enterprise and competition policies - Tender for No ENTR/05/82’ (2007) <https://ueaeprints.uea.ac.uk/37550/1/study-202852-2008_en_2475.pdf> accessed on the 20th June 2017

¹² *ibid* 78

¹³ *ibid* 65 (“Empirical research in the domain of patents has established that there was a significant shift in firms’ propensity to patent – often referred to as the “patent explosion” - in the United States around 1984 and in Europe around 1995.”)

¹⁴ *ibid* 72

¹⁵ *ibid* 81

tents related to a technology, therefore, firms are likely to obtain ‘a strategic advantage over technological rivals’.¹⁶ Especially, firms are facilitated to extract part of rivals’ profit by threatening to stop them from exploiting some of the patents necessary to implement the relevant technology. Hence, Hartoff et al. discuss the possible ill effects on competition that can result from hold-up practices, whereby the decrease in efficiency can force firms off the market.¹⁷

Possible strategic uses of patents have also been revealed in recent socio-legal researches performed with specific regard to business method patents at the EPO.¹⁸ As already discussed in Chapter III,¹⁹ by clustering several patents around the same technology, firms are able of building dense thickets gaining them large competitive advantages. In particular, patent thickets can facilitate practices such as those resulting in rising rivals’ transactional costs, extracting high royalties or posing the risk of costly legal litigations. As such, in cumulative innovations tactical use of patents can result in foreclose the market, especially to small firms that cannot bear such costs. In 2006 Wagner carried out a survey on this topic.²⁰ In his seminal work, the scholar examined both the business method patent phenomenon as a whole, and the specific case of the franking device industries. In particular, the study findings revealed that business methods were granted at the EPO

¹⁶ *ibid* 79 (Hartoff et al. introduces a definition of strategic use of patents “Strategic use of the patent system arises whenever firms leverage complementarities between patents in order to attain a strategic advantage over technological rivals. This behaviour is anticompetitive if the main aim and effect of strategic use of the patent system is to decrease the efficiency of rival firms’ production efforts”)

¹⁷ *ibid* 75

¹⁸ I Liotard, ‘Software and business methods patents: Case law evolution and market strategies’ (Intellectual Property Rights for Business and Society, DIME Conference, London, September 2006); R Kapoor, N van Zeebroeck, ‘The laws of action and reaction: on determinants of patent disputes in European chemical and drug industries’ (2016) ULB Working paper n 19 <<https://dipot.ulb.ac.be/dspace/bitstream/2013/235144/3/WP019-2016.pdf>> accessed on the 20th June 2017. With regard to the US experience *ex multis*, EH Tiller, JR Allison, ‘The Business Method Patent Myth’ (2003) 18 Berkeley Tech. LJ987, 1011; HJ No, Y An, Y Park, ‘A Structured Approach to Explore Knowledge Flows through Technology-Based Business Methods by Integrating Patent Citation Analysis and Text Mining’ (2015) 97 Technological Forecasting and Social Change 181

¹⁹ Text to section 4

²⁰ S Wagner, ‘Business method patents in Europe and their strategic use: evidence from franking device manufacturers’ (2008) 17 Econ. Innov. New Techn. 173

on a regular basis, in opposition to the common assumption of non-patentability of business methods.²¹ However, the quality of business method patents is questioned according to the high rate of oppositions that the data analysis indicates.²² Additionally, the interaction among amount of patents and opposition proceedings at the EPO was focused to conclude that the degree of litigation increased when business method patent holders show a propensity to built large patent portfolio.²³ Similarly, possible strategic uses have been highlighted in the quantitative analysis of patents related to financial activities by Hall et al.²⁴ Especially, the study provided a comparison between financial patents and a sample of patents filed in other technical categories at the EPO.²⁵ Considering the outcome of the analysis, the researchers concluded that patents granted on financial subject matters were “less likely to be granted, and slightly more likely to be opposed”²⁶ and that all this corroborates the idea of “a by-product of strategic patenting by large established computing firms”.²⁷ In addition to the significant conclusion on the possible strategic use of business method patents, the two studies interestingly have brought to the attention another issue often linked to socio-legal analysis performed on this subject matter: the difficulties in identifying business method patents.

In this chapter a quantitative analysis will be performed to understand the extent of the phenomenon of business method patents at EPO. As the attention will be on studying how firms try to use business method patents strategically, then all patent applications, instead of granted patents only, will be considered because patent applications show what firms are *trying* to do, and the mere existence of an application has stra-

²¹ Ibid 182

²² Ibid 193

²³ ibid 194

²⁴ BH Hall, T Grid, S Torrasi, ‘Financial patenting in Europe’ (2009) 6 European Management Review 45; an analysis on Financial patents at the USPTO has been performed by Josh Lerner, J Lerner, ‘Where Does State Street Lead? A First Look at Finance Patents, 1971 to 2000’ (2002) 57 Journal of Finance 901

²⁵ Hall, Grid, Torrasi (24) 50

²⁶ Hall, Grid, Torrasi (24) 57

²⁷ Hall, Grid, Torrasi (24) 61

tegic effects. This will shed light on the entities interested in patenting business methods, and furthermore on the possible reasons that can explain why business methods are so popular nowadays.

3. Business method patents and the category G06Q

Patents and patent applications at the EPO are classified according the International Patent Classification (IPC) system.²⁸ The IPC, which is commonly adopted by several patent offices around the world, consists in “a system of codes that groups inventions according to technical area”.²⁹ Thus, the first letter of the IPC system identifies the technical category of the invention, whereas sub-categories are classified by the addition of further letters and numbers, as the technical features of the subject matter becomes more specific. However, the IPC system did not have a specific class for business methods when it was originally established. Only in 1995 a class for “Electrical Digital Data Processing” was introduced (G06F).³⁰ Then, in 2000 a sub-class of G06F, namely class G06F17/60 relative to digital computing or data processing equipment and methods was added.³¹ The latter class was used to cover business method inventions until 2006, when a new class specific to business method patents was finally created.³² The class, named G06Q – ‘Data processing Systems or Methods, specially adapted for Administrative, Commercial, Financial, Managerial, Supervisory or Forecasting Purposes; Systems or Methods, specially adapted for Administrative, Commercial, Financial, Managerial, Supervisory or Forecasting Purpos-

²⁸ WIPO<<http://www.wipo.int/classifications/ipc/en/>> accessed the 20th June 2017 (“The International Patent Classification (IPC), established by the Strasbourg Agreement 1971, provides for a hierarchical system of language independent symbols for the classification of patents and utility models according to the different areas of technology to which they pertain. A new version of the IPC enters into force each year on January 1”)

²⁹ EPO <<https://www.epo.org/searching-for-patents/helpful-resources/first-time-here/classification.html>> accessed the 20th June 2017A

³⁰ IPC 6th edition in force from 1st January 1995 to 31 December 1999

³¹ IPC 7th edition in force from 1st January 2000 to 31 December 2005<http://www.wipo.int/ipc/itos4ipc/ITSupport_and_download_area/IPC7/subclass/core/en/htm/G06F.htm> accessed the 20th June 2017 (“G06F 17/60 - Digital computing or data processing equipment or methods, specially adapted for specific functions- Administrative, commercial, managerial, supervisory or forecasting purposes”)

³² IPC 8th edition in force from 1st January 2006 to 31 December 2008

es, not otherwise provided for', is divided in six sub-categories accordingly to the specific field of applications of the methods.³³

Surely, the hesitant attitude toward business method patents shown by the EPO Boards of Appeal has greatly contributed to the delay in the IPC introduction of a specific category for business method patents.³⁴ Conversely, the consistency in the US Supreme Court jurisprudence has driven the USPTO to introduce an apposite class for business method patents (class 705 "Data processing: financial, business practice, management, or cost/price determination") as early as 1997.³⁵ Based on such clarity in identifying business method patents at the USPTO, in his seminal work Wagner decided to identify business method patents at the EPO referring to patents already granted at the USPTO in the class 705. In particular, register numbers and priority dates of USPTO patent applications in class 705 were used to identify the equivalent patent applications at EPO.³⁶ On the other hand, Hall et al. identified their sample not only referring to those EPO patents that were equivalent to patents already granted at the USPTO in class 705, but also using other two methods. The first method was based on the IPC classification. Namely all patents granted in the categories of the

³³ WIPO <<http://web2.wipo.int/classifications/ipc/ipcpub?notion=scheme&version=20170101&symbol=G06&menulang=en&lang=en&viewmode=f&fipcp=no&showdeleted=yes&indexes=no&headings=yes¬es=yes&direction=o2n&initial=A&cwid=none&tree=no&searchmode=smart>>

("G06Q_ 'Data processing Systems or Methods, specially adapted for Administrative, Commercial, Financial, Managerial, Supervisory or Forecasting Purposes; Systems or Methods, specially adapted for Administrative, Commercial, Financial, Managerial, Supervisory or Forecasting Purposes, not otherwise provided for' -G06Q 10/00 Administration, e.g. office automation or reservations; Management, e.g. resource or project management -G06Q 30/00 Commerce, e.g. marketing, shopping, billing, auctions or e-commerce -G06Q40/00 Finance, e.g. banking, investment or tax processing; Insurance, e.g. risk analysis or pensions- G06Q 50/00 Systems or methods specially adapted for a specific business sector, e.g. health care, utilities, tourism or legal services-G06Q 90/00 Systems or methods specially adapted for administrative, commercial, financial, managerial, supervisory or forecasting purposes, not involving significant data processing - G06Q 99/00 Subject matter not provided for in other groups of this subclass")

³⁴ Wagner (20) 180

³⁵ USPTO < <https://www.uspto.gov/patents-getting-started/patent-basics/types-patent-applications/utility-patent/business-methods-20>> accessed 20th June 2017 ("Class 705 was created in 1997 from the business and cost/price sections of computer classes 395 and 364. These two sections having originally evolved from class 235 - Registers, beginning in the late 1960's.")

³⁶ Wagner (20) 185

IPC system related to financial inventions were taken into consideration. Additionally, the researchers took into account patent claims. Thus, keywords such as *financial*, *credit*, or *money*, were used to identify patents that could be relevant for the investigation.³⁷

However, the choice to rely on equivalent patents should be put into context, since both the analyses mentioned above investigated the phenomenon of business method patents (or the narrow one of financial patents) before the IPC 8 came into effect in 2006. Thus, the connection with the USPTO, as well as the scrutiny of patent claims, were needed mainly due to the lack of a specific category for business method patents at the EPO. Nowadays, an analysis of business method patent based only on the patents and patent applications registered under the category G06Q should be considered appropriate, according to the new framework established by IPC8. On the other hand, the use of data sets built on the records resulting from the patent offices' registers is a common approach in the socio-legal analysis of patents; thereby, all the patents or the patent applications listed under a specific class or category are collected and investigated.³⁸ Notably, the majority of quantitative studies on patents conducted after IPC 8 entered into force are based on the categorisation provided by the EPO.³⁹

All this considered, namely given that now a specific category has been introduced for business method patents at the EPO, the quantitative study performed in this research does not need to examine USPTO data on business method patents. Instead, an analysis of all the patent applications that have been filed at the EPO in the category G06Q can be considered adequate to provide a complete practical description of the

³⁷ Hall, Grid, Torrisi (24) 50

³⁸ ex multis, SJH Graham, D Mowery, 'Intellectual Property Protection in the U.S. Software Industry' in National Research Council *Patents in the Knowledge-Based Economy* (The National Academies Press 2003), 7-13

³⁹ Harhoff et al. (11); R Kapoor, 'Intellectual property and appropriability regime of innovation in financial services' in AL Mention and M Torkkeli (eds) *Innovation in Financial Services: A Dual Ambiguity* (Cambridge Scholars Publishing 2014), 113; M Komulainen, T Takalo, 'Does state street lead to Europe? The case of financial exchange innovations' (2013) 19 *European Financial Management* 521,535

phenomenon of business method patents at the EPO. Thus conceived, the socio-legal analysis provided in this chapter as well as in Chapter VI has been based on a data set collected accordingly to the established classification system at the EPO. Specifically, all the patent applications registered at EPO and listed under the category G06Q - Data processing Systems or Methods, specially adapted for Administrative, Commercial, Financial, Managerial, Supervisory or Forecasting Purposes; Systems or Methods, specially adapted for Administrative, Commercial, Financial, Managerial, Supervisory or Forecasting Purposes, not otherwise provided for, have been considered.

In connection with the analysis framework, two main points need to be clarified about the category G06Q. The first aspect concerns the time frame of this research. Although, as said above, the category G06Q has been introduced in 2006, the data collected in the data set and used for the quantitative analysis carried out in the following sections of this chapter and in Chapter VI, also contains patent applications filed before 2006, hence before the category G06Q was introduced. This is because, over the years, technical boards at the EPO have acted to reclassify and list under the category G06Q also those patent applications implying business method inventions that were filed before 2006. Therefore, the research performed in this work covers a period going back to 1991, that is the first year in which the filing of a patent application at the EPO in the category G06Q has been reconstructed and reported.

A second point refers to the possibility that business method patent applications are classified in a different category than G06Q. As highlighted also by Hall et al., patent claims can intentionally describe inventions focusing on some elements rather than others.⁴⁰ Thus, some relevant patent applications could have been classified under a different category, instead of under the category G06Q, even if the cornerstone of

⁴⁰ Hall, Grid, Torrisi (24) 50

the invention is a business method.⁴¹ This issue has been raised in the context of the USPTO scenario specifically after the introduction for business methods patent applications of the “second pair of eyes review”⁴², which has led applicants towards other less examined classes. Nevertheless, this is not the case in Europe⁴³, where business method patent applications do not face any deeper scrutiny than applications in other classes, so that applicants do not tend to migrate towards categories different from G06Q. Based on this, there are no doubts that the investigation of all the patent applications in the category G06Q can be itself able to offer a general overview of the phenomenon of business method patents at the EPO. Therefore, no further methodology other than collecting patent applications in the category G06Q has been used in this research work.

4. Data

As already mentioned, a data set has been specifically created to perform the empirical analysis of business method patents at the EPO reported in this chapter and in Chapter VI. The database has been set up in December 2014 in collaboration with the “Complex Systems and Networks” research group at the School of Mathematics Sciences of QMUL. All the patent applications classified under the category G06Q, namely “data processing systems or methods, specially adapted for administrative, commercial, financial, managerial, supervisory or forecasting purposes; systems or methods specially adapted for administrative, commercial, financial, managerial, supervisory or forecasting purposes, not otherwise provided for”, were downloaded from the Euro-

⁴¹ Lerner (24); BH Hall, M MacGarvie, ‘The Private Value of Software Patents’ (2010) 39 *Research Policy* (2010) 994; for an overview on this concerns relating to software patents, J Bessen, R Hunt, ‘An Empirical Look at Software Patents’ (2007) 16 *Journal of Economics & Management Strategy* 157, 165

⁴² U.S. Patent & Trademark Office, Patent Quality Improvement: Expansion of the Second-Pair-of-Eyes Review
<<http://www.uspto.gov/web/offices/com/strat21/action/q3p17a.htm>> accessed on the 20th June 2017

⁴³ See text to n.16 Chapter I

pean patent register (<https://register.epo.org/regviewer>).⁴⁴ No time boundaries were set, so that all patent applications published in the Web site until December 2014 under the category G06Q were accessed. In this way, a data set of 34,446 files corresponding to all the patent applications filed before or on the date of 2nd June 2014 at EPO was produced.

Some clarifications on the construction of the data set and on the retained information are necessary. First of all, in the effort to investigate the business method patent phenomenon from the broadest possible perspective, it has been chosen to collect all the files relative to published patent applications, instead of gathering only the files corresponding to granted patents. Patent applications are, of course, more numerous than granted patents. Moreover, as will be discussed in Section 7, the difference between number of applications and number of granted patents in the category G06Q at the EPO is huge, considering that only less than 1% of the patent applications have been granted. Thus, an analysis based on granted patents only would give a very limited picture of the phenomenon. Granted patents show to some extent the success of a firm, although the mere existence of a patent application has strategic effects. Therefore, a comprehensive examination including all the patent applications filed in the category can offer information not only on the extent of the phenomenon, but also on the possible strategic use of business methods as a patentable subject matter.⁴⁵ Support to this approach is provided by the fact that applicants have the same right of patentees if the patent is ultimately granted. Thus, during the interim period, users of the technology *risks* infringing

⁴⁴ EPO < <https://www.epo.org/searching-for-patents/legal/register.html#tab1> > accessed on the 20th June 2017 (“The European Patent Register contains all the publicly available procedural information on European patent applications as they pass through each stage of the granting process. This free online service contains procedural information on all European patent applications from the moment they are published. It includes links to the patent registers of many of the EPO member states, showing the status of European patents after grant, when the national patent offices take over responsibility for them.”)

⁴⁵R Kapoor, AL Mention, ‘Patenting financial innovation in Europe’ (PICMET, Portland September 2015)

if the patent is granted, and the threat of future legal action is often enough to discourage competitors to use the invention even before the patent is granted. All this considered, the entity of the phenomenon of patenting business method inventions can be revealed in its full extent only through a comprehensive analysis of both patents and patent applications in the category G06Q.⁴⁶ Furthermore, an investigation based on an enlarged data set including also patent applications could be useful also to better intercept possible detrimental effects due to an extended use of patents and patent applications for strategic reasons.⁴⁷

With regard to the available information, a report for each of the published patent applications is accessible from the Web page of the European patent register. A typical patent application report, as it appears in the Web page, is shown in Figure 1 and in Figure 2. Each report contains detailed data about the content of the patent application, its status, and also some references to previous patents patent applications. First of all, the status of the application and both the name of the applicant and the name of the inventor are indicated in the report. This is because patent protection is often sought by entities different from the inventors, such as the firms or societies that are finally going to exploit the invention. Then, the report mentions the date when the patent application was filed. Also, the publication date of the patent application and the priority date, if different, are indicated. In addition to this, and to other information such as examination procedures, fees paid, etc., all the references related to the previous art are reported in a specific field named "Documented Cited".

⁴⁶ N van Zeebroeck, B van Pottelsberghe de la Potterie, 'Filing strategies and patent value' (2011) 20 *Economics of Innovation and New Technology* 539

⁴⁷A Palangkaraya, PH Jensen, E Webster, 'Applicant behaviour in patent examination request lags' (2008) 101 *Economics Letters* 243

About this file: EP2271976

EP2271976 - GRAPHICAL REPRESENTATION OF SOCIAL NETWORK VITALITY [Right-click to bookmark this link]				
Status	The application is deemed to be withdrawn Status updated on 23.11.2012 Database last updated on 25.02.2017			
Most recent event	23.11.2012	Application deemed to be withdrawn	published on 26.12.2012 [2012/52]	
Applicant(s)	For all designated states Microsoft Corporation One Microsoft Way Redmond, WA 98052-6399 / US [2011/02]			
Inventor(s)	01 / HOWARD, Joshua Microsoft Corporation International Patents One Microsoft Way Redmond, WA 98052-6399 / US 02 / TRUSSEL, Bryan Microsoft Corporation International Patents One Microsoft Way Redmond, WA 98052-6399 / US [2011/02]			
Representative(s)	Goddar, Heinz J. , et al Boehmert & Boehmert Anwaltspartnerschaft mbB Patentanwälte Rechtsanwälte Pettenkoferstrasse 20-22 80336 München / DE [N/P]			
Application number, filing date	09734319.8 [2011/02] WO2009US37903	21.03.2009		
Priority number, date	US20080106610 [2011/02]	21.04.2008	Original published format: US 106610	
Filing language	EN			
Procedural language	EN			
Publication	Type:	A1 Application with search report		
	No.:	WO2009131778		
	Date:	29.10.2009		
	Language:	EN		
	[2009/44]			
	Type:	A1 Application with search report		
	No.:	EP2271976		
	Date:	12.01.2011		
Language:	EN			
The application has been published by WIPO in one of the EPO official languages on 29.10.2009 [2011/02]				
International and Supplementary search report(s)	International search report - published on:	KR	29.10.2009	
	Supplementary European search report - dispatched on:	EP	07.10.2011	
Classification	International:	G06Q10/00, G06F3/048, G06F15/00, G06F3/14, G06F17/00	[2011/45]	

Figure 1. Example of the report shown in the Web page of the EPO for a typical patent application in the category G06Q (part 1).

Title	English:	GRAPHICAL REPRESENTATION OF SOCIAL NETWORK VITALITY	[2011/02]
	French:	REPRÉSENTATION GRAPHIQUE DE LA VITALITÉ D'UN RÉSEAU SOCIAL	[2011/02]
Entry into regional phase	01.09.2010	National basic fee paid	
	01.09.2010	Search fee paid	
	01.09.2010	Designation fee(s) paid	
	01.09.2010	Examination fee paid	
Examination procedure	01.09.2010	Examination requested [2011/02]	
	27.12.2011	Amendment by applicant (claims and/or description)	
	22.02.2012	Despatch of a communication from the examining division (Time limit: M04)	
	04.07.2012	Application deemed to be withdrawn, date of legal effect [2012/52]	
	09.08.2012	Despatch of communication that the application is deemed to be withdrawn, reason: reply to the communication from the examining division not received in time [2012/52]	
Divisional application(s)	The date of the Examining Division's first communication in respect of the earliest application for which a communication has been issued is 22.02.2012		
Fees paid	Renewal fee		
	11.02.2011	Renewal fee patent year 03	
	14.03.2012	Renewal fee patent year 04	
Documents cited:	Search	[L] Statement in accordance with the Notice from the European Patent Office dated 1 October 2007 concerning business methods (OJ 11/2007; p592f) The claimed subject matter, with due regard to the description and drawings, relates to processes comprised in the list of subject matter and activities excluded from patentability under Art.52(2) and (3) EPC. The applicant is advised that in accordance with the established practice of the EPO, no search need be performed in respect of those aspects of the claimed invention. The only identifiable technical aspects of the claimed invention relate to the use of conventional, general-purpose data processing technology for processing data of an inherently non-technical nature. The information technology employed is considered to have been generally known as it was widely available to everyone at the date of filing/priority of the present application. The notoriety of such prior art cannot reasonably be contested. No documentary evidence was therefore considered required. A note to this effect has been made in the search report	
	International search	[A]US2005198172 (APPELMAN BARRY [US], et al);	
		[A]US2005198031 (PEZARIS PETER [US], et al);	
		[A]KR20060070982 (PANTECH CO LTD [KR]);	
		[A]US7359894 (LIEBMAN JASON B [US], et al);	
		[A]US2005267766 (GALBREATH NICHOLAS [US], et al)	
	Examination	US2008030496	
		- 'Bulletin manual', [Online] 21 December 2007, pages 1 - 472, XP055019675 Retrieved from the Internet: [retrieved on 2012-02-16]	

Figure 2. Example of the typical report shown in the Web page of the EPO for a patent application in the category G06Q (part 2)

For each of the reports, as the one shown in Figure 1 and Figure 2, it is possible to download the corresponding metafile from the EPO website. For the purpose of this research, the metafiles regarding all patent applications classified under the category G06Q have been downloaded. In particular, the downloaded material includes two different types of

metafiles.⁴⁸ This is because some of the metafiles are directly created by the EPO, since the corresponding patent applications have been filed for the first time at the EPO. Instead, some other patent applications have been originally filed at other patent offices; thereby, the EPO has imported the corresponding metafile, which is in a format prescribed by the World Intellectual Property Organization (WIPO). However, except for the different format, the information contained in the two type of metafiles, i.e. metafiles created by EPO and metafiles imported by EPO, is the same; thus, both the name of the applicants and the date of filing are provided in all the downloaded metafiles. Also, details about the priority art, namely the citations to previous applications or granted patents, are shown in all the downloaded metafiles.

Regarding the status of applications, this information is provided in each of the report published on the EPO Web site; specifically, it is indicated at the top of the report if the application is approved, rejected or withdrawn. However, the downloaded metafiles do not have a specific field where it is recorded if the patent has been eventually granted. Nevertheless, this information can be retrieved from the documentation related to the patent application process that is linked to the metafile. In particular, all documents related to a patent application are recorded in the report and labelled with a letter A or B. Specifically, B is used to identify official papers related to applications that have been approved. Thus, if a patent application report contains a document labelled with the letter B, it gives evidence of the fact that the patent has been granted; whereas, documents labelled with an A only indicate that a patent application has been published but not granted.⁴⁹

⁴⁸ Patent application can be entered in different way: under article 75 EPC, through direct filing (“EPdirect”); under Art. 76 EPC, as a divisional application; under article 153 EPC, as a PCT application entering the regional phase (“EuroPCT”).

⁴⁹ EPO < <https://www.epo.org/searching-for-patents/helpful-resources/first-time-here/definitions.html>> accessed on the 20th June 2017

A document

European patent application, published 18 months after filing with the EPO or 18 months after priority date (*A1 document* European patent application published with European search report; *A2 document* European patent application published without European search report (search report not available at the publication date); *A3 document* Separate publication of the European search report; *A4 document* Supplementary

Initially, the information necessary to perform the planned socio-legal analysis has been identified in the reports publishes for each application on the EPO Web site. Then, the identified information has been selected in the metafile and extracted. In particular, the following information needed for the further analysis has been collected: application number, filing date, applicant/company, official paper label A or B, application numbers and patent numbers linked to the *document cited* section. This information has been maintained in a file named SUM_UP_FILE. As an example, for the patent shown in Figure 1 and Figure 2, the record in SUM_UP_FILE reads as follows: EP2271976, 21.03.2009, Microsoft Corporation, A1, US2005198172, US2005198031, KR20060070982, US7359894, US2005267766, US2008030496.

5. How many patent applications in the category G06Q?

The volume of applications published at the European Patent Register in the category G06Q has been the first quantity considered in the quantitative analysis performed in this thesis. As shown by previous analyses, the digital revolution has brought a substantial increase in the number of patent applications at the EPO, especially in those categories related to inventions that are implemented by computer.⁵⁰

search report; Corrected A document: *A8 document* Corrected title page of an A document, i.e. A1 or A2 document, *A9 document* Complete reprint of an A document, i.e. A1, A2 or A3 document.)

B document

European patent specification (*B1 document* European patent specification; (granted patent); *B2 document* New European patent specification (amended specification); *B3 document* European patent specification (after limitation procedure); Corrected B document: *B8 document* Corrected title page of a B document, ie. B1 or B2 document, *B9 document* Complete reprint of a B document, ie. B1 or B2 document)

⁵⁰ Ex multis, E Archontopoulos, 'Spot the difference: a computer implemented invention or a software patent?' (6th Annual Conference of the EPIP Association, Brussels, September 2011) <www.epip.eu/conferences/.../ARCHONTOPOULOS%20Eugenio.pdf> accessed 25 February 2014, 4; BH Hall, G von Graevenitz, C Rosazza-Bondibene, 'A Study of Patent Thickets' (The Intellectual Property Office, 2013) <<http://www.ipo.gov.uk/ipresearch-thickets.pdf>> accessed 20th June 2017, 22; Harhoff et al. (11). With regard to the US experience, DH McQueen, 'Growth of software related patents in different countries' (2005) 25 *Technovation* 657; Allison, Tiller (18) 991; JR Allison, SD Hunter, 'On the Feasibility of Improving Patent Quality One

Business methods are believed to be among them, as most of the business methods are software or Internet implemented.⁵¹ Indubitably, the contribution of business methods in increasing the total number of patents applications at EPO is demonstrated by the database created to conduct this research. In point of fact, the collected data indicates that almost 35.000 patent applications have been filed in the category G06Q between January 1991 and July 2014.⁵² This number is in itself impressive, especially so because the first patent applications in this category were recorded only in 1991. Although a relatively new subject matter at EPO, business methods have grown to be a very popular one. As such, business methods have largely contributed to the growth in the total number of patent applications filed at the EPO, specifically in the decade between 2000 and 2010.⁵³ The following two plots give a quantitative indication of the increase in the volume of patent applications in the G06Q over the years, starting from the year 1991, when the first patent applications in this category were filed.

nology at a Time: The Case of Business Methods' (2006) 21 Berkeley Tech. L.J. 729, 730-31; Bessen, Meurer (1); K Rivette, D Kline, 'Discovering New Value in Intellectual Property' 2000 Harvard Business Review 54; USPTO, U.S. Patent Statistics, Calendar Years 1790-2015, <http://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.pdf> accessed 20th June 2017, showing an increased of five-fold between 1980 and 2014

⁵¹ See Chapter I, 3

⁵² X Qu, 'Should business methods be patentable?' (2010) 5 Journal of Intellectual Property Law & Practice 412, 415; UPTO, Class 705 Application Filing and Patents Issued Data <<https://www.uspto.gov/patents-getting-started/patent-basics/types-patent-applications/utility-patent/business-methods-18>> accessed 20th June 2017

⁵³ Archontopoulos (50), 4; Hall, von Graevenitz, Rosazza-Bondibene (50), 14

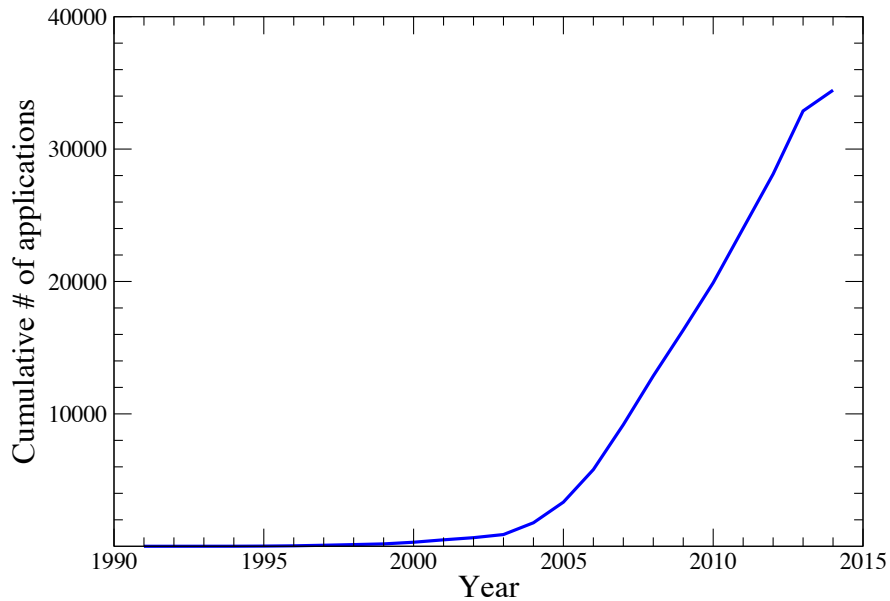


Figure 3. Cumulative number of patent applications in the category G06Q, showing year by year the total number of applications with a filing date in that year or in one of the previous years.

The plot in Figure 3 reports the cumulative number of patent applications in the category G06Q as a function of time. Namely, it indicates, for each year, the total number of applications with a filing date in that year, or in one of the previous years. Overall, the graph points out how business methods have been since their beginning. Indeed, the applications filed at the EPO under the category G06Q have followed an exponential increase and have gone from a few in the 1990 to almost 35.000 in 2014. To better highlight this fast growth, a logarithmic scale for the vertical axis, which is the typical scale used when the quantity of interest, as in this case the number of applications, changes rapidly and takes a wide range of value, has been adopted in Figure 4.

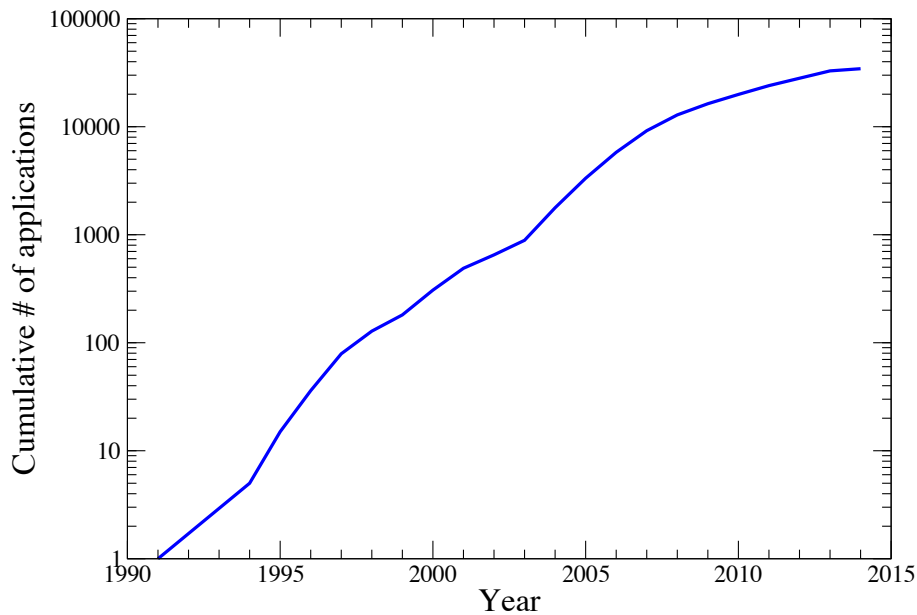


Figure 4. The same plot as in Figure 3 is shown adopting a logarithmic scale for the vertical axis. A straight line in this linear-logarithmic plot indicates that the cumulative number of patent applications in the category G06Q has grown approximately exponentially in the last 20 years.

In the base-10 logarithmic scale adopted, the first segment on the vertical axis indicates numbers going from 1 to 10, the second segment has the same length as the first one and indicates numbers from 10 to 100, and so on. In this way, it is much easier to read the actual value of the cumulative number of patents from the plot. For instance, we can extract that there were 307 patent applications standing in year 2000, thus 307 is the total number of applications that were filed at EPO under category G06Q before the end of year 2000. Analogously, the plot indicates that there were 19,903 patent applications that were filed at EPO before the end of year 2010, and so on.

More information on the growth of the volume of patent applications in the relevant category can be obtained from the plot in Figure 5, which reports instead the number of patent applications filed year by year. Again a logarithmic scale as the one in Figure 4 was adopted here for the vertical axis.

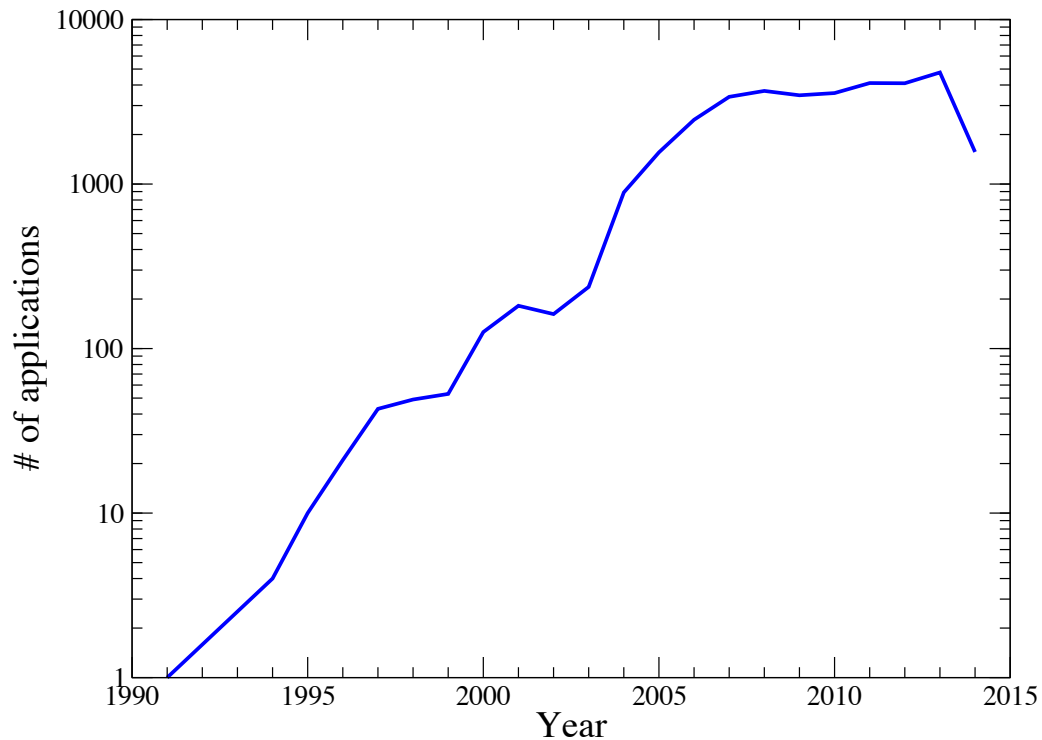


Figure 5. The number of patent applications filed each year in the category G06Q shows an exponential increase until 2007 and then a saturation to a constant number approximately equal to 4000 applications per year from 2007 to 2013. The decrease in the last point is due to the non-completeness of the data set in year 2014.

The number of applications filed each year shows clearly the important relation existing between the decision of the EPO Boards of Appeals and the trends in the volume of business method patent applications. Significantly, the beginning of the success of business method inventions can be set around the first years of this century, in parallel with the issuing of the PBS decision⁵⁴ that represents a first step towards the acceptance of the patentability of business methods in Europe. We can indeed notice that, while there were only 53 business method patents filed in year 1999, this number raised to 126 in year 2000 and to 182 in 2001.

Moreover, the plot points out that the number of applications has sharply increased again around the years 2004-2007. Mainly, the introduction of the category G06Q explains this trend. Nevertheless, the

⁵⁴ Text to n. 79 in Chapter II, *PBS Partnership/Controlling pension benefits system* (T931/95), (2002) E.P.O.R. 52

growth of the applications coincides also with the strengthening of the EPO Boards of Appeal position in favor of business method patents. In those years, the EPO Board of Appeals issued both the Microsoft⁵⁵ and the Hitachi decision.⁵⁶ Thereby, further assurances were ultimately offered about the patentability of business methods in Europe, and this encouraged firms to seek patent protection for this kind of inventions.⁵⁷

Interestingly, the increase in the number of applications slightly reduced again around 2008-2009, which is the period when the Bilski case⁵⁸ in the US and the Referral to the EPO Enlarged Board in Europe⁵⁹ started to cast doubts on the patentability of business methods. In particular, the uncertainty created by those decisions drove firms to a more caution approach towards business method patents. Nevertheless, this attitude did not last for a long time and the number of applications per year started to rise again after 2010. Indeed, it was in 2010 that the Enlarged Board of Appeal decision was issued making clear that no drastic step would have taken against patentability of business methods in Europe.⁶⁰ Consequently, firms resumed their normal patenting activities as the consistent increase in number of applications in the category G06Q indicates in the plot above. Notice that, while in the data set it results that 2013 is the year with the largest number, namely 4,767, of filed patents in the category G06Q, no definitive conclusions can be drawn about the year 2014, because the reported number 1,567 represents only a fraction of the patents, namely those filed before the 2nd June 2014. This explains the decrease in the last point of the plot.

⁵⁵ *Microsoft/Clipboard formats* (T424/03) (2006) 39 E.P.O.R. 414

⁵⁶ *Hitachi/Auction Method* T 258/03 (2004) 55 E.P.O.R.550

⁵⁷ DF Spulber, 'Should Business Method Inventions be Patentable?' (2011) 3 *Journal of Legal Analysis* 265, 316

⁵⁸ *Bilski v. Kappos*, 130 S. Ct. 3218 (2010); M la Belle, HM Schooner, 'Big Banks and Business Method Patents' (2013) 16 *U.Pa.J. Bus. L.* 431, 458 ("Before Bilski, the PTO issued 1,177, 1,694, and 1,996 Class 705 patents in 2007, 2008, and 2009, respectively. Following Bilski the number of Class 705 patents increased to 4,059, 4,064 and 4,854 between 2010 and 2012")

⁵⁹ *Programs for Computers* (G3/08) (2010) 36 E.P.O.R. 349

⁶⁰ *Ibid* 362

6. Who applies for business method patents at the EPO?

Nowadays, patent protection is more sought by entities than individuals. The picture of inventors filing applications to grant patent protection for their single invention is a thing of the past. Now patents are markedly a company business. Production, marketing and development of goods or services increasingly requires the economical and financial capacity to hold and/or to license several patents. Additionally, patents are valued for their own commercial potential, so the importance of the so-called “market for innovation” is increasing, and transactions in patent rights are becoming a vital component of economic growth.⁶¹ Thereby, to investigate what type of entities – if only firms or other groups - have played a leading role in the success of business method patents at the EPO is relevant to understand the phenomenon. The dataset created for this work offers the possibility to investigate quantitatively who has filed the largest number of patent applications in the category G06Q. Names of firms and other entities will be explored in chapter VI, while the focus of this section is mainly on categories of applicants filing the largest number of patent applications in the category G06Q at the EPO.

Results, as detailed below show that firms are without any doubt the category filing the majority of patent applications related to business method inventions at the EPO. Firms have been identified in the data set by looking at applicants with words or abbreviations in their name that indicate that they are entities running a business to make profit, i.e. *corporation, incorporated, limited, company, inc., co., ltd., n.v., s.a., ab, ag, l.l.c, gmbh, b.v., plc, s.a.s, l.p., c.v., s.r.o., s.p.a, oy* etc..⁶² The number of applications filed by firms in the category G06Q at the EPO is plotted in Figure 6. In particular, the green line shows the number of

⁶¹ A Galasso, M Schankerman, ‘Patent thickets, courts, and the market for innovation’ (2010) 4 RAND Journal of Economics 472

⁶² These are all abbreviations used to indicate entities running a business to make profit accordingly with some of the legal system around the word

patent applications that firms have filed year by year in the relevant category. Comparing this plot to the one reported as green curve in Figure 5, it emerges clearly that the main contribution to the curve describing the total volume of applications in category G06Q comes from patent applications filed by firms, as the differences between the two curves is almost unnoticeable. As such, the primary role of firms in the success of business method patents cannot be questioned.

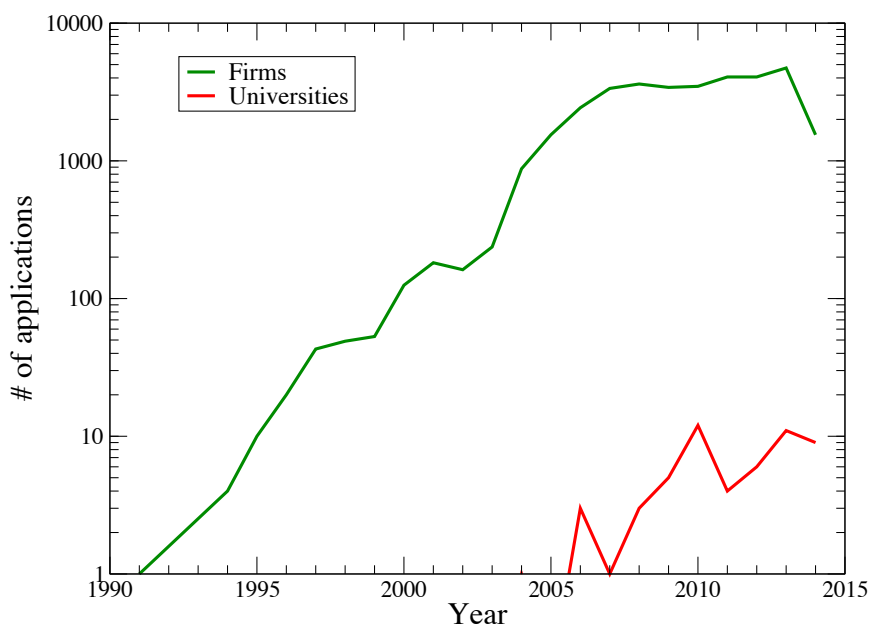


Figure 6. Number of patent applications filed year by year in the category G06Q by firms (green) and by universities (red).

In Figure 6, the volume of patent applications filed by firms is also compared to the number of patent applications submitted by universities year by year, which is reported as a red curve.⁶³ The main reason for looking in parallel to entities such as universities is indeed the intrinsic difference between firms and universities.⁶⁴ In particular, making profits is not the aim of universities, as their principal institutional role is to improve knowledge and to stimulate scientific research and science progress. Universities are in some sense the polar opposite of firms, according to the fact that universities cannot be institutionally commit-

⁶³ University have been identified by selecting in the dataset all the applicants with word university in their name.

⁶⁴ Wipo, *World Intellectual Property Report 2011- The Changing Face of Innovation* (WIPO-Economics & Statistics Series 2011) 14 (“Accordingly, there has been a marked increase in patent applications by universities and PROs – both in absolute terms and as a share of total patents filed”).

ted to implementing or developing inventions as firms are. Until recently such a difference was easily identifiable in the university attitude towards patents. In the past, universities used to file patent applications only occasionally.⁶⁵ However, some recent studies have pointed out that more and more universities are interested in patents.⁶⁶ In particular, possible strategic uses of patents have been highlighted in the tendency of universities to legally enforce their patents.⁶⁷ As already discussed in Chapter III, recent years have witnessed the emerging of new entities in the patent context, the so-called *non-practising entities* (NPE).⁶⁸ Such bodies are commonly identified in those entities that do not implement patent inventions. Conversely, non-practising entities are interested in filing patent applications as well as in building large patent portfolios with the main purpose of aggressively enforcing patent rights to secure high revenues. Such approaches have been mainly observed in the IT

⁶⁵ Ibid 15

⁶⁶ With regard to the US experience, D Foray, F Lissoni, 'University research and public-private interaction' in BH Hall, N Rosenberg (eds) *Handbook of the Economics of Innovation*, (Elsevier 2010); DC Mowery et al. *Ivory Tower and Industrial Innovation: University-Industry Technology Transfer Before and After the Bayh-Dole Act* (Stanford University Press 2004)

⁶⁷ BJ Love, 'Do University Patents Pay Off-Evidence from a Survey of University Inventors in Computer Science and Electrical Engineering.' (2013) 16 Yale JL & Tech. 285, 290 ("However, things are changing in the world of university patenting. In recent years, tech transfer tectonics have shifted strongly in the direction of computing and telecommunications. Increasingly, universities are pursuing patents on high-tech⁸ inventions⁹ and, moreover, enforcing those rights widely and aggressively"); AK Rai, JR Allison, BN Sampat, 'University Software Ownership and Litigation' in M Abramowicz, JE Daily, FS Kieff (eds) *Perspectives on Patentable Subject Matter* (CUP 2014) 338 ("Assertive university patenting has attracted attention in both scholarly and popular literature. Additionally, because universities and sometimes even their exclusive licensees are non manufacturing patentees, the intense debate over whether such patentees employ "holdup" strategies deleterious to innovation when they assert patents against successful commercializers directly implicates universities"); BH Hall, D Harhoff, 'Recent Research on the Economics of Patents' (2012) NBER Working paper n. 17773 < <http://www.nber.org/papers/w17773> > accessed on the 20th June 2017, 24

⁶⁸ Text to n.152, 153 in Chapter III. With regard to the "patent troll" phenomenon in Europe, BJ Love, C Helmers, L McDonagh, 'Is There a Patent Troll Problem in the UK?' (2014) 24 Fordham Intell. Prop. Media & Ent. L.J. 509, 510 ("Conventional wisdom states that "patent trolls"—entities that obtain patents not to facilitate the development of new products, but instead for the purposes of suing those who do—are a uniquely American phenomenon"); Hall, Grid, Torrisi (24) 61 (Referring to financial patents in Europe "Moreover, oppositions mostly involve, as opponents or as defendants, firms that are also important contributors to financial innovations and the underlying IT infrastructure. This result points to an important difference with the US system, in which the most active plaintiffs in patent litigation are patent holder firms specializing in licensing and patent litigation"); S Fusco, 'Markets and Patent Enforcement: A Comparative Investigation of Non-Practicing Entities in the United States and Europe' (2013) 20 Mich. Telecomm. & Tech. L. Rev. 439, 454

and in the biotechnology sector.⁶⁹ And, universities appear to have employed this strategy precisely in those areas.⁷⁰ For this reason, universities have also been included among the non-practising entities. Hence, a deep economical and institutional divide runs between firms and universities. Thus conceived, a joint analysis of the volume of patent applications filed by firms and universities can provide an additional insight into the growth of the business method patent phenomenon.

Referring in particular to Figure 6, the plot emphasises the main role of firms in the increase of the volume of patent applications in the category G06Q at the EPO. However, the two curves demonstrate that firms are not the only player, as other types of entities, namely universities or other NPEs, have shown interest in the category G06Q. Significantly, the figure reveals that universities only started to seek patent protection for their business methods in 2006 when a specific category for this type of inventions was finally introduced. Thus, universities have taken a more cautious approach towards patenting business methods compared to firms, which have instead shown a pioneering spirit and have started to file patent applications in the category G06Q already in the 1990's. Moreover, the smaller volume of applications by universities leads to relatively larger fluctuations in the number of applications year by year. This is clearly visible in the sharp drops in the red curve in Figure 6, which are unparalleled in the green curve, the firm's curve.

Universities are not the only entities being surprisingly passionate about business method patents at the EPO. From the analysis of the data set, it clearly emerges that also banks have demonstrated a certain degree of interest in filing patent applications in the category G06Q. The attitude toward patenting of banks started to change a decade ago when

⁶⁹ CV Chien, 'From arms race to marketplace: the complex patent ecosystem and its implications for the patent system' (2010) 62 *Hastings LJ*, 297; T Sichelman, 'The Vonage Trilogy: A Case Study in Patent Bullying' (2014) 90 *Notre Dame L. Rev.* 543

⁷⁰ Rai, Allison, Sampat, (67) 339 (Rai et al. recall "an IBM vice president that "[u]niversities have made life increasingly difficult to do research . . . because of all the contractual issues around intellectual property"); Graham, Mowery (38)7-24

a stream of innovative products based on IT methods were produced in the financial sector.⁷¹ However, this spur of innovation coincided with an increase in litigations; thus, banks turned from trade-secret agreements to patents in order to better protect their relevant inventions.⁷² This change in the bank approach towards patents has been recently examined in research based on the USPTO Patent Register.⁷³ The study suggests that banks' lobbyists in the US have strongly contributed to business method patentability, even persuaded Congress in passing some ad-hoc regulations on this issue.⁷⁴

The role of banks in building patent protection for business methods has not been specifically analysed in Europe. However, as already indicated in Section 2, several analyses have highlighted the growing attention to patent protection in the financial sector also in the European context.⁷⁵ In particular, the data collected for this research indicate a certain degree of interest of banks, as an increasing number of applications is filed in the category G06Q by applicants that have the word 'bank' in their name or that are well known entities operating in the financial market. In the following two figures, Figure 7 and Figure 8, the number of patent applications filed in the category G06Q at the EPO by entities operating in the financial sector have been compared to the number applications submitted by firms in the same category and in the same Register.

⁷¹ Financial Crisis Inquiry Commission of United States, *Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States* (Official Government Edition 2011) 53 ("In 2003 speech, Fed Vice Chairman Roger Ferguson praised "the truly impressive improvement in methods of risk measurement and management and the growing adoption of these technologies by mostly large banks and other financial intermediaries.")

⁷² S Fusco, 'Is the use of patents promoting the creation of new types of securities' (2008) 25 Santa Clara Computer & High Tech. LJ 243; Lerner (24) 906; Belle, Schooner (58) 434

⁷³ Belle, Schooner (58)

⁷⁴ *ibid* 460 ("Although the financial industry took some interest in the earliest patent reform efforts, it became a real priority in 2007. That year, bank lobbyists (particularly the Financial Services Roundtable) stepped up their efforts with Congress, and it paid off.191 In April 2007, parallel patent reform bills were introduced in both houses of Congress.")

⁷⁵ Hall, Grid, Torrasi (24) 45

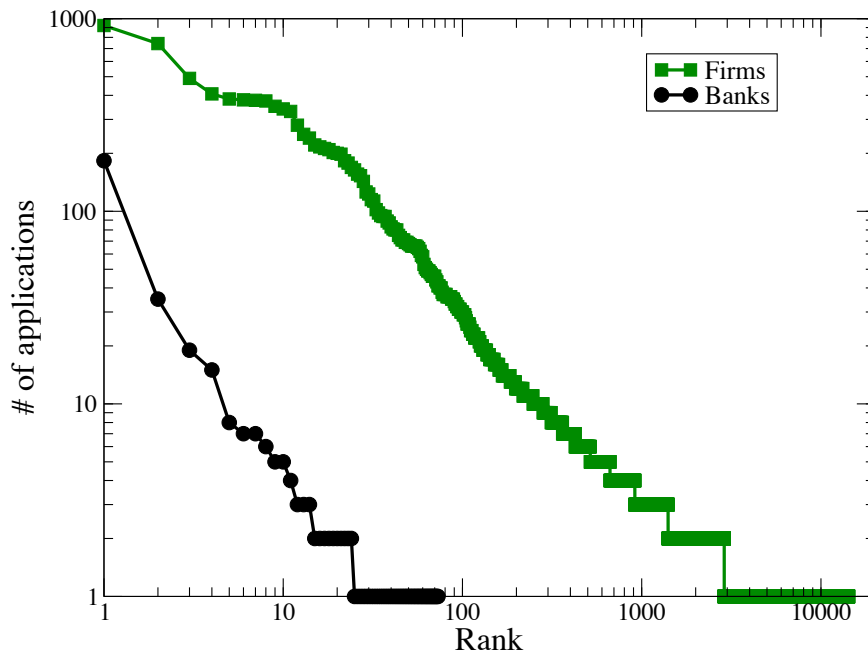


Figure 7. Firms operating in the financial sector (banks) are compared to all firms in terms of number of applications filed in the category G06Q. The two curves show the number of applications for each firm (green) or each bank (black), ranked by number of applications.

In particular, Figure 7 reports the number of applications filed by each firm and each bank. This type of plot is known as a *ranked distribution*, since firms are sorted by their activity, so that the firm corresponding to Rank=1 in the x-axis is the firm with the largest number of applications, the one corresponding to Rank=2 is the second largest in terms of number of applications, and so on. Notice the logarithmic scale adopted in the plot, both for the x-axis and for the y-axis. The almost linear behavior observed in the plots in the double-logarithmic scale indicates that the distribution of the number of applications is a power-law function of the ranking, thus it is an extremely heterogeneous distribution. Mathematically, this means that we can write: *Number of applications* = $A \cdot Rank^{-\gamma}$, with A and γ two positive constants. This is true for all firms in general, but also for banks only, independently from the big difference in the volume of their applications. Notice, that the bank with the largest number of applications has filed only 183 applications, whereas there are more than 20 firms with a number of applications larger than this. Considering also that the firm with the largest number of applica-

tion has 922 applications, banks can be considered a relatively small player in the business method patent arena, compared to firms. Nevertheless, their attention over time to this subject matter after year 2004 seems to be consistent to that of firms, as shown in Figure 8.

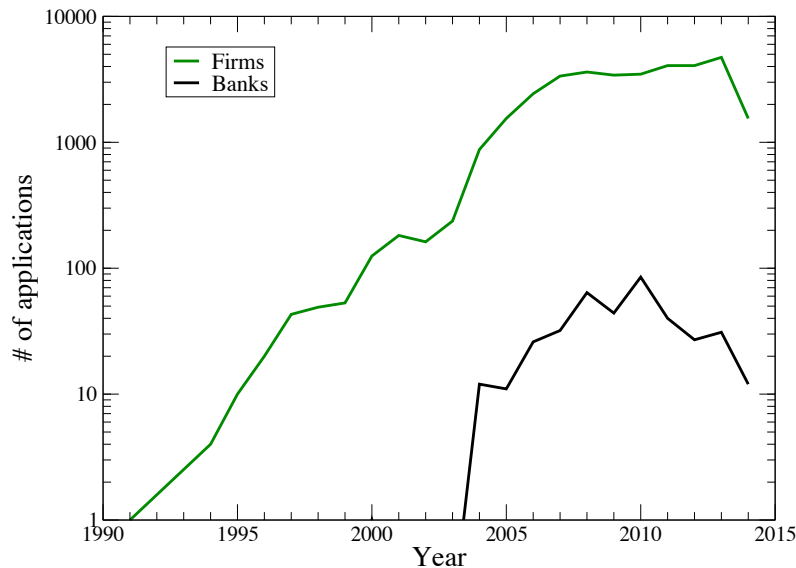


Figure 8. The number of patent applications filed year by year in the category G06Q by banks (black) is compared to the total number of applications filed by firms (green).

This figure shows the curve of the number of yearly applications filed by banks (black), and compares it to the same plot corresponding to firms (green) already reported in Figure 6. As in Figure 6, a logarithmic scale has been adopted on the vertical axis. The two curves show strong similarities but also some differences in their trends. Proportionally, the increase in the number of bank patent applications seems to be more rapid at the beginning of the phenomenon, i.e. in the years 2004-2007, while the plot shows a more marked decrease in the last years than that of firm applications. Thereby, banks demonstrate to be interested in business method patents, though their attention to the subject matter has started only in 2004 and more recently has shown signs of slowing down. In conclusion, banks seem to have played a relevant role, though not the major one, in the success of category G06Q at EPO.

The plot in Figure 8 reveals also a remarkable similarity with the trends in business method patent at the USPTO.⁷⁶ In particular, the number of patents granted in the class 705 at the USPTO has increased significantly after 2004; in the same way, banks started to file patent applications in the category G06Q at EPO in 2004. Additionally, a growing trend has been identified in class 705 after the 2009, as well as we can observe a peak of patent applications in the category G06Q in year 2010 in our plot for banks. Such similarities are not surprising according to the table below.

Number of applications	Name of the applicants
183	Bank of America
35	Barclays
19	JP Morgan Chase Bank
15	Citibank
8	Morgan Stanley
7	Metabank
7	Goldman Sachs
6	The Bank of New York Mellon
5	Royal Bank of Scotland
5	The Bank of New York

Table 1. The top ten banks for total number of patent applications filed in the category G06Q are shown together with the number of their applications.

As highlighted by the list reported in Table 1, most of the banks applying for patent protection of business methods at the EPO are American, with Bank of America being the one with the largest number of applica-

⁷⁶ Belle, Schooner (58) 448 (“Before State Street, the most Class 705 patents granted in a year since 1992 was 249; that number increased to 489 in 1998, 720 in 1999, and 736 in 2000. Between 2001 and 2004, however, there was a marked decline in issued business method patents compared to the previous three years, most likely resulting from the PTO’s heightened examination procedures for these types of inventions. The trend began to reverse in 2005 when the PTO granted 776 business method patents; by 2009, that number had grown to just shy of 2000”)

tions, namely 183. These results indicate that American banks have triggered a wave of support to business method patentability that has produced its effects also in Europe.⁷⁷ However, in terms of volume of the phenomenon, the numbers are quite different. As Table 1 reveals, applications filed by banks at EPO are fewer than those filed by firms; and, as indicate before, they are also less than those filed by American Bank at the USPTO.

All this considered, some conclusions can be drawn about the entity applying for business method patents at the EPO. First of all, it appears that firms are the driving force behind the business method patent phenomenon at the EPO. Patent applications filed by firms are utmost the grater number in the category G06Q. However, the collected data indicates that not only firms, but also other types of applicants are interested in granting patent protection for business method inventions. Not only firms but also universities and banks - both of them usually not involved in patenting⁷⁸ - have focused their attention on this subject matter. Therefore, G06Q interestingly features as a cross cutting category, able to protect a broad spectrum of entities as well as a broad spectrum of interests, presumably.

7. Is there any strategy behind business method patents?

As the collected data at the EPO indicates, business methods are not only a widely patented subject matter, but also a cross cutting category

⁷⁷ *ibid* (58) 471 (“From 1995 to 2007, none of the G-SIFIs [global systemically important banks] appeared on this list. That trend began to shift in 2008 when JP Morgan was issued forty-seven patents; JP Morgan has remained on the list for the past four years with its highest number of patent grants (eighty-four) in 2010. The other G-SIFIs with substantial patenting activity include BOA, Morgan Stanley, and Goldman Sachs. BOA received seventy-three patents in 2011 and 165 patents in 2012, while Morgan Stanley and Goldman Sachs have each only appeared on the list once since 2008.”); Komulainen, Takalo (39) 530

⁷⁸ JF Duffy, JA Squires, ‘Disclosure and Financial Patents: Revealing the Invisible Hand’ (Bank of Finland-CEPR Conference, Helsinki, October 2010)< https://www.suomenpankki.fi/globalassets/en/research/seminars-and-conferences-and-workshops/documents/cepr2008/cepr2008_duffysquires_paper.pdf > accessed on the 20th June 2017; Rai, Allison, Sampat (67) 347

involving different entities. Nevertheless, different attitudes toward patenting business method have developed over time. Indeed, firms on the one hand, and banks and universities on the other hand have acted differently over the years. This can be seen from the plot in Figure 9, which reports, as a function of time, the yearly percentage increase in the number of applications filed by the different actors. Specifically, the three curves shown in Figure 9 report the percentage variation in the number of applications as function of time for firms, banks and universities, respectively.

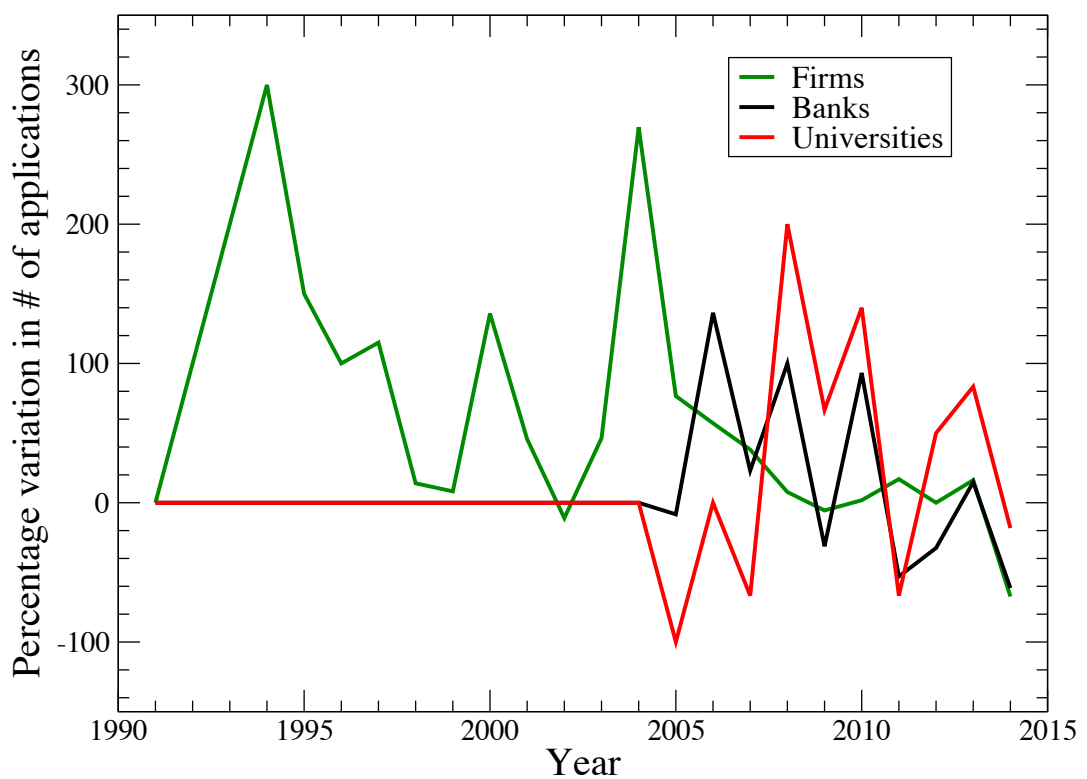


Figure 9. The percentage variation in the number of patent applications filed each year with respect to the number of applications in the previous year is shown as a function of time for firms (green), banks (black) and universities (red).

In the figure above, for each year t , the quantity reported on the vertical axis is obtained by computing the ratio:

$$\text{Variation in \# applications } (t) = \frac{\# \text{ applications } (t) - \# \text{ applications } (t-1)}{\# \text{ applications } (t-1)} = \frac{\# \text{ applications } (t)}{\# \text{ applications } (t-1)} - 1,$$

and expressing it as a percentage. Finding a value of such a ratio equal to 300, as for instance observed for firms at year 1994, means that the variation in the number of patent applications submitted in year 1994 with respect to that submitted in year 1993 is equal to three times the number of patent applications filed in 1993. Or, in other words, the number of patent applications filed in 1994 is four times as large as the number of applications filed in the previous year, 1993.

According to the above criteria, the plots show that from 2004 the percentage variation in the number of new applications filed by firms per year assumed values always smaller than 100, and decreasing with time. The graph also reveals that such variation for firms, after 2004, is lower in percentage than the variation in the number of applications filed in the same time frame by banks and universities. This indicates that firm's interest in business method patents have reached a stationary state in recent years,⁷⁹ whereas, in the same period of time, banks and universities are still stabilizing their attention to this subject matter, as confirmed by the relatively large fluctuations in the percentage variation in the number of filed applications after 2005.

It is noticeable that entities usually not involved in patent protection tend to show an interest in business method patents. Indeed, entities that do not implement themselves inventions, and also entities that usually act in non-technological areas, express interest to grant patents. Such behaviors reveal an anomaly indicating that applicants could seek patent protection for business methods for other reasons than only to be allowed the exclusive use of the invention. This conclusion seems also to be supported from an analysis of the number of

⁷⁹ A possible explanation is offered by Komulainen, Takalo, (39) ("Our findings suggests that that the State Street decision created a period of uncertainty where the boundaries of the European patent system were tested by the U.S. firms with more experienced intellectual property management organizations. But contrary to what has been speculated, we find that the patentability standards for financial innovations have not weakened in Europe in the aftermath of the State Street decision. This shows that law matters, albeit the link from the law on the books to the actual enforcement might be complicated.")

applications finally turning into a granted patent in the category of business methods. The result of this analysis is shown in Figure 10. This figure, in particular, shows a *scatter plot*, which represents correlations between the number of applications in the category G06Q and the number of patents granted in the same category.

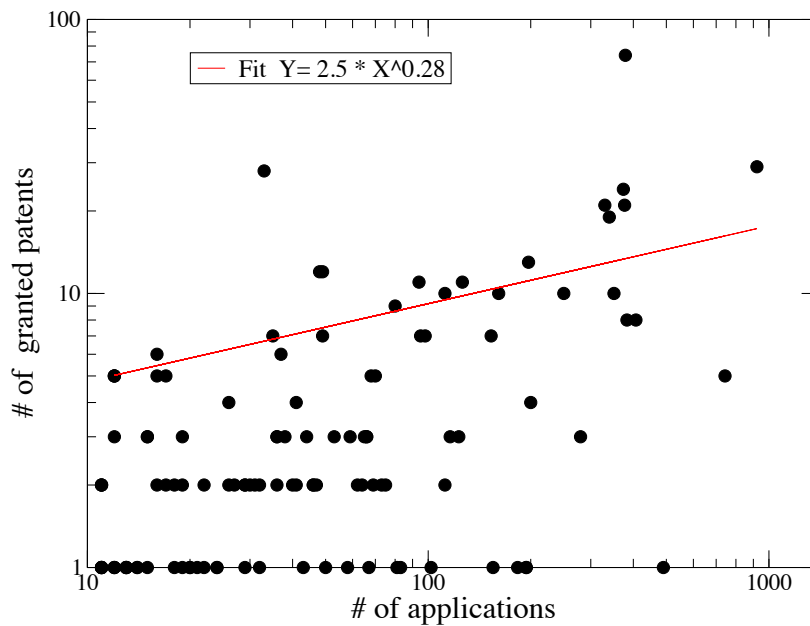


Figure 10. Scatter plot of the number of granted patents vs. the number of patent applications filed in the category G06Q. Reported are only cases of entities (firms, universities, banks) having filed at least 10 patent applications and having been granted at least 1 patent in the considered period 1991-2014.

In point of fact, patent applications submitted at EPO are examined by examination divisions, which verify the fulfillment of the requirements ex Article 52 EPC. The examination period can last up to six years. At the end of the examination, the patent can be granted or refused.⁸⁰ Therefore, not all patent applications are approved; indeed, quite the opposite usually happens. In the above graph the data on the volume of patent applications are combined with those referring to the numbers of granted patents. Specifically, the scatter plot reports the number of

⁸⁰ It is also possible that the applicants decide to withdraw the application. In this case applications will be labeled with an A as it happens when the application is rejected.

granted patents in the category G06Q, shown on the vertical axis, as a function of the number of filed applications, shown on the x-axis. Each point in the scatter plot represents a different entity (firm, or university, or bank). Only active entities, i.e. those having filed at least 10 patent applications in the period covered by our data set, have been considered. And, among them, only entities with at least one granted patent are shown.

The most striking thing revealed by the plot is that only a small percentage of applications result in the issue of a patent. In particular, the plot shows that the productivity is in general always less than 1%.⁸¹ So, in the average, only one application over more than 100 filed by the same applicant fulfills all the requirements of Article 52 EPC, and is finally granted. Figure 10, hence, suggests that applicants in the category G06Q have little interest in having patent protection granted to their business method inventions, whereas great attention is paid to patent applications. Notably, the number of patent applications has increased over the years, while the possibility to obtain patent protection for business method inventions has remained significantly low.⁸²

Hence, Figure 10 corroborates the hypothesis that patent applications are more appealing than patents themselves in the category G06Q. As such, patent applications are submitted, even when it is highly probable that they will be rejected. This might indicate that firms are interested in a short-period patent protection, thus, in a protection lasting only from the submission of the application until its rejection. Alternatively, this might demonstrate that firms want to overpopulate intentionally the category G06Q in order to slow down the work pace of the examination divisions, or with the purpose of creating uncertainties on what

⁸¹ About the USPTO allowance rate in the category G06Q, G Quinn 'Business Methods by the Numbers: A Look Inside PTO Class 705' (*IPWatchdog*, 22 January 2012) <<http://www.ipwatchdog.com/2012/01/22/business-methods-by-the-numbers-a-look-inside-ptoclass-705/id=21892/>> accessed 20th June 2017; Archontopoulos (50) 38

⁸² EPO, 'Granted patents 2007-2016 per field of technology' <<https://www.epo.org/about-us/annual-reports-statistics/statistics.html#granted>> accessed on the 20th June 2017

extent patents cover new business methods. All this supports the idea that some other strategies, different from obtaining patent protection, are what in fact lie behind the increasing number of applications in the business method category.

8. Some conclusions

A more detailed analysis of the data set introduced in this chapter will be performed in Chapter VI, where also the names of relevant firms will be explored more in details. However, the examination conducted in this chapter already offers some material for reflection. Indeed, the category G06Q is a very popular one at the EPO, as about 35,000 patent applications have been registered under this class. Despite the large number of applications, only less than 1,000 business method patents have been granted in the last 20 years in this category. Additionally, the analysis performed in this work has highlighted that patent protection for business methods is sought not only by firms but also by entities that traditionally are not involved in selling or trading of goods. All this confirms once again the need to investigate the underlying reason for such a success of business method patents at the EPO. The possible strategic use, not only of business methods patents but also of patent applications, will be investigated in the next chapter.

Chapter V

A strategic approach behind patenting business methods?

1.Introduction

With the beginning of the digital revolution, there has been an increasing attention towards patents has been observed in both Europe and the US. Surveys¹ have revealed an exponential growth in the number of patent applications, to such an extent that some scholars have stigmatized the phenomenon as a ‘patent flood’² or a ‘patent explosion’.³ Business method patents belong squarely to this phenomenon. According to empirical analysis carried out in Chapter VI, the number of patent applications in category G06Q at the EPO has greatly increased in the last twenty years. From only a few applications over the 1990s, category G06Q is now one of the most popular with more than one thousand applications per year. However, the business method patents ultimately granted at the EPO are not as numerous as might be expected from the large amount of patent applications.

Figure 10 of Chapter IV clearly indicates that only few patent applications in category G06Q are accepted. These data are consistent with the strict approach toward business method patents developed by the EPO over the last decades. As discussed in the first two chapters, the requirement of technicality established in both Article 52 and Article 56 EPC has been applied carefully. As such business method can obtain patent protection in Europe only when capable of causing a change in

¹ Ex multis, J Bessen, MJ Meurer, *Patent failure: How judges, bureaucrats, and lawyers put innovators at risk* (Princeton University Press 2008); H Hall, G von Graevenitz, C Rosazza-Bondibene, ‘A Study of Patent Thickets’ (The Intellectual Property Office, 2013) <<http://www.ipo.gov.uk/ipresearch-thickets.pdf> > accessed 20th June 2017; Harhoff et al., *The strategic use of patents and its implications for enterprise and competition policies - Tender for No ENTR/05/82* (2007) <https://ueaeprints.uea.ac.uk/37550/1/study-202852-2008_en_2475.pdf> accessed on the 20th June 2017

² Text to n.132 Chapter III; M Meurer, ‘Business method patents and patent floods’ (2002) 8 Wash. UJL & Pol’y 309

³ Text to n. 13 Chapter IV; Harhoff et al.(1)65

the physical nature or technical functioning of clearly technical features, or capable of reflecting technical considerations required to carry out the disclosed invention.⁴ Nevertheless, the EPO approach does not seem to have affected the interest of firms, especially the large ones, in filing business method patent applications. As already discussed in Chapter III, such a large number of patent applications in category G06Q has raised the suspicion that some strategy could be behind the growing interest to business method patents.

Chapter III thoroughly examined some of the economic rationales traditionally associated to patent protection have been. Nevertheless, that analysis revealed that neither the standard or conventional motivations could fully explain the reasons behind the phenomenon of business method patents. Neither the implementation of business method inventions, nor their exploitation has been observed to increase as result of business method patent protection. Equally, innovation in this technological area does not seem to have been encouraged by granting patent protection to business methods. Conversely, the increase in the demand for patent protection to business method has been linked to the growing reality of firms in holding large amount of patents.

The aim of this chapter is to analyze the phenomena that are usually associated with firms' attitudes of accumulating patents and patent applications. Among such phenomena are large patent portfolios and patent thickets. These will be examined in Section 1 and in Section 2 respectively. Greater attention will be, however, given to patent thickets. The peculiarity of this phenomenon is not only the huge amount of patent applications, but also the cumulative nature of the inventions and the uncertainty intentionally created around the extent of patent protection ultimately granted. And, indeed, all these features are usually identified in connection to business method patents and patent applica-

⁴ EPO, 'Examination of computer-implemented inventions at the European Patent Office with particular attention to computer-implemented business methods' *Official Journal EPO* (November 2007) 594, 597 <http://archive.epo.org/epo/pubs/oj007/11_07/11_5947.pdf> accessed on the 20th June 2017

tions. For this reason, patent thickets will be the subject of a wider investigation, which will focus not only on features of patent thickets and strategic reasons, but also on their effects and on possible inefficiencies created in the market.

2. Patent Portfolios

2. 1 Patent portfolio: a definition

In general terms, a patent portfolio is defined as a “strategic collection of distinct, but related, individual patents that, when combined, confer an array of important advantages upon the portfolio holder”.⁵ In particular, firms are not interested either in the validity or in the strength of individual patents, or in their technological contents in strategically building a patent portfolio. Quantity instead of quality is the firm’s overriding interest when patents are accumulated to result in a strategic patent portfolio. Indeed, owning several patents can enable firms to take advantage of patents in other ways than by their implementation.⁶ Additionally, the amassing of patents resulting in holding a large portfolio can help firms avoid infringement claims: either by showing their ability in bringing strong infringement counterclaims⁷ or by creating patent overlap, which makes it difficult to assess patent validity.⁸ Also, in addition to defensive purposes, patent portfolios are often built for offensive reasons. As such big patent portfolio can be used to increasing firm leverage and power in the market.⁹

⁵ G Parchomovsky, PR Wagner ‘Patent Portfolios’ (2005). 54 U. PA. L. REV.1, 27

⁶ Ibid. 32

⁷ CV Chien, ‘From Arms Race to Marketplace: The Complex Patent Ecosystem and Its Implications for the Patent System’ (2010) 62 Hastings L.J. 297, 308-10; T Ewing, ‘Indirect Exploitation of Intellectual Property Rights By Corporations and Investors: IP Privateering and Modern Letters of Marque and Reprisal’ (2012) 4 Hastings Sci. &Tech. L.J. 1,15-17

⁸ JR Orr, ‘Patent Aggregation: Models, Harms, and the Limited Role of Antitrust.’ (2013) 28 Berkeley Tech. LJ 525, 526

⁹ BH Hall, RH Ziedonis, ‘The Patent Paradox Revisited : An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979 – 1995’ (2001) 32 RAND Journal of Economics, 101, 108-110

2.2 Patent portfolio as “super patents”

As suggested in Parchomovsky and Wagner’s seminal work, building a big patent portfolio results in owning a sort of “super patent”.¹⁰ The two scholars emphasize that patent accumulation offers their owner benefits larger than the ones provided by the single patent separately.¹¹ Nevertheless, it is thought that the scale of these advantages depends on the particular features of the patent cluster. As such, not only the number of patents but also the relationship between them is considered crucial.¹² For example, the possibility to rely on more than one patent related to the same innovation can be of significant importance.¹³ Indeed, ‘patent redundancy’, i.e. the inclusion in the portfolio of several patents all referring to the same technology, can ultimately discourage competitors from taking legal action or even using the threat of legal action to strengthen their position in the market, due to the increased costs of challenging multiple patents.¹⁴ Furthermore, the reduced value of a technology becomes less likely when more patents cover it and patents are all in the same portfolio.¹⁵ As such, the protection of innovative products or processes is provided simultaneously by different patents; thus, even if some patents are invalidated, the presence of other patents covering that same technology (which are not strictly necessary to exploit the invention, but to be used in case of invalidity of infringement of others) can still allow the exploitation of the innovation by the firm that holds all the related bundle of patents.¹⁶

Moreover, it is more difficult finding unpatented space within a technological field when several patents cover it. As such, start-up entries can be deterred, given the difficulties to detect a piece of technology that is

¹⁰ Parchomovsky, Wagner (5) 7 (“...by combining the “right to exclude” of many closely related patents, a patent portfolio greatly increases the effective scale - the total scope of protection in the marketplace- beyond that of a collection of differentiated patents.”)

¹¹ Ibid. 51-52

¹² Ibid. 32

¹³ MA Lemley, C Shapiro, ‘Probabilistic Patents’ (2005) 19 J. Econ. Persp. 75, 82

¹⁴ Orr(8) 537

¹⁵ Parchomovsky, Wagner (5) 73

¹⁶ Lemley, Shapiro(13), 85-86

not covered by patent protection.¹⁷ Similarly, competitors already in the market can be discouraged to submit patent applications in those technological areas where several patents have already been filed by a rival. In such a case, competitors that want to continue to operate in that market could be forced to reach a licensing agreement that includes all the patents in the portfolio in a bid to avoid lengthy litigation.¹⁸ However, it could be costly, and ultimately firms that do not hold large patent portfolios, i.e. do not have patents to offer in return in cross-licensing agreements, could find it more convenient to leave the market. Diversity inside a patent portfolio can also positively affect the value and the bargaining power of patents.¹⁹ Indeed, diversity presents patent portfolio holders with the possibility of reaching licensing agreements with a wider range of other patent holders. In particular, the opportunity of reaching cross-licensing agreements increases, given the possibility to offer patents in return.²⁰ Thus, holding a large amount of patents is agreed on having the effect of growing a firm's market power.²¹ Moreover, diversity of patent portfolios tends to bolster a firm's position in the market.²² As such, the presence of patents related to different technologies can reduce risks and uncertainty, specifically inherent to innovative industries. Indeed, strong positions in more than one technological market can help in consolidating the firm's grip in new and growing markets.²³

2.3 Patent portfolios and competition

The effect of patent portfolios have been also analysed trying to understand whether the trend to patent accumulations can contribute to the stifling of competition. As suggested in the previous subsection, amassing a large amount of patents tends to strengthen patents holders'

¹⁷ Parchomovsky, Wagner (5) 39-41.

¹⁸ Ibid. 73-74; Orr (8) 538

¹⁹ Ibid. 35

²⁰ Ibid. 65

²¹ Ibid. 34

²² E Dorsey, 'Building Patent Portfolios to Facilitate Cross-Licensing Agreements: Implications for Merger Efficiency Analysis' (2013) 15 Colum. Sci. & Tech. L. Rev.125, 134

²³ Parchomovsky, Wagner (5) 38

economic power. Indeed, patent portfolios can result in providing firms with greater bargaining power. As such, the accumulation of patents can secure an unassailable position in the market to firms that, owning a large amount of patents often related to more than one technology, can increase the amount of collected royalties as well as reduce access to technologies by other competitors.²⁴ Both hold-up, i.e. threatening legal actions to obtain royalties higher than the value of the patent, and tying arrangement i.e. forcing rivals to license also patents that they are not interested in, can be strategically adopted using the strong position in the market.²⁵ Hence, patent portfolios can result in the asymmetrical rising of rival costs since competitors and start-ups can only develop their products by incurring high sunk costs to access the patented technology.²⁶ Therefore, the accumulation of patents has the potential to both deter the entry of new firms in the first place while, at the same time, hastening other rivals to exit the market.²⁷

Notwithstanding, patent portfolios can promote economic growth. Indeed, patent aggregations have been indicated as a means capable of creating efficiencies in the market. As will be fully discussed in Chapter VIII, the aggregation of patents in patent pools, i.e. large portfolios including all the patents related to the same technology and managed by a dedicated entity, can reduce the cost of transactions. Ultimately, firms interested in implementing a technology can be facilitated by patent aggregations, given the opportunity of reaching only one licensing agreement with the patent pool instead of entering into multiple licensing negotiations.²⁸ Furthermore, patent aggregation resulting in patent pools can increase the possibility to access a technology at fair, reasonable and non-discriminatory terms (FRAND).²⁹ Thus, more room can be

²⁴ Chien (7) 322-324

²⁵ Parchomovsky, Wagner (5) 72; Lemley, Shapiro (13) 82. For a definition of hold-up, Federal Trade Commission of the United States, *The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition.* (Federal Trade Commission Report, 2011), 58

²⁶ Orr (8) 550

²⁷ Ibid. 539

²⁸ Parchomovsky, Wagner (5) 73

²⁹ European Commission, 'Communication from The Commission to The European Parliament, The Council, The European Economic and Social Committee. An Industri-

found for reducing product prices when a large patent portfolio is built around a specific technology and handled by a patent pool.³⁰ Moreover, patent accumulation in a big portfolio can result in increasing investment in new technologies. As already mentioned in the previous section, diversification in owned patents can reduce risks and diminish concerns in investing in new fields.³¹ Hence, as it will be more fully explained in Chapter VIII, patent portfolios, i.e. patent accumulation managed by dedicated entities, could facilitate beneficial effects, such as fostering innovation and ultimately increasing consumer welfare.³²

2.4 Strategic uses of patent portfolios

As it will be fully discussed in Chapter IX, the monopolistic prerogative resulting from granting patent protection to inventions can affect competition in the market. Admittedly, the issue of reconciling patent exclusive rights and free access to the market has been focused over the years, and indeed the Court of Justice of the European Union (CJEU) has underlined the difference between the existence of an IP right and its exercise in order to clarify the possible interface between these two pieces of legislation. As such, the Court has pointed out that the existence of “rights granted by a Member State to the holder of a patent are not affected by the prohibitions”³³ established in the Articles 101 and 102 TFEU. However, the “exercise of such rights cannot of itself fall either under [ex] Article 85(1), in the absence of any agreement, decision or concerted practice prohibited by that provision, or under [ex] Article 86, in the absence of any abuse of a dominant position.”³⁴ Thus, the existence of a patent cannot itself confer any market power; however, the

al Property Rights Strategy for Europe’ (COM(2008) 465/3, 2008), 9 (Referring to standard setting, i.e. setting technologies essential to a standard, the Commission indicates that “Rules within standard-setting organisations may specify an ex ante (i.e. before a standard is set) duty to disclose essential patent applications and/or issued patents or a duty to offer commitments to license the essential patents on fair, reasonable and non-discriminatory (FRAND) terms”)

³⁰ Parchomovsky, Wagner (5) 73

³¹ P Giuri et al., *Report of the Expert Group on Patent Aggregation* (European Union, 2015) 5

³² Orr (8), 565

³³ Case 24/67 *Parke, Davis and Co. v Probel, Reese, Beintema- Interpharm and Centrafarm* [1968] ECR 55,72

³⁴ Ibid.

use of a patent can be caught by competition law, according to the Court conclusion.

All this considered, accumulations of several patents in the hands of individual firms or other entities are entirely legal.³⁵ Indeed, building a patent portfolio is considered a lawful activity.³⁶ However, the decision of a firm to accumulate a large amount of patents can be questioned when a large patent portfolio excludes current or future competitors, and generally harms competition.³⁷ In the *Axalto* case,³⁸ for example, the European Commission highlighted the ill effect on competition that could be produced when a merger agreement resulted in combining patent portfolios, ultimately creating a big patent portfolio.³⁹ In particular, the Commission stressed the suspicion that a firms' decision to merge could be mainly based on the opportunity to aggregate a large amount of patents and other IP rights. Indeed, according to the Commission, big patent portfolios could prompt tacit coordination among leading players in the market.⁴⁰ As such, increasing rivals' costs as well as competitors' difficulties in exploiting the technology involved in the merger was indicated as potential outcomes.⁴¹ Therefore, the Commission concluded that large patent portfolios could be strategically used to foreclose the market, thereby weakening competition.⁴² However, in the specific case of the merger agreement between Axalto and Gemplus, the Commission deemed that competition was not weakened. This was due to the Axalto and Gemplus' commitment of disclosing and granting at the same terms

³⁵ EPO, Economic and Scientific Advisory Board, *Patent aggregation and its impact on competition and innovation policy* (EPO, 2015)

³⁶ *Automatic Radio Mfg Co. v. Hazeltine Research* 339 U.S. 827 (1950), 834 ("mere accumulation of patents, no matter how many, is not in and of itself illegal.")

³⁷ Orr (8) 527

³⁸ European Commission, 'Case COMP/M.3998 *Axalto/ Gemplus*, Merger Procedure' (SG-Greffe(2006) D/202682, 19 May 2006)

³⁹ Ibid. para 60

⁴⁰ Ibid. para 65

⁴¹ Ibid. para 66

⁴² Ibid. para 64 ("In summary, the new entity will be in a position to marginalise competitors with its combined IP portfolio. The likelihood that it will actually implement such a strategy and, consequently, harm competition, is very high given the elements presented above.")

to any party that was interested in implementing Over-The-Air (“OTA”) platforms.⁴³

Such conclusions on possible strategic uses of big patent portfolio have been also supported in recent decisions. In approving Google’s acquisition of Motorola Mobility,⁴⁴ the European Commission has focused on the acquisition of patents as a lawful conduct that do not itself raise competition issues.⁴⁵ Similarly, the Commission has highlighted that the size of patent portfolios could not be considered “anti-competitive” in itself, when the effect of merger agreements are assessed ex Article 102 TFEU.⁴⁶ However, importance has been given to the fact that patent transactions could end up in amassing into the same ownership of patents that were deemed essential to the practice of industry standards. Significantly, the Commission has suggested that antitrust concerns needed to be raised towards patent portfolio that could result in imposing anti-competitive licensing rates on downstream competitors, compelling downstream competitors to grant cross-licenses on terms they otherwise would not have agreed to, and/or excluding competitors’ products from the market altogether.⁴⁷ Nevertheless, the Commission has concluded that Google’s acquisition of Motorola ‘would not significantly modify the market situation in respect of operating systems and patents’⁴⁸ because the Google patent portfolios has been perceived as unlikely to harm competition or to prevent or inhibit innovation.⁴⁹ Specifically, the idea of hold-up behaviors, i.e. Google forcing rivals towards costly licensing agreements using the threat of an injunction, has been

⁴³ Ibid. para 84

⁴⁴ European Commission, ‘Case COMP/M.6381 –*Google/Motorola Mobility*, Merger Procedure’ (C(2012) 1068, 13 February 2012)

⁴⁵ Ibid. para 181 (“The Commission finds that Google’s proposed acquisition of Motorola Mobility does not raise serious doubts as to its compatibility with the internal market on the basis of conglomerate effects.”)

⁴⁶ Ibid. para 110

⁴⁷ Ibid. para 109

⁴⁸ European Commission, ‘Mergers: Commission approves acquisition of Motorola Mobility by Google’ (2012) EU Commission Press Release

<<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/12/129>> accessed 20th June 2017

⁴⁹ *Google/Motorola Mobility* (44) 110

dismissed as a possible result of the patent accumulation in that specific case.⁵⁰

Similarly, in the *Microsoft* case,⁵¹ albeit with a different framework, the Commission underlined the risk that patent portfolios could be used to gain a substantial amount of market power.⁵² As already discussed in the previous sections, big patent portfolios could create strong bargaining positions to be used to force rivals into costly licensing agreements,⁵³ especially those aimed at avoiding legal actions. Hence, big patent portfolio has been viewed as a key means of reducing competition.⁵⁴ Nevertheless, with regard to the specific case involving Microsoft and Nokia, the Commission concluded that no competition concerns could be raised related to the analysed merger. In seeking to provide reassurance by its continued monitoring of the situation, the European Commission has stressed the current minimal overlapping in the activity of Microsoft and Nokia and the present inability of Microsoft to effectively restrict competition.⁵⁵ Nevertheless, the Commission's decision in the *Microsoft* case has further emphasised concerns about the strategic use of big patent portfolios. Despite the fact that creating large portfolios can not be considered anti-competitive in itself, it cannot be ignored that mergers or cross licensing can be used to combine patent portfolios resulting in increasing firms' market power, thereby reducing competition and inhibiting innovation.

2.5 Some conclusions

The practice of creating big patent portfolios has become fairly common over the recent decades. Firms, specifically large ones, seem to be in-

⁵⁰ Ibid. para 134-136 (“The Commission considers that Google's incentives to significantly impede effective competition, including by forcing licensees to grant cross-licences under the threat of injunctions, is limited by that letter”).

⁵¹ European Commission, ‘Case COMP/M.7047 - *Microsoft/ Nokia Merger Procedure*’ (C(2013)8873, 4 December 2013)

⁵² Ibid. para 198

⁵³ Ibid. para 201 (“ In their view, this specific transaction structure will allow Nokia to increase its patent royalties and thus raise the costs of mobile device manufacturers other than Microsoft.”)

⁵⁴ Ibid. para 230

⁵⁵ Ibid. para 257

clined to aggregate under their own control large amounts of patents. Especially, it appears a tendency toward holding patents related to different technologies. According to Parchomovsky and Wagner, strategic reasons could be behind the practice of creating big patent portfolios. Indeed, patent accumulation is often more valuable than the simple sum of singular patent values. Additionally, big patent portfolios could be a key means of gaining a substantial amount of market power. Thus, concerns have been expressed also by the European Commission on the possible use of patent portfolios in foreclosing the market.

As will be further analysed in the following sections, quantity is a common feature also of another phenomenon related to patent accumulation: the patent thicket phenomenon. Big patent portfolios and patent thickets also share the same concerns on the possible detrimental effects on competition as both could be strategically used to deter rivals from entering the market as well as investing in the same technological area. Nevertheless, some differences could be highlighted between big patent portfolios and patent thickets. For example, one of the main aspects of the patent portfolio is the concentration of numerous patents under the same ownership, whereas patent thickets can also result from dispersed ownership. Moreover, patent portfolios are always intentional; by contrast, patent thickets – specifically those of a small scale- can result accidentally. Finally, patent thickets occur in cumulative innovation areas, whereas big patent portfolio strategy do not necessarily implies the accumulation of cumulative patents. This feature will be expanded below.

3. Patent thicket

3.1 Patent thicket: a definition

The patent thicket phenomenon was analysed by Carl Shapiro in 2001.⁵⁶ According to his seminal work, patent thickets tend to occur when more than one patent, often several, cover the same technology.

⁵⁶ C Shapiro, 'Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting' (2001) 1 *Innovation Policy and the Economy* 119

As such, a patent thicket is described as a “dense web” of patents that firms need to license in order to commercialize a certain technology.⁵⁷ In particular, Shapiro highlights that patent thickets are a main issue when innovations are cumulative, i.e. when inventions are built on previous ones and singular products are based on a group of patents.⁵⁸ Accordingly to the innate nature of this type of innovation, a technology usually relates on several patents in cumulative invention area. Nevertheless, this often translates in a great uncertainty about the extent of each patent, i.e. about the extent of patent protection granted to each piece of invention to be implemented in the final product.⁵⁹ Indeed, patents can easily overlap. Additionally, uncertainty can be intentionally worsens when both the use of unclear languages and the creation of complex patterns of citations is put in place. All this can makes difficult for competitors to identify possible infringements. When a patent thicket occurs, therefore, firms are ultimately forced to license numerous patents (even patents that they are not going to implement) in order to avoid the risk of infringements.⁶⁰ As shown by the “sewing machine wars”, which is one of the first examples of incremental innovation strategically used, the lack of certainty is the most concerning effects of patent thickets.⁶¹ The “war” happened more than a century ago. At the time the needle patented by Howe was the key element around which other firms, such as Singer or Wheeler, implemented new type of sewing machines. However, too broad patent protection was granted to the Howe’s needle; thus, not only the needle but also the process of using the needle was covered. This involved a certain degree of uncertainty

⁵⁷ Ibid. 120

⁵⁸ Ibid. 119; J Bessen, E Maskin ‘Sequential innovation, patents, and imitation’ (2009) 40 The RAND Journal of Economics 611,612 (Referring to software industries, Bessen and Maskin provide a definition of sequential and complementary innovations as sub-categories of cumulative innovations “This is, we argue, because these are industries in which innovation is both *sequential* and *complementary*. By “sequential,” we mean that each successive invention builds on the preceding one, in the way that the Lotus 1-2-3 spread sheet built on VisiCalc, and Microsoft’s Excel built on Lotus. And by “complementary,” we mean that each potential innovator takes a different research line and thereby enhances the overall probability that a particular goal is reached within a given time.”)

⁵⁹ Ibid. 120

⁶⁰ Ibid. 121

⁶¹ P Moser, ‘Patents and Innovation: Evidence from Economic History’ (2013) 27 Journal of Economic Perspectives 23, 27

about the extent of Howe patent and the contents of other patents covering sewing machines. As a result, Howe was able to sue his competitors for infringement, ultimately receiving millions in licensing fees.

According to Shapiro's definition of patent thickets, two elements can be particularly useful in detecting patent thickets. The large number of patent applications filed referring to the same technology is one of the indications of the existence of a patent thicket. Also, the creation of a complex pattern of citation among patents could be an indication revealing that patents and patent applications are strategically filed to create some degree of uncertainty, thereby posing such a threat to be sued for infringements that firms are deterred from implementing new inventions. Therefore, according to Shapiro, firms could be discouraged from creating new products or services when a patent thicket is created around a technology, due to the uncertainty on what is patented and what is not, ultimately involving a high risk of litigation.⁶²

Similarly, the threat of patent infringement drives the European Commission to focus on patent thicket issue in the *Axalto* case⁶³. As already said in section 1.4, the danger of creating large patent portfolios was stressed in the decision. Scrutinizing the merger between two of the main firms in the market of the secure plastic card, in particular, the Commission pointed out the possibility that patents could be used strategically to create asymmetric bargaining positions.⁶⁴ However, the European Commission also expressed concerns about the difficulties of competitors to detect possible involvement in patent infringement because of the "fog" generated by the large number of patents covering the same technology.⁶⁵ Further, the decision highlighted that the merger would have combined under the same ownership most of the patents

⁶² Ibid. 24

⁶³ Case *Axalto / Gemplus* (38)

⁶⁴ Ibid. para n.58

⁶⁵ Ibid. ("These concerns are not related to specific patents but rather to a 'thicket' or 'fog' of patents filed by the parties that makes it hard to know whether and what patents of the parties are infringed.")

related to the same technology.⁶⁶ Thus conceived, the Commission underlined the risk that both the uncertainty and the bargaining position could have used by the new entity to 'let these competitors know about the alleged patent infringement(s) and urge them to agree on licensing the patent families that would spare them a legal challenge'.⁶⁷

A different perspective, however, has been provided more recently in a study published by the European Commission – Directorate General for Competition. In this work, according to Régibeau and Rockett, patent dispersed ownership is pivotal in identifying patent thickets, so that both the amount and the scattered ownership of patents are key points in defining the phenomenon.⁶⁸ According to the study, the product price level tends to increase when several patents are needed for manufacturing a final product. However, they contend that such increasing is magnified when more than one firm owns those patents. Dispersed ownership tends to cause more uncertainty about the extent of patent protection granted to each piece of inventions. Thus, even a firm, which holds all the patents it needs to produce the new product, will consider it more safer to access rivals' patents implementing the technology.⁶⁹ Indeed, this will significantly reduce the risk of being involved in infringement lawsuits. However, licensing agreements imply that licensing fees will be paid. Thus, costs inevitably increase and firms can eventu-

⁶⁶ Text to n. 40

⁶⁷ Case Axalto / Gemplus (38) para 59

⁶⁸ P Régibeau, K Rockett, *Assessment of potential anticompetitive conduct in the field of intellectual property rights and assessment of the interplay between competition policy and IPR protection* (European Commission, Competition Report COMP/2010/16, 2011)

<http://ec.europa.eu/competition/consultations/2012_technology_transfer/study_ipr_en.pdf> accessed the 20th June 2017, 13 ("patent thickets arise when the IP rights necessary to market a product and do so without significant risk of infringement are held by a large number of different parties.")

⁶⁹ Ibid. 13 ("It is also important to understand the nature of "overlap" of patent rights that helps define a thicket. Such "overlap" has two main sources. Firstly, different patent rights might cover different aspects of the technology required to produce a new product. In other words, several patents might be technologically essential for the commercialisation of a given product. The second source of overlap comes from the nature of patent rights. These rights can be mutually blocking and are moreover uncertain. In practice this means that a firm with a valid patent covering a given aspect X of a new product might still fear that it might infringe another firm's patent that relates to the same aspect or at least to a similar underlying innovation. In such a situation, access to the other firm's patent is not technologically necessary but it is required if the firm wants to proceed under conditions of legal certainty.")

ally stop improving new products. Therefore, the economic inefficiencies of patent thickets are highlighted, namely growing costs and reducing investment in innovation are shown as major concerns regarding extensive patenting in dispersed ownership contexts.⁷⁰

In its attempt to define the patent thicket phenomenon, the EPO has, also, focused on the increase of transactional costs resulting from this strategic use of patents. In particular, in a recent study, the EPO's Economic and Scientific Advisory Board has highlighted how a "large dense bush" of patents can affect the firm's attitude towards cross – licensing.⁷¹ Indeed, firms are urged to reach several patent licensing agreements to avoid the uncertainty create by the existence of a numerous patent applications referring to the same cumulative invention.⁷² As such, the EPO's report has point out that small entrepreneurs could face more difficulties in making such type of arrangement and ultimately in passing through the "dense bush".⁷³ In the same way, the antitrust issue has been highlighted in a recent report commissioned by the UK Patent Office.⁷⁴ The study focuses on the intentionality of patent thickets, given much attention to the strategic reason that can be concealed behind the choice of filing several patent applications.⁷⁵ According to Hall *et al*, the significant increase in the number of patent applications filed in some technological area, such as pharmaceutical or IT, is due to a certain tendency to overlap patent applications, i.e. to seek patent protection for a piece of innovation filing several patent applications. Thus, the amount of patents or patent applications is not the principal feature in defining patent thickets; instead, intentional overlapping between patents is shown in this study as the most significant aspect of the

⁷⁰ Ibid. 16

⁷¹ EPO Economic and Scientific Advisory Board, *Workshop on Patent Thickets* (EPO 2013)<
[http://documents.epo.org/projects/babylon/eponot.nsf/0/B58781F239B083CEC1257B190038E433/\\$FILE/workshop_patent_thickets_en.pdf](http://documents.epo.org/projects/babylon/eponot.nsf/0/B58781F239B083CEC1257B190038E433/$FILE/workshop_patent_thickets_en.pdf) > accessed on the 20th June 2017

⁷² Ibid. 7

⁷³ Ibid. 17

⁷⁴ Hall, Graevenitz, Rosazza-Bondibene (1)

⁷⁵ Ibid. 13

phenomenon.⁷⁶ The analysis conducted in the report specifically stresses the significance of the uncertainty that is deliberately created by overlapping patents and the possible effects in pushing firms to license and cross-license in order to tackle the problem. Due to this rise in the number of licensing agreements, however, sunk costs increase to the extent that new entrepreneurs are discouraged from entering the market.⁷⁷ Hence, Hall *et al* conclude that competition concerns can be raised, whereby firms already in the market decide to file several patent applications with the clear intention of leading to legal uncertainty among rivals and new comers.⁷⁸ Indeed, it cannot be rejected that patent thickets, i.e. behaviours engaged to put in place patent thickets, could result in antitrust violations as will be further discussed in the following chapters, namely Chapters VII and IX.

Notwithstanding the above, patent overlapping is not always the result of a strategic patenting. As a recent survey has revealed the increasing number of patents can be traced to the nature of the innovation than to a strategic purpose.⁷⁹ In particular, the survey has pointed out that, at least at the starting of the “patent flood” phenomenon,⁸⁰ the rise in the amount of applications, and patent overlapping was due to the innate nature of digital technologies, mainly based on cumulative and sequential innovation paths. In particular, as already analysed in Chapter III, cumulative technologies depend on several inventions. Additionally, cumulative innovations can be sequential i.e. new inventions are directly induced from already patented inventions. It seems to be case of the computer implemented inventions. As such, overlapping could be the

⁷⁶ Ibid. 9

⁷⁷ Ibid. 29-35

⁷⁸ Ibid. 60 (“As we find thickets to affect entry negatively, there is a strong indication that thickets represent some kind of barrier to entry in those technology areas in which they are present”)

⁷⁹ I Hargreaves, *Digital opportunity: a review of intellectual property and growth: an independent report* (2011) <<http://bipp.com/Portals/0/public/docs/Hargreaves%20Report.pdf>> accessed on the 20th June 2017, 57 (“The increase in numbers of patents and patent applications is at least in part a consequence of the way that the innovation process has changed.”)

⁸⁰ Text to n.132 Chapter III

effect of the innate nature of this type of inventions.⁸¹ All this considered, it should be take into consideration the possibility that patent thickets are not (necessarily) created deliberately. They could arise because numerous economic actors are working in the same field and patent innovation can be simultaneously promoted. Therefore, filing numerous applications, which ultimately results in patent claim overlapping, is commonly allowed. Thus, antitrust issues cannot be always associated with that practice as it simply can be the unintended consequence of certain types of innovations. However, the next chapters will thoroughly examine the issue of voluntary basis in patent thicketing. Indeed, the possibility that business method patents would be used strategically to reduce or eliminate competition in the market is one of the main concerns in recognizing patent protection to those type of inventions. Hence, much attention will be given to understand the significance of patent ticket strategy in the business method technological area.

3.2 Main features of patent thickets

The previous review on the definition of patent thickets has pointed out some differences in identifying the phenomenon depending on which point of view it is analysed, whether it may be legal or economic or anti-trust one. Nevertheless, some elements seem to be common to each of the highlighted definition of patent thickets. In particular, the definitions offered in the previous subsection provided a shared framework that identifies the patent thicket phenomenon according to some peculiarities. Indeed, the presence of a large amount of patents and patent applications is stressed in each of the given definitions. Also, dispersed ownership is a common feature in identifying patent thickets.⁸² Moreover, “overlapping”, i.e. the fact that more than one patent application could covers the same piece of invention, is pointed out as a significant element. However, it is worth to establishing the specificities of this

⁸¹Hargreaves (79) 58 (“in a strongly sequential environment it is often unclear where the boundaries of protection afforded by one patent lie in comparison with another. This compounds the thickets problem discussed above.”)

⁸² Régibeau, Rockett (68) 13

common framework to identify the technological areas that can facilitate the incidences of patent thickets. Indeed, as indicated by the EPO, patent thickets tend to arise where patents are linked to “same, similar, or complementary technologies”.⁸³

High volume of patents

According to a seminal work in the field,⁸⁴ technology areas can be divided into “complex” and “discrete” considering the number of patentable elements needed to commercialise a new product or process.⁸⁵ Notably, complex are those technologies where new inventions, i.e. new products, tend to be built on previous works. Thus, in complex technologies products result from assembling complementary components, whereas discrete technologies emit a strong link between product and patent so that a product often result from the implementation of only one patent. Hence, complex industries tend to patent more than discrete industries, thus patent categories involved in manufacturing complex products result in being the more successful according to the significant number of patent applications filed every year.⁸⁶ Semiconductors and digital products are indicated as classic examples of the complex technology outcome and, in fact, in these areas patenting is often an extensive activity as well as the strategic use of patents is highlighted as a common practice.⁸⁷

Dispersed patent ownership

Empirical research in the field of semiconductors has identified some key features of complex technologies that are thought to facilitate pa-

⁸³ EPO, Economic and Scientific Advisory Board (71) 8

⁸⁴ W Cohen, J Walsh, R Nelson ‘Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)’ (2000) NBER working paper w7552 <<http://www.nber.org/papers/w7552>> accessed on the 20th June 2015

⁸⁵ Ibid. 19 (“For our purpose, the key difference between a complex and a discrete technology is whether a new, commercializable product or process is comprised of numerous separately patentable elements versus relatively few”).

⁸⁶ Ibid. 11-13

⁸⁷ Cohen et al (25-27); Hall, Graevenitz, Rosazza-Bondibene (1) 32

tent thickets.⁸⁸ In particular, scholars have highlighted that in semiconductor industries the ratio of the number of patents to the number of final products pointing towards the fact that several patents are often required to produce a single product.⁸⁹ Moreover, this research has shown that the patent complementarity, i.e. several patents implemented into one product, is associated with the “reality” that the same technology is often developed by different firms at the same time.⁹⁰ Thus conceived, the significance of dispersed ownership has been stressed in facilitating the creation of patent thickets in complex technologies. Indeed, it is thought there is a relationship between the number of patent holders, i.e. the existence of a widely dispersed ownership, and the firm’s urge to adopt strategic behaviours.⁹¹

Patent overlapping

The recent plethora of patents and patent applications related to complex technologies is often associated with a reduction in patent quality.⁹² Notably, the broadness in patent claims is one of the most common concerns behind certain antipathy shown toward patenting software and other computer – implemented inventions. Indeed, firms tend to take advantage of the newness of some inventions as well as of the lack of “prior art”, to file claims that are deliberately vague. Hence, patent claims related to digital products are likely to show uncertainty in their contents; thus, overlapping can easily result as an offshoot of patent “vagueness in the boundaries”.⁹³ Indeed, it is a fairly frequent occurrence that two or more patents cover the same subject matter when claims are written using generic expressions and refer to abstract

⁸⁸ Hall, Ziedonis (9); RH Ziedonis, ‘Don’t Fence Me In: Fragmented Markets for Technology and the Patent Acquisition Strategies of Firms’ (2004) 50 *Management Science*, 804

⁸⁹ Ziedonis (88) 805

⁹⁰ *Ibid.* 806

⁹¹ Ziedonis (88) 814

⁹² ex multis, G Scellato et al., ‘*Study on the quality of the patent system in Europe*’ (Official Journal of the European Union, 2011); Bessen, Meurer(1); Hall, Graevenitz, Rosazza-Bondibene (1)

⁹³ MA Lemley, ‘Software Patents and the Return of Functional Claiming’ (2013) *Wis. L. Rev.* 905, 940

concepts.⁹⁴ Therefore, overlapping due to ‘fuzzy and unpredictable boundaries’ can strategically create barriers that do not just metaphorically but also concretely hide the core of the innovative technology.⁹⁵ As such, other competitors in the same market are impeded to implement similar technologies without avoiding the possibility to be sued for infringement.⁹⁶ Nevertheless, as already highlighted in the previous sections, overlapping can also result accidentally as a standard outcome of developing some IT technologies. Notably, software as well as business methods inventions consist of claims showing the results of the implementation rather than the method to achieve the results.⁹⁷ Given this, doubts have been cast about the necessity of including each case of patent overlapping under antitrust assessments since, for thickets to emerge, it is thought to be necessary that a large amount of ‘patents with ill-defined boundaries are granted’.⁹⁸

All this considered, patent thickets are likely to be created in several technological fields. In particular, semiconductor is unusually indicated as an area where patent thickets are common. In particular, digital innovations are considered to contain all those features that could facilitate the development of patent thicket behaviours. Indeed, a certain tendency to file several patents related to the same technology as well the use of vague and overly-broad language have been highlighted with regard to software and other computer implemented inventions, such as business methods. Nevertheless, other avenues should be explored that might account for the rise in the number of patent thickets. This, in the context of business method patents, it will be examined in later sections.

3.3 Measuring patent thickets and strategic patenting

⁹⁴ Bessen, Meurer (1) 19

⁹⁵ Ibid. 54-58

⁹⁶ Ibid. 55

⁹⁷ K Osenga, ‘Still Aiming at the Wrong Target’ in in M Abramowicz, JE Daily, FS Kieff (eds) *Perspectives on Patentable Subject Matter* (CUP 2014), 35

⁹⁸ Hall, Graevenitz, Rosazza-Bondibene (1) 25

As pointed out in the previous subsections, the typical characteristics of patent thickets are large volumes of patents, dispersed ownership and overlapping. Nevertheless, the significance of the phenomenon is attached to the size, or more accurately the pattern of the links among patents and ultimately among patent holders. As already explained, a patent thicket consists in a group of patents, usually a considerable number of patents, having potential overlaps with multiple other patents, or potentially requiring the use of multiple other patents. As such, the existence of patent thickets is not an issue in itself. Nevertheless, patent overlapping as well as blocking effects, i.e. the need to licence other patents to implement the innovation, could be resolved only by reaching several licensing agreements. Thus, patent thickets can result in inefficiencies in the market due to the increase in transactional costs. Therefore, methodologies that could measure the degree of overlapping or the interaction of patents with regard to final products could play a major role in analysing not only a patent thicket in itself but also the extent of its detrimental effects on the market. Additionally, patent thicketing measurement could help in revealing some strategic reasons behind the choice of building a patent thicket. Over the years, correlation between thickness, strategic patenting and decrease in competition has sought to be quantified.

In 2004, Ziedonis put forward the “fragmentation index” as a method to identify intentionality, i.e. strategic reasons, in firms’ propensity for patenting.⁹⁹ In particular, the hypothesis advanced was that firms were more willing to file patent applications when patents related to the same technology were widely dispersed among different entities. According to the study, the presence of a fragmented patent ownership reinforced the firms’ perception of infringement risks.¹⁰⁰ As such, firms sought patent protection extensively in these contexts. Indeed, holding several patents was deemed useful to avoid hold-up effects or high transactional

⁹⁹ Ziedonis(88) 810

¹⁰⁰ Ibid. 806

costs.¹⁰¹ Hence, patent thickets were likely to be built for strategic reasons when ownership was fragmented. All this considered, a method was developed to measure the degree of distribution of patent ownership among entities in the same technological market. The method was based on the backward citations, i.e. citations to previous patents and patent applications; especially, backward citations among patents and patent applications were counted.¹⁰² Given this, the study used the number of back citations to establish the degree of distribution of patent ownership with regard to specific inventions. As such, the pattern of the citations was used to identify the number of different entities that hold patent related to the same technology, thereby revealing its index of fragmentation.¹⁰³ According to the theoretical considerations discussed above, the study suggested that this index of fragmentation was able to indicate whether some strategies were concealed behind the tendency of firms to file numerous patent applications.¹⁰⁴ In point of fact, the study tested the methodology referring to previous finding presented in relation to semiconductor industries, ultimately proving that the high index of fragmentation revealed in this area matched with a certain propensity to patent thicketing already demonstrated by the previous study.¹⁰⁵ According to its critics, the index considered only citations from an ownership prospective; specifically the number of patent holders was quantified, although overlapping between patents, i.e. the number of patents related to the same inventions, was not taken into account.¹⁰⁶

¹⁰¹ Ibid. 806-807

¹⁰² Ibid. 809

¹⁰³ Ibid. 810 (“Assume that two firms, Firm A and Firm B, each receive 10 patents from the U.S. Patent and Trademarks Office in 1990 and that each firm’s 10 patents collectively cite 100 other U.S. patents. Assume further that all of the 100 patents cited by Firm A are assigned to a single entity (for example, IBM). In this case, Firm A’s fragmentation index for 1990 would equal zero (all cited patents are held by one entity and the index is at its minimum value). In contrast, assume Firm B cites patents that are assigned to 100 different entities (e.g., 1 to IBM, 1 to Texas Instruments, 1 to an independent inventor, etc.). Here, the legal rights to potentially exclude Firm B are widely dispersed across entities, as reflected in a fragmentation index that approaches one—the maximum value”)

¹⁰⁴ Ibid. 817

¹⁰⁵ Ibid. 817

¹⁰⁶ Hall, Graevenitz, Rosazza-Bondibene (1)

A first attempt to take account of patent overlapping was concluded done by Siebert and Von Graevenitz.¹⁰⁷ Their study introduced the “blocking strength” measurement.¹⁰⁸ In particular the two scholars underlined that more than one patent was usually needed to implement “complex” products, whereby patents can easily overlap.¹⁰⁹ As such, theoretically, each patent could fully ward off any exploitation from the others. In this light, a method was developed to quantify the extent of the interaction among patent in complex technologies. Especially, blocking patents, i.e. patents that a firm must license to implement a certain technology, were considered.¹¹⁰ Hence, blocking effects among patents were emphasised, thereby evaluating the strength of complementarity between new and existing patents.¹¹¹ Indeed, the extent to which a new patent is blocked from a previous one was used predict the propensity of a firm reaching *ex post* licensing agreements to deal with the patent thicket issue.¹¹²

In a subsequent work, von Graevenitz *et al* have opted, instead, for an approach based on the network analysis¹¹³ to provide a measurement of patent overlapping in patent thickets.¹¹⁴ According to the study, patent thickets can be imagined as networks of firms. As such, patent thickets are drawn as webs where firms are the nodes and the thickness of threads represents the degree of overlap between two firms’ patent portfolios.¹¹⁵ According to the model developed in this study, the overlap among patents can be measured using the number of citations. In particular, the so-called “critical citations”, i.e. citations relating to firms’ patent applications that contain a prior art that limits one or more

¹⁰⁷ R Siebert, G von Graevenitz, ‘Jostling for Advantage: Licensing and Entry into Patent Portfolio Races’ (2010) 73 *Journal of Economic Behavior & Organization* 225

¹⁰⁸ *Ibid.* 225 (“The extent of complementarity between a new technology and existing technologies determines the blocking strength of patent stocks.”)

¹⁰⁹ *Ibid.*

¹¹⁰ *Ibid.* 226

¹¹¹ *Ibid.* 227

¹¹² *Ibid.* 240

¹¹³ D Watts, *Six degrees: The science of a connected age* (WW Norton & Company, 2004); MO Jackson, *Social and economic networks* (Princeton University Press, 2010)

¹¹⁴ G Von Graevenitz, S Wagner, D Harhoff, ‘How to measure patent thickets—A novel approach’ (2011) 111 *Economics Letters* 6.

¹¹⁵ *Ibid.* 7

claims in the citing patent application, are taken into account. In particular, Von Graevenitz *et al.* demonstrate that overlapping is likely to take place when several critical citations are found, showing communality in prior arts between patents implementing similar technologies.¹¹⁶

Furthermore, the study adapts the overlapping measurement to analyse the blocking effect resulting from patent thickets and its consequence on competition. On this note, the scholars detected the number of triples for each technological area triples¹¹⁷. Referring to the network analysis methodology, the triples have been identified in groups of three firms that own patents that cite critical patents of the other two so that each firm can easily block the others from implementing their inventions.¹¹⁸ As such, according von Graevenitz *et al.*, the presence of triples can provide an indication about a certain degree of difficulty in solving the blocking effect resulting from patent overlapping. Indeed, when two firms refer to each other's patents, both can be equally interested in cross licensing their inventions. Therefore, firms can easily deal with blocking effects, i.e. reaching cross-licensing agreements. Instead, the propensity towards cross licensing decreases when three firms or more refer to each other's previous patents or patent applications. According to the scholars, licensing could be more costly when three or more firms are involved.¹¹⁹ Indeed, the blocking effect could be eliminated only when all of the firms decide reciprocally to license their

¹¹⁶ Ibid. 7 ("Our measure of patent thicket density exploits the classification of references in the search reports issued by the EPO. Search reports describe the state of prior art regarded as relevant for the patentability of an invention application and contain a list of references to prior patents and/or non-patent sources. Often, existing prior art limits the patentability of an invention and the references pointing to such critical documents are then classified as X or Y references"); Hall, Graevenitz, Rosazza-Bondibene (1) 39

¹¹⁷ A triple is a fully transitive triad. A triad is a set of three actors (in this case firms). A fully transitive triad is a triad such that each actor has a directed link to the other two. Therefore triple is a set of three nodes and all the six possible relations among them. Triads were first identified by Holland and Leinhardt (Holland and Leinhardt, 1976), as local structures that characterize the global characteristics of a network.]

¹¹⁸ Ibid. 7 ("We propose a measure that identifies constellations in which three firms each own patents that block patent applications of the other two firms. If three firms block each other in this way, we call this a triple").

¹¹⁹ Ibid. 7

patents, thereby reaching at least three different agreements. Additionally, von Graevenitz *et al.* suggest that inefficiencies could persist even when blocking effects are obviated reaching several cross-licensing agreements. In point of fact, it is highly probable that the three or more firms involved have differences in bargaining powers. As such, unbalanced agreements are likely to be reached, i.e. one firm bear most transactional costs compared to the others, thereby harming competition.¹²⁰ The network analysis approach proposed by Von Gravenitz *et al.*, therefore, not only proposes a method to measure overlapping, but also provides an opportunity to link this measurement to the possible strategic use of patents, according to their blocking effect on other firms' efforts in implementing similar technologies.¹²¹

3.4 Factors contributing to the growth of patent thickets

As already discussed, the growth of firm interest in building patent thickets has been often linked to a certain propensity in filing patent applications. Over the last 20 years, an increase in number of patent applications have been consistently observed in software as well as in business methods and in other products related to the Digital revolution.¹²² Initially, speculation on the cause of such a phenomenon has been based on analyses conducted on semiconductor patents.¹²³ More recently, surveys have been carried out in other areas where innovation is cumulative.¹²⁴ According these studies, several reasons might explain the rise in patents, and consequently the rise in patent thickets. As will

¹²⁰ Hall, Graevenitz, Rosazza-Bondibene (1) 39 (“While two firms holding mutually limiting or blocking patents may resolve the threat of hold-up by contract, this is no longer as simple for firms in a triple. Here the relative value of any two firms’ patents depends on the actions of a third firm, making bargaining more difficult. Where multiple triples arise within the same network of firms it is highly likely that these will overlap creating ever more complex bargaining problems that require recourse to patent pools or standards for their resolution.”)

¹²¹ Régibeau, Rockett (68)

¹²² Text on n.1

¹²³ Hall, Ziedonis (9)

¹²⁴ Ex multis, BH Hall, D Harhoff, ‘Recent Research on the Economics of Patents’ (2012) National Bureau of Economic Research Working paper n. 17773 < <http://www.nber.org/papers/w17773> > accessed on the 20th June 2017; SJH Graham et al., ‘High Technology Entrepreneurs and the Patent System: Results of the 2008 Berkeley Patent Survey’ (2010) 24 Berkeley Tech. LJ1255; Hall, Graevenitz, Rosazza-Bondibene (1)

be examined below, some hypotheses have been designed to account for the development of the phenomenon referring to digital technological areas.

As highlighted in Chapter III, enhanced computer technology has changed the very nature of innovation. On the one hand, the cumulative nature of inventions is often indicated as the main features of digital inventions. Thus, IT inventions are often the sum of singular innovative components, whereas only one innovation is usually incorporated in the other areas' invention. On the other hand, digital inventions tend to have an abstract formulation because of the inherent limitation in manufacturing tangible products in the IT industry. As is often the case in business method inventions, the innovation is not in the device per se, i.e. the tangible element, but in the way in which the device performs according to the brand-new process. However, the increase in number of applications related to digital technology is the feature that emerges strongly from any analysis in this field. Even the investigation conducted in Chapter IV has demonstrated a growing interest in patenting business method at the EPO over the last decades. Nevertheless, not the quantity in itself but both the aspects of cumulative innovation and abstractness have been put up as the leading factor in creating uncertainty and ultimately in facilitating the developing of patent thickets.¹²⁵

Further, the presence of Non-Practicing Entities (NPEs) has been given as an explanation for the rise of patent thicket phenomenon.¹²⁶ In point of fact, these entities are not interested in implementing inventions. From their point of view, patents are “bargaining chips” to be used in negotiations, specifically in settlements engaged to resolve infringement disputes.¹²⁷ In this way patents are typically filed or acquired by NPEs to obtain substantial sums of money by aggressively asserting them against the firms developing the technology covered in the patent.¹²⁸ Therefore, NPEs are not interested in developing new products or in en-

¹²⁵ Hall, Graevenitz, Rosazza-Bondibene (1) 17

¹²⁶ Ibid. 17. See Section 4.4 in Chapter IV for a definition of NPEs

¹²⁷ Ibid. 10

¹²⁸ Bessen, Meurer (1) 159

tering into the market of manufactures. Conversely, a tendency to strategic and disingenuous practices has been pointed out.¹²⁹ Hence, the development of patent thickets is considered to be highly probable when NPEs are numerous in a technological market.¹³⁰

Additionally, patent enforcements, or better the increased threat of injunctions, have been identified as some of the main reason behind the increase in the number of patent applications as well as in creating patent thickets.¹³¹ In particular, the uncertainty that is generated in patent thicket context, as already discussed in Section 2.1, enhances the possibilities for firms to sue and to be sued for infringement. In particular, the seeking of injunctions to put pressure on competitors has been highlighted as a common practice in some jurisdictions, especially those where when injunctions can be granted easily.¹³² It could be the case when a product is multicomponent in nature, i.e. several patents are implemented within and all of them are equally necessary, and a firm, which owns the patent of a singular component, threatens to shut down the entire production.¹³³ In such a case, the firm can use the threat of legal action to force the rival to pay high royalties. However, being sued for infringement seems unlikely when the threat of counter-injunctions can be posed because, for example, the defendant also holds some patents related to some of the plaintiff multicomponent products. Given the context, firms are more likely to file patent applications as well as to create uncertainty through patent thickets when they are involved in cumulative invention areas.¹³⁴ Indeed, patents can be important weapons of defense, though patent protection is sought only for strategic purposes in such cases.¹³⁵

¹²⁹ Hall, Graevenitz, Rosazza-Bondibene (1) 24

¹³⁰ Ibid. 8; MA Lemley, DA Melamed, 'Missing The Forest For The Trolls' (2013) 113 Colum. Law Rev. 2117, 2153

¹³¹ Hall, Graevenitz, Rosazza-Bondibene (1) 17

¹³² Bessen, Meurer (1)

¹³³ CV Chien, MA Lemley, 'Patent Holdup, the ITC, and the Public Interest' (2012) 98 Cornell L. Rev 1,8

¹³⁴ Hall, Graevenitz, Rosazza-Bondibene (1) 9

¹³⁵ SF Morton, C Shapiro, 'Patent Assertions: Are We Any Closer to Aligning Reward to Contribution?' (2016) 16 Innovation Policy and the Economy 89, 96

3.5. Strategic uses of patent thickets

Analysis of the main features of patent thickets as well of the factors that have contributed to the rising of the phenomenon appear to support the idea of some strategy behind the development of such behaviours, i.e. filing of several patent applications related to the same piece of technology creating uncertainty on the extent of protection granted by each patent. In theory, as already stated in Chapter III, firms should seek patent protection to obtain the exclusive right to use their invention.¹³⁶ As such, firms should be interested in granting patent protection because it secures fully against any exploitation of that invention and consequently great rewards for their investment in innovation. However, this does not seem to be the case when innovations are cumulative, as is true of business methods. As discussed in Chapter III, others means such as to be the first mover in the market has been deemed capable of rewarding investment in R&D with regard to inventions that are cumulative.¹³⁷ Hence, the pursuing of some strategy has been considered the probable reasoning behind the growing interest in patenting in cumulative innovation context.¹³⁸ This idea, or rather this concern seems to be confirmed by the spread of patent thicket practices. In particular, either defensive or aggressive strategies have been offered to explain the success of patent thickets.

Defensive use

Defensive reasons have been suggested to be behind the development of patent thicket behaviors. According to Shapiro, the spread of patent thickets can be linked to the concern of infringement.¹³⁹ The latter is frequent in cumulative invention areas. Firms involved in digital technologies often simultaneously implement the same piece of previous art without be aware of that. Due to low standards of non-obviousness, firms could find difficult to set their research targets so clearly to avoid

¹³⁶ Text to Section 2.1, Chapter III

¹³⁷ Text to Section 3 c), Chapter III

¹³⁸ Text to Section 4, Chapter III

¹³⁹ Shapiro (56) 121-124

any overlapping with competitors.¹⁴⁰ Moreover, experiences proved that firms are likely to introduce into the market similar products at the same time when cumulative inventions are involved.¹⁴¹ All this considered the chance to be sued for infringement is deemed higher than usual when cumulative inventions are involved.¹⁴² As such, firms face a certain degree of uncertainty about the real extent of the patent protection granted to their inventions. Nevertheless, surrounding the innovative process with uncertainty has been also viewed as a way to deal with the threat of infringement itself.¹⁴³

Filing patent applications even when inventions are weak or with uncertain commercial value has been considered to be ultimately worthwhile when inventions are cumulative. In point of fact, as already discussed in the previous section, firms have realized that owning multiple patents can be a means of defense. The ownership of several patents can be crucial to avoid infringement, irrespective of the strength of each of them. Indeed, filing several patent applications is a way to create a “fog” that firstly impedes rivals to be sure themselves not to infringe and some certainty of not being infringed.¹⁴⁴ Second it can be used for counterattacking, whereby firms are sued for infringement.¹⁴⁵ Therefore, patent thickets can be created for defensive reasons. Here is the danger that can be generated that urges firms not only to file several patent applications, but also to issue broad claims in order to prevent or coun-

¹⁴⁰ Bessen, Meurer (1) 250

¹⁴¹ Ibid.

¹⁴² Hall, Ziedonis (9) 109; Lemley, Shapiro (13) 79; M la Belle, HM Schooner ‘Big Banks and Business Method Patents’ (2013) 16 U. Pa. J. Bus. L. 431, 450 (La Belle et al listed some well know litigations “Though Amazon v. Barnes & Noble is probably the most notorious business method patent suit, others have garnered significant attention too. Since the late 1990s, for example, Walker Digital has filed a series of lawsuits against technology companies like Microsoft, Google, Facebook, Amazon, Yahoo, and others for patent infringement.”)

¹⁴³ Shapiro (56) 125-127

¹⁴⁴ Ibid.

¹⁴⁵ C Shapiro, Technology Cross-Licensing Practices: FTC v. Intel (1999)’ in JE Kwoka, LJ White (eds) *The Antitrust Revolution; economics, competition, and policy* (4th edn, OUP 2004) 350, 354 (Shapiro defines defensive patenting as follow “Defensive patenting refers to the practice of seeking patents in order to defend oneself from patent infringement actions brought by others. Under this strategy, the company does not plan to assert its patent proactively against others, but it can counterattack with its own patent infringement claims if sued for infringement”)

teract to future legal actions.¹⁴⁶ Therefore, a defensive battle could easily result in economic inefficiencies, as it will be discussed in Chapter VII.

A different point of view has been offered about a possible defensive reason that lies behind patent thicket behaviors. This is especially in the context of pointing out to the role of patents, specifically a large quantity of them, in strengthening firms' bargaining positions.¹⁴⁷ As already stressed in section 1, firms can be facilitated in reaching licensing agreements when deploying a huge patent arsenal. According to this line of reasoning, quantity is one important feature of patent thicketing not least because firms, specifically those involved in the digital technology, deem that holding a significant number of patents can be useful to ward off their rivals. Indeed, a large amount of patents, particularly when their claims are broad and vague, can obtain to their holders a certain position in negotiation. In particular, both the patents' volume and the difficulties in understanding their actual extent could be used to pretend to be playing a certain role in the market, regardless if, in fact, most of the patents might be weak or possibly invalid.¹⁴⁸ As such, patent thickets can be created to increase the opportunity of reaching licensing agreements, especially cross-licensing agreements with rivals, agreements to which they might otherwise not be interested in.

Aggressive use

The increase in the number of NPEs involved in digital technologies is often acknowledged when referring to aggressive reasons behind the spread of patent thicket phenomenon.¹⁴⁹ Most obviously, firms that are not intending to implement patents, focus only on the possibility of

¹⁴⁶ J Farrell, C Shapiro, 'How strong are weak patents?' (2008) 98 *The American Economic Review* 1347, 1362

¹⁴⁷ Ziedonis (9) 806-807

¹⁴⁸ Federal Trade Commission of United States, *To promote innovation: the proper balance of competition and patent law and policy* (DIANE Publishing, 2003) <<https://www.ftc.gov/sites/default/files/documents/reports/promote-innovation-proper-balance-competition-and-patent-law-and-policy/innovationrpt.pdf>> accessed on the 20th June 2017, 30

¹⁴⁹ CV Chien, 'Startups and Patent Trolls' (2013) 17 *Stan. Tech. L. Rev.* 461.

gaining financial remuneration by trading patents.¹⁵⁰ Thus, it hardly comes as a surprise that NPEs negotiate licensing agreements with a mind only at obtaining the maximum possible amount of royalties. Unlike firms that develop their own products, NPEs are not interested in acquiring patents to develop new products. Moreover, NPEs do not face the threat of being sued for infringement. Therefore, the chances of being caught in high-cost licensing agreements increase when NPEs are in the technology market. What it is more, many NPEs have demonstrated a strong tendency for intentionally “asserting” patents against firms, with the aimed effect of forcing them to reach costly settlement agreements.¹⁵¹

Patent assertion entities (APEs) are, indeed, labelled those entities specialized in patent assertion¹⁵² - they are also known as “patent troll”-¹⁵³ and their aggressive behaviour is often stigmatised with the label “patent mining”,¹⁵⁴ which explicitly underlines the intent to obtain ‘the most out of their patents by asserting them more aggressively than ever against possible infringing firms’.¹⁵⁵ A high profile example of aggressive behaviour has been the case of Texas Instruments that in the 1980s started to aggressively assert its own patents significantly increasing profits coming from the technological licensing program.¹⁵⁶ Most recently “patent mining” has increased in complex technology areas. In particular, firms have started to create intermediary entities to serve as

¹⁵⁰ Federal Trade Commission (25) 162

¹⁵¹JR Allison, MA Lemley, J Walker, ‘Patent quality and settlement among repeat patent litigants’ (2010) 99 *Geo.LJ* 677; BJ Love, ‘An Empirical Study of Patent Litigation Timing: Could a Patent Term Reduction Decimate Trolls Without Harming Innovators?’ (2013) *University of Pennsylvania Law Review* 1309

¹⁵² Morton, Shapiro (135) 89 (Morton and Shapiro describe assertion referring “to certain patent litigation tactics that a patent holder can employ to generate returns that are out of proportion to the social contribution resulting from the R&D activities that led to the issuance of the patent in question. While the organizational form of the entity using these tactics is not directly relevant to this question, the most questionable tactics are often used by entities that specialize in patent assertion”); Chien, Lemley (133) 1 (“PAEs assert patents as a business model, traditionally using the threat of an injunction to reach a favourable settlement with the defendant.”)

¹⁵³ Text to n.153 in Chapter III

¹⁵⁴ Shapiro (56) 121

¹⁵⁵ *Ibid.*

¹⁵⁶ Hall, Ziedonis (9) 109

a “shell firm” that can assert patents against rivals.¹⁵⁷ Taking advantage of the overlapping nature and the quantity, firms strategically allocate their patent rights to non-practicing entities (also called patent privateers) that can sue rivals for infringement without any fear of being counterattacked.¹⁵⁸ In particular, the most “assertable” patents are transferred to controlled privateers that allege infringements with the purpose to reaching unbalanced agreements.¹⁵⁹ These would not be otherwise reached with competitors in the same market.¹⁶⁰

Another example of aggressive patent use in creating patent tickets is provided by “continuation” practices.¹⁶¹ Continuation in patents has been commonly identified as the practice of filing several patent applications referring to the same priority date. It is usually made possible by modifying or adding a new claim to the specification in the original application. Thus, continuations could be used, and indeed it is used, to file several patents all referring to same piece of invention. Proper continuation is only allowed in a very few patent systems.¹⁶² Nevertheless, firms are entitled to divisional continuation in several systems; even at the EPO, divisional continuation is possible. As such, at the EPO firms are allowed to use the same priority date, i.e. a date which refers the same invention, in more than one patent application, when the invention can be referred to different categories. Thus, it will happen that a singular firm can draft several patent applications related to the same

¹⁵⁷ Chien (7) 319

¹⁵⁸ MA Lemley, AD Melamed, ‘Missing The Forest For The Trolls’ (2013) 113 Colum. Law Rev. 2117, 2137 (“ Sometimes, firms sell patents in more strategic ways. One example is the recent rise of patent privateers—product-producing companies that spin off patents or ally with trolls to target other firms with lawsuits.”)

¹⁵⁹ Ibid. 2138

¹⁶⁰ T Ewing, ‘Indirect Exploitation of Intellectual Property Rights by Corporations and Investors’ (2012) 4 Hastings Sci. & Tech. L.J.1, 5

¹⁶¹ D Hedge, DC Mowery, SJH Graham, ‘Pioneers, submariners, or thicket-builders: Which firms use continuations in patenting?’ (2007) NBER Working paper n. 13153 < <http://www.nber.org/papers/w13153> > accessed on the 20th June 2017, 7 (Referring to the USA experience, Hedge et al clarify that “Continuations permit an applicant to refill a pending patent application, with or without substantial modifications, by renewing at least some portion of the original application.”)

¹⁶² Ibid. 1 (“Continuations are unique to the U.S. patent system and have been criticized by economists and members of the patent bar because of their potential for strategic manipulation, notably in so-called “submarine patents” that are issued following long periods of examination and revision through continuation applications”)

invention; however, only one patent will be granted, even if each application is assessed by a different divisional office.¹⁶³ Indeed, continuation is often strategically put in place to delay patent issuance¹⁶⁴ or to create tactical flexibility during the examination processes.¹⁶⁵ Nevertheless, continuation, i.e. the opportunity of filing several patent applications referring to the same priority date, can also be used to create uncertainty around claims and patent boundaries in the timeframe between the filling of patent applications and the granting of the patent.¹⁶⁶ Hence, patent continuation can facilitate the building of patent thickets, ultimately generating enough confusion to discourage rivals from filing applications in the same technological area.¹⁶⁷

3.6 Why patent thickets are a problem for firms?

Based on the analysis conducted in the previous subsection, some conclusions can be drawn concerning the effect about effects of patent thicketing. Most obviously, the existence of patent tickets works as a disadvantage to most firms, while serving only very few beneficially. Notably, some significant consequences can arise from patent thicketing.

Increasing in uncertainty.

The previous analysis has clearly pointed up the connection between patent thicketing and uncertainty both on the claims and ownership of patents. Large amount of applications, vague language and overlapping

¹⁶³ GM de Saint-Georges, B van Pottelsberghe de la Potterie, 'A quality index for patent systems' (2013) 42 Research Policy 704, 708 ("In Europe, divisional applications are allowed. However, abusive reliance on this option has been limited since April 2010, when the EPC (European Patent Convention) decided to substantially reduce the period during which a divisional application can be filed (prior to April 2010, unlimited subsequent divisional applications were allowed with the extreme case being that claims could be pending for nearly 20 years)."); Harhoff et al., *The strategic use of patents and its implications for enterprise and competition policies* - Tender for No ENTR/05/82' (2007) < https://ueaeprints.uea.ac.uk/37550/1/study-202852-2008_en_2475.pdf> accessed on the 20th June 2017, 166

¹⁶⁴ Hall, Harhoff (124) 32

¹⁶⁵ Harhoff et al (163) 125

¹⁶⁶ European Commission, Communication from the Commission Executive Summary of the Pharmaceutical Sector Inquiry Report' (COM /2009/ 351, 2009) <http://ec.europa.eu/competition/sectors/pharmaceuticals/inquiry/communication_en.pdf> accessed on the 20th June 2017, 9

¹⁶⁷ Harhoff et al. (163) 251); Hedge, Mowery, Graham(161) 34

of claims are some of the most common features of the phenomenon: with all of them intentionally combined to create a dense web, which ultimately impede to see through the reality of the invention.¹⁶⁸ There are a variety of practices that are driven by their potential effects on competitors and market. These range from the intent to hide the core of an innovative technology, to the desire of concealing the obviousness of some product or processes.¹⁶⁹ In particular, patent thickets are common in those areas where the implementation of inventions does not need much time and products have a short life span; thus, a temporary confusion about the range of the invention can be crucial to gain a significant position in the market.¹⁷⁰ Thus conceived, uncertainty is often the desired outcome of patent thicketing. Nevertheless, firms, even the very ones that have resorted to patent thicketing, can themselves suffer ill effects from such practice. For example, uncertainty affects a firm's sureness about acquiring a patent that cannot be challenged by others.¹⁷¹ Moreover, the number of infringement proceedings steadily increases in patent thicket contexts given to such an intentional vagueness in the claims that easily results in "fuzzy boundaries".¹⁷² Consequently, firms constantly face the risk of inadvertent infringement so that often firms express a fear of infringing others' patents, even if they have been granted all the patents related to the invention implemented in a new product.¹⁷³ Additionally, uncertainty created by strategic overlapping ultimately conceals the identity of the potential plaintiffs, thus ex ante licensing is problematic and complicated, there-

¹⁶⁸ Text to n. 57

¹⁶⁹ MA Lemley, C Shapiro, 'Patent holdup and royalty stacking' (2006) 85 *Tex. L. Rev.* 1991, 1995

¹⁷⁰ DL Burk, MA Lemley, 'Policy levers in patent law' (2003) 89 *Va. L. Rev.* 1575, 1688

¹⁷¹ BH Hall, C Helmers, G von Graevenitz, 'Technology Entry in the Presence of Patent Thickets' (2016) IFS Working paper n. 16/02 <<https://www.ifs.org.uk/uploads/publications/wps/wp201602.pdf> > accessed on the 20th June 2017, 4

¹⁷² Text to n. 95; ex multis PS Menell, 'Reinvigorating Patent Notice through Faithful Implementation of the Section 112 (b) Claim Indefiniteness Provision' (2014) UC Berkeley Public Law Research Paper No. 2403902

<<https://ssrn.com/abstract=2403902> or <http://dx.doi.org/10.2139/ssrn.2403902>> accessed the 20th June 2017, 12, Lemley, Shapiro (169)

¹⁷³ Bessen, Meurer (1) 46; Régibeau, Rockett (68) 13

by reducing the ease and chances of reaching agreements.¹⁷⁴ Conversely, costly settlements are often the outcome of patent thickening, because firms are frequently held up after inventions are implemented.¹⁷⁵ As such, agreeing on high licensing royalties can be the only way to avoid major costs coming from switching technology.¹⁷⁶

Increasing in negotiation costs

Patent thickets routinely create a bundle of patents that are all related to the same invention, or at least, to the same technology. As already discussed, patent thickets are likely to happen in cumulative technologies due to the fact that these technologies rely on several patents.¹⁷⁷ Nevertheless, patent thickets can be built intentionally. As such, the number of patents related to the same technology is tactically increased to a rate that is unsustainable, especially for small firms. Most pressing, the increasing number of patents ensures that several agreements need to be reached, most of the times with more than one licensee.¹⁷⁸ Thus, both monetary and social costs can emerge since more time and expertise are required to deal with such complicated negotiations. Hence, only very few firms can bear costs to implement those technologies that are wrapped up by thickets. Accordingly, rising in transaction costs has been pointed up as one of the major drawbacks of patent thickets, especially from the point of view of small firms.¹⁷⁹

Additionally, rising costs has been associated with difficulties in gaining a fully knowledge of those technologies related to patent thickets. In particular, the fact that several patents cover a technology can affect the ability of a purchaser to understand the real value and quality of it.¹⁸⁰ Frequently, claims are deliberately vague and important knowledge

¹⁷⁴ Hall, Graevenitz, Rosazza-Bondibene (1) 33

¹⁷⁵ MA Lemley, C Shapiro, 'Patent holdup and royalty stacking' (2006) 85 Tex. L. Rev. 1991, 2009

¹⁷⁶ Bessen, Meurer(1) 135; Allison, Lemley, Walker (151)

¹⁷⁷ Text to n. 58

¹⁷⁸ Text to n. 72

¹⁷⁹ ex multis Bessen, Meurer(1) 165; Hall, Graevenitz, Rosazza-Bondibene (1); Régibeau, Rockett (68)

¹⁸⁰ Bessen, Meurer(1) 182

is intentionally not patented.¹⁸¹ Hence, patents are eventually unreliable in patent thicket context because they do not offer enough information to predict, even approximately, the profits that could be realized once that technology is implemented.¹⁸² Therefore, transactions are not only more complicated but also more risky in patent thicket contexts with the effect that firms face an increase of costs, alongside the indeterminacy in economic benefits, ultimately received by investing in a technology.

Increasing in litigations

As earlier stated, broad patents are one of the most common characteristic within patent thicket phenomenon. Due to the vagueness in claim descriptions and the abundance of patent applications, precise patent boundaries are often extremely difficult to identify in technological areas where patent thicketing is practised.¹⁸³ Therefore, in those areas patents routinely deploy broad terms generating wide interpretation with the effect that litigation has become increasingly common.¹⁸⁴ In particular, doubts on the obviousness can easily be cast when inventions are broadly described, or innovations regard practices already adopted or are based on mathematical formula that are already in use.¹⁸⁵ Moreover, the large amount of patents and applications connected to the same technologies can make it difficult to search for prior art so that inadvertent infringements can easily occur.¹⁸⁶ It also creates difficulty in assessing the validity of the patent itself. Therefore, patent “weakness”, i.e. broadly-defined patents that can be interpreted widely, has been put forward to explain increasing litigation and, in actual fact, more than

¹⁸¹ Ibid. 183

¹⁸² Ibid.

¹⁸³ Text to n. 93

¹⁸⁴ A Galasso, M Schankerman, ‘Patents and cumulative innovation: Causal evidence from the courts’ (2014) 130 *The Quarterly Journal of Economics* 317,

¹⁸⁵ CV Chien, ‘Of Trolls, Davids, Goliaths, And Kings: Narratives And Evidence In The Litigation Of High Tech Patents’ (2009) 87 *N.C.L. Rev.* 1571, 1580.

¹⁸⁶ Allison, Lemley, Walker (151)

one study has provided evidence of the escalation of patent disputes in those areas where patent thickets have arisen.¹⁸⁷

As already explained in chapter III, “abusive” litigation has been stressed with regard to patent trolls, which also has been pointed up to explain increasing in litigation and litigation costs.¹⁸⁸ Indeed, patent trolls purposely wait for other firms to implement inventions and eventually sue them for infringements based on later-developed technologies. Hence, patent trolls exploit their patents for no other purpose than obtain great damage rewards and patent vagueness is a useful tool.¹⁸⁹ Moreover, a general tendency to use patents for opportunistic behaviours has been identified as a tactic of not only “patent troll” but of all kind of entities that are not interested in manufacturing and commercializing products.¹⁹⁰ In particular, a propensity to assert patents against numerous firms has been shown by non-practice entities in the USA and Europe.¹⁹¹ Therefore, costs for defending patents are steadily increasing over the last few years, specifically in the US.¹⁹² Costs far exceed profits in a patent-thicket context such as software technological area so that they are thought to be “an important disincentive to innovation”.¹⁹³

3.7 Some conclusions

As revealed by the analysis carried out in this section, patent thickets are identifiable by the amount of patents and patent applications involved, as well as their vague language and the risk of overlapping revealed by the high rate of mutual citations. In particular, patent thickets are a

¹⁸⁷ ex multis Bessen, Meurer(1), K Cremers et al., ‘Patent litigation in Europe’ (2017) *European Journal of Law and Economics* 1

¹⁸⁸ Text to n.153 Chapter III

¹⁸⁹ ex multis, Bessen, Meurer(1)67, JR Allison, MA Lemley, J Walker, ‘Extreme Value Or Trolls On Top? The Characteristics Of The Most-Litigated Patents’ (2009) 158 *University of Pennsylvania Law Review* 1; Chien (185); Lemley, Melamed, (158)

¹⁹⁰ Chien (7)

¹⁹¹ ex multis, M Risch, ‘Patent Troll Myths’ (2012) 42 *Seton Hall L. Rev.* 457, Bessen, Meurer(1); Hall, Graevenitz, Rosazza-Bondibene (1); C Helmers, B Love, L McDonagh, ‘Is there a patent troll problem in the UK?’ (2013) 24 *Fordham Intell. Prop. Media & Ent. LJ* 509.

¹⁹² Bessen, Meurer(1) 14

¹⁹³ *Ibid.*

specific occurrence of cumulative technology, i.e. technology resulted by combining singular innovative components. In such a context, it can happen that patent applications covering each of the innovation's components are intentionally broadly defined. As such, several patents are involved, usually citing each other. Using citations and vague language, confusion is ultimately created on the extent of each of the patent. When it happens, when uncertainty on the extent of patent protection is created, a strategic patent thicket is built.

Most obviously, when uncertainty is intentionally created, some strategic tactic reasons are involved. Due to the uncertainty, rivals find practically impossible to invent round the patents. Moreover, securing the set of licenses necessary to exploit the technology implies prohibitive costs according to the numerous agreements that have to be reached. Thus, patent thickets can be used to generate inefficiencies, ultimately deterring competitors to enter the market. Hence, patents and patent applications in a patent thickets can be used as a part of a wider collection of patents covering a particular area of economic activity, rather than individually. In particular, entities owning entire collections of patents can use them to negotiate agreements among themselves, revealing either defensive or aggressive purposes. Therefore, building patent thickets can be an effective strategy for partitioning or even closing off the market.

In the following chapter, the database including all patent applications filed in the category G06Q will be analyzed to understand whether some patent-thicket strategy has been developed in Europe with regard to business method patents. As already indicated, citations between patents can provide useful information about patent thicket strategy. As such, a network analysis of the citations among business method patents at EPO will be conducted. This will give the opportunity to identify the more involved firms in the business method patent phenomenon. Furthermore, evidence will be provided of the possibility that some strategic patenting could have put in place.

Chapter VI

What evidence of patent thicketing in business method patents at the EPO?

1.Introduction

As discussed in previous chapters, granting exclusive rights on an invention seems not to be enough to explain the observed large numbers of patent applications in the category G06Q at the EPO. In particular, the theoretical framework provided in Chapter V has emphasized how digital revolution, i.e. innovation due to IT technologies, has brought to the fore new ideas and concepts around patents and patent protections. Above all, the use of patents to create monopolistic positions in the market has been pointed out, in connection with practices of patent claim overlapping and patent application crowding, ultimately to impede rivals to enter the market and to implement similar technologies. Thus conceived, patents and patent applications are more and more often a tool not only to secure the exclusive use of singular inventions, but also a way to ensure the exclusivity in the implementation of a whole technology. Therefore, not only inventions, but also innovation and knowledge are conceived as issues of property rights.

Referring to strategic behaviors, namely patent thicketing, this chapter is aimed to investigate if some of these tactical approaches have indeed been adopted in the European context of business method patenting. In order to do that, the leading players in the category G06Q at the EPO will be identified. Thus, the names of the most active firms will be revealed and discussed in the first section of this chapter. Then, the attitude towards patents and patent applications of the top ten firms for number of applications in the category G06Q will be analyzed, and the relationships among these firms will be scrutinized. On this purpose, patent citations data will be used to construct a network of citations

among firms and to disclose the possible presence of strategic links, through the use of network theory.

2.The key players in the world of business methods at the EPO

As indicated in Chapter IV, firms file the majority of applications in the category G06Q at the EPO. Thus, firms are the main protagonists and at the same time the architects of the success of business methods as patent subject matter in Europe. But, are all the firms contributing equally to the phenomenon? Or only few of them are driving the entire market? And in the latter case, which are then the firms playing the key role? Satisfactory answers to these questions can be obtained making use of the data set introduced in Chapter IV. As discussed in Section 4 of Chapter IV, the file SUM_UP_FILE maintains information on all patent applications filed in the category G06Q at the EPO.⁷⁷⁶ In particular, patent applications can be listed according to the name of the applicants, and from a visual inspection of SUM_UP_FILE, it clearly emerges that big firms tend to submit patent applications using also their subsidiaries or parent companies so that, for example, Visa files applications as Visa International Service Association (Visa Int. in the following) but also as Visa USA Inc. (Visa USA). Thereby, all the applications referring to the same organization have been summed up to provide a more complete overview. Names of applicants and numbers of patent applications have been reported in Figure 1.

⁷⁷⁶ For more information on the dataset, see Chapter III, 4

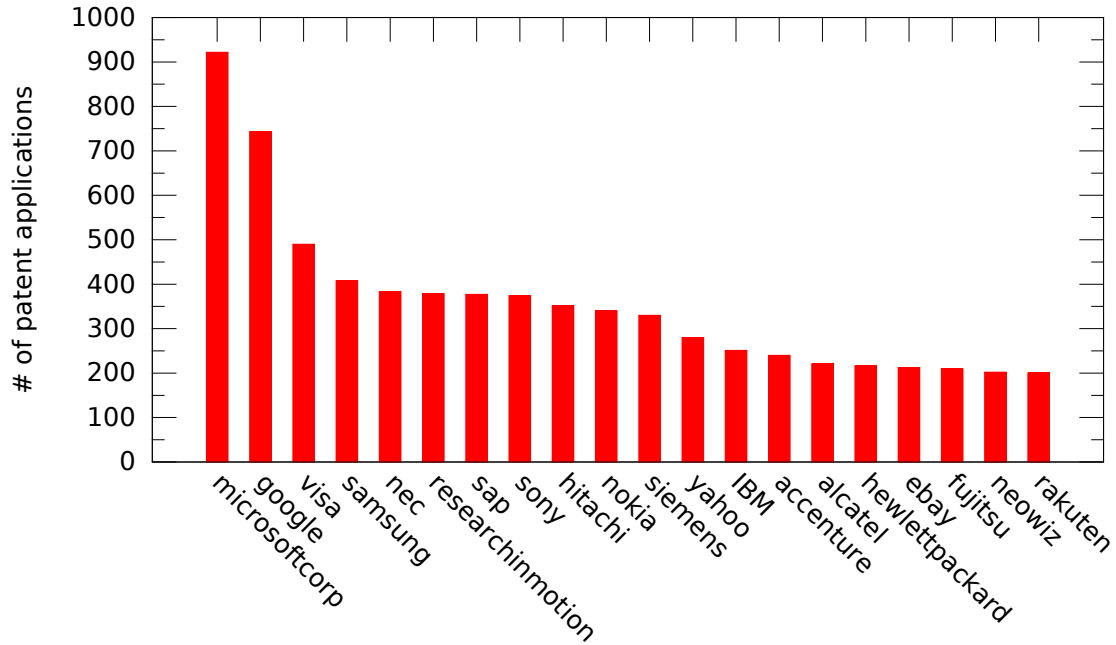


Figure 1. The top 20 firms, in terms of number of applications filed in the G06Q category, are ranked by number of applications.

In particular, the figure shows the top 20 firms sorted by the number of applications that each of them has filed in the category G06Q at the EPO. The graph indicates that Microsoft is the applicant with the highest number of filed applications, about 950, followed by Google with nearly 800 patent applications, and then all the remaining others firm, each with a number of filed patent applications ranging from 300 to about 500. Thereby, a significant gap emerges clearly in Figure 1 between the number of applications filed by the first two firms in the list and the number of applications filed by the remaining firms. Whereas Microsoft's and Google's applications in the category G06Q far exceed the number of 500, all the other firms in the chart have filed less than 500 applications, with nine of them having less than 300 applications. Therefore, Figure 1 reveals Microsoft and Google as indubitably the two leading characters in the race to grant patent protection for business methods in Europe.

The results obtained are not totally surprising. Indeed, the firms found in the list are the expected ones according to the fact that all of them

are entities well known for being internationally involved in the market of digital technologies.⁷⁷⁷ If proof was needed, Figure 1 is in support of the view that IT firms have played an important role in the growth of popularity and interest in business method patents.⁷⁷⁸ Nevertheless, a certain degree of heterogeneity also emerges from the graph. In particular, some big manufacturing firms, such as Samsung or Sony, are in the list, as well as financial firms as Visa, or Internet based entities like Ebay. Based on this result, business methods seem to be conceived as a crosscutting patentable subject matter, attracting the attention of different entities.⁷⁷⁹

Further information can be extracted from Figure 1. First of all, European firms seem to be less interested in obtaining patent protection for their business methods than American firms.⁷⁸⁰ In particular, the first European firm in the list is Nokia, which is only in the 10th position. This finding is consistent with the EPO annual statistics. According to the EPO reports published in the last decade, American applicants account for about the 25% of all the applicants at the EPO in all categories.⁷⁸¹ Moreover, the EPO statistics reveal that large enterprises represent in average as much as the 65% of the applicants in the last decade.⁷⁸² Thereby, the presence of several large American firms in the list of the top applicants in category G06Q must not seem surprising.

There are however some surprising results that can be derived from the plot in Figure 1. For example, the reader can wonder why Apple or Amazon does not show up in the list. Regarding Apple, it is important to

⁷⁷⁷ BH Hall, T Grid, S Torrissi, 'Financial patenting in Europe' (2009) 6 *European Management Review* 45, 46

⁷⁷⁸ DF Spulber, 'Should Business Method Inventions be Patentable?' (2011) 3 *Journal of Legal Analysis* 265, 291

⁷⁷⁹ Text to Section 6 Chapter IV

⁷⁸⁰ M Bader, 'Managing intellectual property in the financial services industry sector: Learning from Swiss Re' (2008) 28 *Technovation* 196, 196 ("At the European Patent Office 75% of patent applications in the bank and (re-) insurance industries originate from companies in Anglo-Saxon countries like the US, Canada, and Great Britain. Only 10% of all patent applications come from European organizations.")

⁷⁸¹ EPO Annual Reports at <http://www.epo.org/about-us/office/annual-report.html>

⁷⁸² *Ibid.*

realise that Apple is not a top applicant in general. According to the EPO statistics, Apple has never been in the list of top 50 applicants during the last decade. Moreover, recent studies indicate that Apple has become a player in the context of patent protection only in the last few years, and has tended to file patent applications in categories different from G06Q, such as for instance in category G06F.⁷⁸³ With regard to Amazon, the absence of its name in the list of the top 20 applicants marks a significant difference with respect to the US framework.⁷⁸⁴ Amazon is indeed ranked as one of the main applicants in the class 705 at the USPTO, whereas in Europe the total number of applications filed by Amazon Technologies is about 70.

A look at the Amazon “one-click” patent *affaire* can probably provide useful clues to understand the different behaviours of Amazon in Europe and in the US. As it is well known, Amazon sought patent protection for its innovative “one-click” method, applying both to the USPTO and to the EPO. While the USPTO issued a patent to cover the method,⁷⁸⁵ the application was rejected at the EPO.⁷⁸⁶ According to the conclusions of the EPO technical board, the “one-click” method lacked of enough novelty.⁷⁸⁷ Ultimately, Amazon “one-click” *affaire* is the epitome of the different attitude of the EPO and the USPTO toward business method patents. Such as, the European approach seems to penalize those business methods that are not innovative per se but, as supported by Amazon arguments, are new according to their application to a

⁷⁸³ *Inside the iPhone Patent Portfolio* (Thomson Reuters 2012)

⁷⁸⁴ USPTO, Extended Year Set - Patenting In Technology Classes, Breakout By Organization at https://www.uspto.gov/web/offices/ac/ido/oeip/taf/tecasga/705_torg.htm; see also M la Belle, HM Schooner ‘Big Banks and Business Method Patents’ (2013) 16 U. Pa. J. Bus. L. 431, 450 (“all Class 705 patents are assigned to banks and other financial firms the majority are issued to companies in the high tech sector like IBM, Microsoft, and Amazon.104 In 2012, for example, the PTO granted IBM, Microsoft, and Amazon 262, 87, and 103 Class 705 patents, respectively.”)

⁷⁸⁵ US 5960411/1999- Method and system for placing a purchase order via a communications network

⁷⁸⁶ EP1134680/2001- Method and system for placing a purchase order via a communications network

⁷⁸⁷ EPO, Technical Board of Appeal, T 1244/07 (1-Click/AMAZON) of 27.1.2011 at <<http://www.epo.org/law-practice/case-law-appeals/recent/t071244eu1.html>> accessed 7th August 2017

new context, as the e-market in this particular case.⁷⁸⁸ Indeed, the more strict European approach could explain why Amazon, which is one of the most popular applicants at the USPTO, is not listed among the twenty applicants with the highest number of patent applications in the category G06Q at the EPO.

3. How the leading players behave

Once the names of the firms who have played, overall, the leading role in the business method arena have been identified, it is also possible to investigate the behaviour over time of these leading players. Noticeably, the results show slightly different attitudes in the way the firms have submitted applications in the category of business methods. Some of the heterogeneities, in relations to the number of applications filed in the category G06Q over the years, are already revealed by the curves in Figure 2.

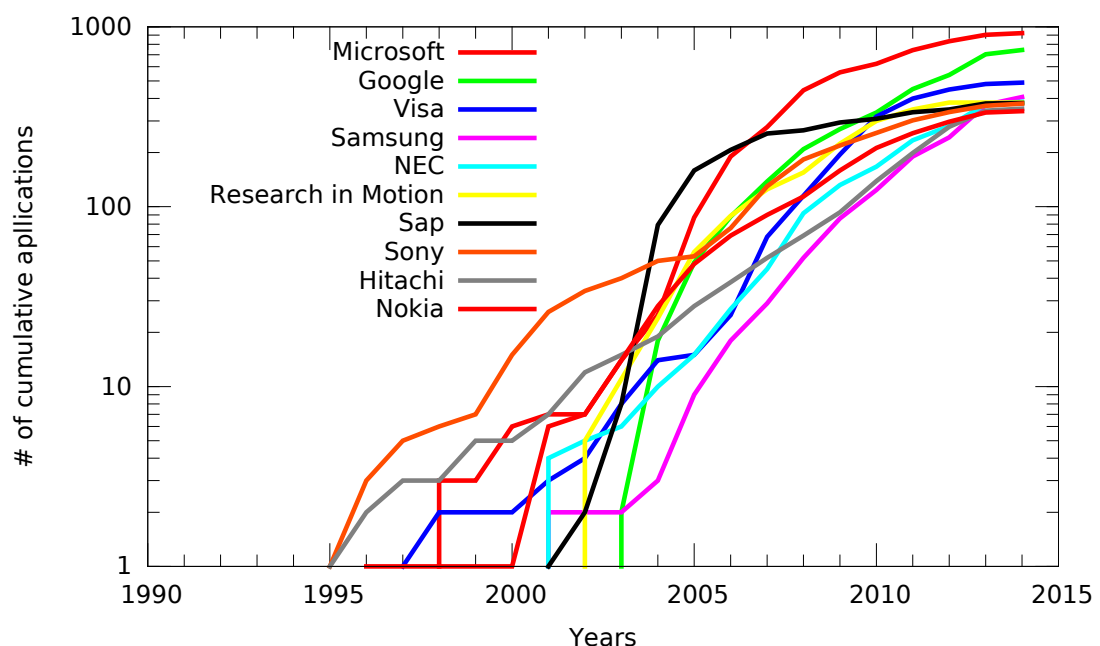


Figure 2. Cumulative number of patent applications in the category G06Q, showing year by year the total number of applications filed by each of the top ten companies with a filing date in that year or in one of the previous years. A logarithmic scale for the vertical axis has been adopted.

⁷⁸⁸ R Hilty, C Geiger, 'Towards a new instrument of protection for software in the EU? Learning the lessons from the harmonization failure of software patentability' (2011) Max Planck Institute for Intellectual Property and Competition Law Research Paper n. 11-01, 17

In particular, the graph reports, as a function of the year and in a linear-logarithmic plot, the cumulative number of applications filed by the top-ten firms, namely those in the list shown in Figure 1. Namely, it indicates, for each year, the total number of applications with a filing date in that year, or in one of the previous years. First of all, Figure 2 provides a general overview of the behaviour of the leading firms in the area of business method patents at the EPO. It shows that the number of applications filed in the category G06Q has increased, for each of the top-ten firms, in almost all the years in the period from 1990 to 2014. Ultimately, the figure indicates that the major players in the category G06Q have maintained their interest for business method patents over the years. Since a straight line in a linear-logarithm scale is the indication of an exponential increase, then all curves show in general an initial stage in which the cumulative number of patents has grown exponentially in time, and then a slowing down in more recent periods. Each line is specifically displayed in a different colour, so that it is possible to distinguish one firm from another. For instance, Microsoft, the firm with the largest total number of applications in our data set, is reported in red. Markedly, firms in the top-ten list started filing applications in the category G06Q in the 1995 to 2000 five-year period; although, the number of patent applications became significant – i.e. more than 10 for each firm – only around 2005. After 2005, the consistent growth in the number of patent applications is highlighted by the largest slopes of the curves, which are indeed found in the period 2005-2010, for most of the firms. Differences are present from one company to the other. There are cases in which the curves are crossing each other, meaning that one firm is overtaking another firm in terms of total number of applications. Emblematic is for instance the case of Google, which starts to file applications for patents in the category G06Q only in year 2003, but already at year 2010 has become the second largest player after Microsoft. Summing up, Figure 2 supports the idea that the most important multinational corporations in the ICT sector have paid a continuous attention paid to business methods. It is in

indeed possible to show that almost one third of the applications in the constructed data set have been filed by the top-20 firms shown in Figure 1.

More detailed information on the temporal distribution of the applications of each firm can be obtained if the numbers in Figure 2 are disaggregated.

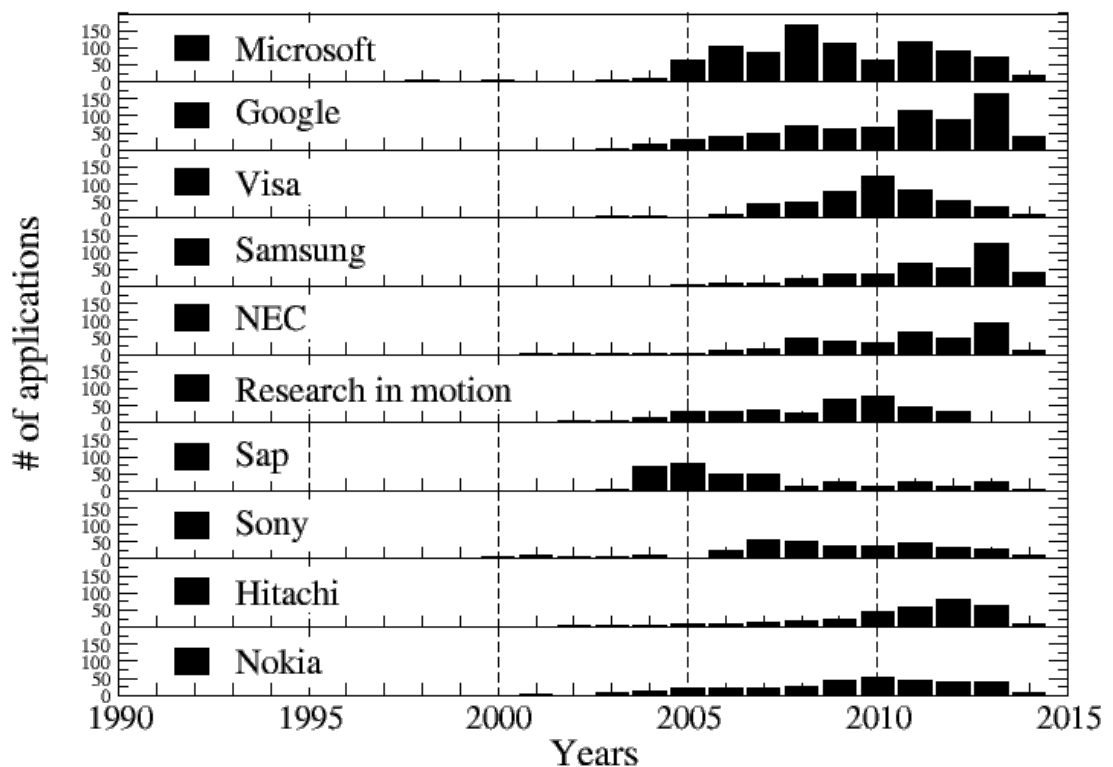


Figure 3. Histogram of the number of patent applications filed year by year in the category G06Q by each of the top ten companies.

This is done in Figure 3, which reports the histogram of the number of applications filed by each of the top ten list firms year by year (in contrast to the cumulative numbers shown instead in Figure 2). Also here we have adopted a double-linear scale, and the values on the y-axis range from 0 to 300, with large ticks of values equal to 50 units. Due to the linear scale of the vertical axis large amounts are better detected than small, thus significant changes in number of patent applications in the category G06Q are immediately understandable. This figure

clearly highlights the different attitudes of the leading players towards business method patents. For instance, the data indicate that Microsoft expressed its largest interest in business method patents in terms of patent applications in the years 2007 and 2008. Then, the number of patent applications filed by Microsoft in the category G06Q dropped in 2010 and has never reached the previous peaks again, in the following years. In point of fact, a certain decrease in the amount of G06Q applications can be observed for most of the firms in the chart referring to 2010. This trend, either temporary and of minor importance in most of the cases, reflects the uncertainty that surrounded business method patents at that time; specifically, as already pointed out in chapter II, doubts were casted about the patentability of business methods in 2009 and 2010, as the *Bilski* affair in the US, and the Referral to the Enlarged Board of Appeal in Europe, took place.

Nevertheless, a certain positive trend for business method patents has emerged again after 2010, as shown by the general increase in the number of applications filed by most of the top-ten firms in the category G06Q. However, doubts casted by the *Alice* affair⁷⁸⁹ in the US seem to have affected the previous inclination to seeking patent protection for business methods. But not all the firms in the top-ten have engaged in this type of behaviour, namely cutting or stopping to file patent applications in the category G06Q. In particular, Google as well as Samsung and NEC maintain a positive attitude towards business method patenting. Notably, the number of patent applications filed by Google has increased significantly after 2010, especially in each of the years between 2011 and 2013. Such numbers are higher than the numbers of applications submitted in the three-year period before 2010. Therefore, according to the histogram, if Microsoft has played the leading role in category G06Q before 2010, Google is clearly the protagonist of the phenomenon nowadays.

⁷⁸⁹ Text to n. 190 Chapter II

4. Are the leading players really interested in business method patents?

According to the data analysis carried out until now, business methods emerge as a popular subject matter at the EPO. In particular, the data set has provided evidence of almost 35.000 different applications submitted in the category G06Q at the EPO. Moreover, our further investigation into the contents and details of the submitted applications has revealed that various types of entities are involved in the phenomenon, and with a very heterogeneous behaviour. Nevertheless, the reason of such popularity is not completely clear. As already discussed in Chapter III, large numbers of patent applications seems to be a common feature when inventions are implemented by computer or are related to Internet technologies. Referring to this type of inventions, indeed, more than one study has highlighted strategic purposes hidden behind the choice of firms to file numerous patent applications. Therefore, it could be possible that strategic reasons also drive the behaviour of firms in planning and applying for business method patents.

Indications in support of the possible existence of strategic behaviours in the category G06Q is provided by one of the plots that have been already presented in chapter IV. Such a plot, showing the number of granted patents versus the number of patent applications filed in the category G06Q in a double logarithmic scale, is reported here again in Figure 4. As already discussed, the plot provides a graphic representation of the considerable difference between the volume of patent applications submitted at the EPO and the number of patents eventually granted. Hence, the figure supports the idea that firms are in reality interested in filing applications more than in having patents granted. As a matter of fact, just a few of the applications filed in the category G06Q seem to satisfy all the requirements imposed by Article 52 EPC. Indeed only a small percentage of the applications successfully pass the EPO examination.

Additionally Figure 4 offers valuable insights now that the names of the most active firms in the business method context are reported in the plot.

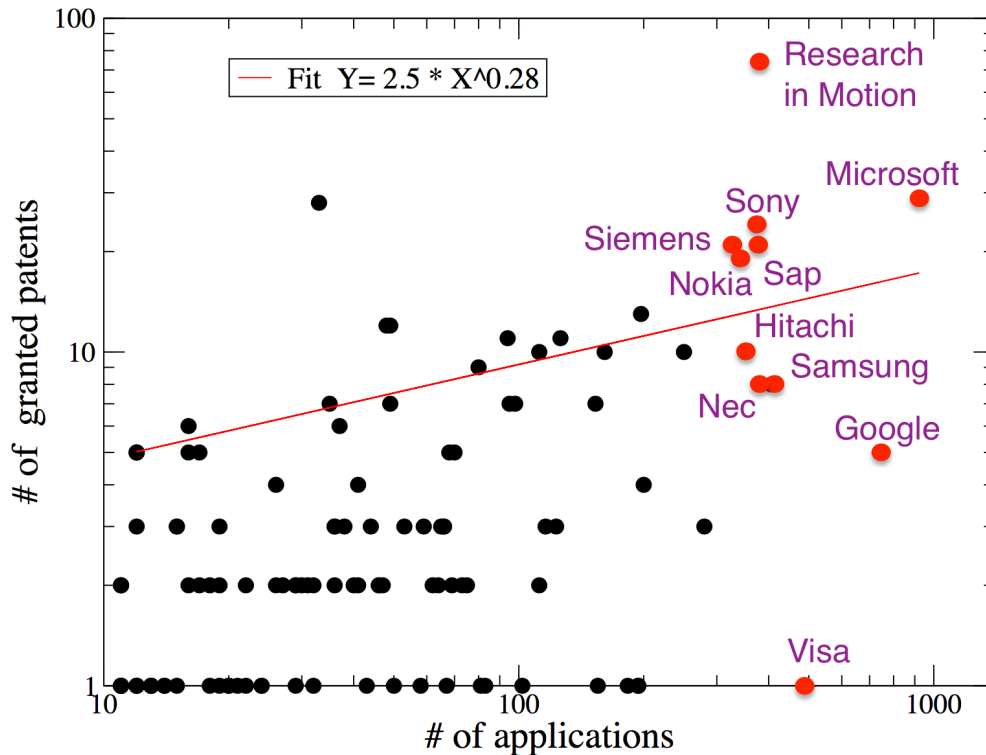


Figure 4. Same scatter plot as in Figure 10 of Chapter IV showing the number of granted patents vs. the number of filed applications in the category G06Q. Reported are only entities having filed at least 10 patent applications and having been granted at least 1 patent in the considered period 1991-2014. The names of the top-ten firms in terms of number of applications are also shown in the plot.

As the values reported in this graph already reveal (and will be clear from the following two tables), even if as expected the number of granted patents shows an overall increases with the number of filed applications, the most active firms in the category G06Q, i.e. the leading characters in terms of number of filed applications, are in general not the most successful ones in terms of granting patent protection for their business methods. In particular, the number of granted patented with respect to the number of filed applications can be significantly low for the top-ten firms, with three of them with less than 10 granted patents. In some of the cases, for instance for Google, this can be explained by the extremely long time, on average six years, spent by the EPO in ex-

aming patent applications.⁷⁹⁰ Indeed, as observed in Figure 3, the bulk of Google patent applications have been submitted after 2010, thus most of them might even not have been examined yet. However, the disproportion between the efforts of large firms to address business method patentability and the protection ultimately granted remains large even when one takes into consideration the effects of the delays in the examinations process. The extent of this inconsistency is evident from the computation of the so-called *success percentage*, namely the rate of success per company, defined as the percentage of successful applications with the respect to the total number of filed applications. This allows a quantitative comparison of the rate of success of the most active companies to the rate of success of the most successful ones. The results are reported in the following two tables. In particular, Table 1 shows the name of the firms with the highest ratio of granted patents per number of filed applications in the category G06Q. The last column of the table is the one reporting the values of the success percentage of the firms.

Name of applicant	Number of applications	Number of granted patents	Success percentage
Silver brokers	33	28	85 %
Swisscom	13	5	42 %
NCR	13	5	42 %
Diebold	13	5	42 %
Alcatel	16	6	37 %
Vodafone	16	5	31 %

Table 1. The top entities in terms of percentage of granted patent per filed applications in the category G06Q are shown together with the number of applications, the number of granted patents, and the success ratio. Firms are sorted in decreasing order of success percentage.

⁷⁹⁰ A Calulu, EPO Performance 1 – application pendency times (IPKAT, March 2016) <http://ipkitten.blogspot.co.uk/2016/03/epo-performance-1-application-pendency.html> accessed on 7th August 2017.

A success percentage equal to 85 % indicates that the company with the highest rate of successful application in Table 1, namely Silver Broker, has been granted 85 % of its patents. In this particular case in fact the firm has been granted 28 patents out of a total of 33 filed applications. Table 1 shows that, in the case of the most successful companies, the percentage of success can be quite high, as there are other firms with success percentages ranging from 30% to 50%. However, none of the most active firms in terms of number of applications, i.e. none of the key players in the category G06Q appears in this table. Table 2 lists instead the success percentages of the top-ten firms in terms of number of filed applications in the category G06Q. Apart from Research in Motion, which is in the first position with a success rate of almost 20%, all the other firms have been granted between 0.2 and 6.4 % of their applications. Indeed, Sony is the only other company in the table with a success ratio larger than 6%. The following two firms, the only two with a success percentage larger than 5%, are two European firms, namely Nokia and SAP. Also Siemens, which has not been included in Table 2 because it is not in the top ten by volume of applications (with the 11th largest number of applications, it is indeed the first excluded firm) has a success ratio larger than 5% (namely 6.36% with its 21 granted patents out of 330 filed applications). This suggests that, European based firms seem to know more about EPO procedures than other firms. Moreover, the table reveals that manufacturing firms, such as Research in Motion or Nokia, namely those involved in smartphones, are better than others in granting patent protections. Probably, it is far easier for this type of firms to provide enough evidence of technicality since the method is ultimately implemented by a technical medium, i.e. the smartphone.

Name of applicant	Number of applications	Number of granted patents	Success percentage
Research in Motion	379	74	19.52 %
Sony	374	24	6.41 %

Name of applicant	Number of applications	Number of granted patents	Success percentage
Nokia	340	19	5.58 %
SAP	377	21	5.57 %
Microsoft	922	29	3.14 %
Hitachi	351	10	2.85 %
Nec	383	8	2.09 %
Samsung	407	8	1.97 %
Google	743	5	0.67 %
Visa	490	1	0.20 %

Table 2. The top ten firms for total number of patent applications filed in the category G06Q are shown together with the number of applications, the number of granted patents, and their success ratio. Firms are sorted in decreasing order of success percentage.

Therefore, the comparison between Table 2 and Table 1, together with the results of Figure 4, highlights the inability of the big multinational firms to obtain patent protection for their business methods in Europe, even if they pour a considerable amount of money and time into filing large numbers of patent applications. At the same time, the results indicate that significant failure rate has not affected the determination of firms in obtaining patent protection, as patent applications have been filed consistently in the category G06Q over the years. Indeed, the low success rate does not seem to have had any impact on firms' interest in granting patent protection for business methods patent applications, as well as the strict EPO viewpoint into the business methods patents seems not to have been a deterrent for firms to filing patent applications in the category G06Q.

Certainly, the low rate of patent issuance in the category G06Q cannot go unnoticed. Such a low rate, indeed, seems to suggest that big companies are more interested in filing patent applications than in obtaining patent protection, when dealing with business methods. Thus, accumulating patent applications, rather than patents, might be

the real reason behind business methods. This ultimately supports the hypothesis that those firms that have filed numerous patent applications in the category G06Q at the EPO consistently over the years should have followed strategic purposes. Truly, some of the features of the patent thickening phenomenon seem to emerge in the backdrop of business method patents at the EPO.

According to the conclusions of the previous chapter, a high volume of patent applications can be an indicative factor of the firm's patent thickening attitude. Additionally, flooding patent offices with numerous patent applications has been described as a usual strategy to create such an uncertainty than competitors would avoid entering in the same market. Admittedly, the table discussed above shows that big firms take a great interest in filing numerous patent applications in the category G06Q at the EPO. Not only the total number of patent applications in this category is significant, but also the number of patent applications filed by each of the top-ten firms is surprising. On the other hand, firms appear uninterested to the quality of their applications as the collected data indicates that far less than 1% of applications are eventually granted. Thereby, a certain strategic approach could be involved in the firm choice for high volume application in the category G06Q.

Referring now to the uncertainty, a considerable ambiguity about the extent of patent protection can be thought to be due to the large amount of applications filed in the category G06Q. Especially, patent applications in this technological area are said to use broader language compared to other technical fields. Also their complexity has been highlighted according to the numbers of claims for each patent application. Moreover, the examination of patent applications at the EPO usually takes years, as already said. All this to confirm that the identification of the aspect of an innovative method covered by patent protection can result difficult, specifically when more than one patent application can potentially cover it and none of them has been examined yet. Uncertainty is ultimately created, so that in the meantime competitors would

rather prefer not to implement similar inventions and develop similar technologies, too. Conclusively, the analysed data seems to reveal a certain patent thickening attitude in the EPO context when referring to business method innovations. Thereby, significant evidences appear to exist that patent applications in category G06Q could be used not only to provide exclusive rights on the singular inventions, but also to strategically exclude rivals from using similar technologies, so that a wider protection is ultimately de facto received.

5. Patent citations and network analysis

Further evidences on patent thickening in business method patents can be provided by the analysis of the EPO network of patent citations in the category G06Q. As already discussed in Chapter V, citations have been analysed to evaluate some features of patents and patent applications performance.⁷⁹¹ In particular, according to the EPO Guidelines for Examination, in a patent application (but also later within subsequent submissions) applicants are asked to specify about pieces of previously existing knowledge upon which the invention is built.⁷⁹² These pieces can be scientific works, granted patents or published patent applications. Additionally, while investigating newness of claimed invention, patent officers can identify links between the new product or method and previous patents and patent applications. All these are labelled as citations and are recorded in the patent register at the EPO. Citations

⁷⁹¹ Text to para 3.3 Chapter V; see also on the link between number of citations and uncertainty of patent originality JR Allison, MA Lemley, 'The growing complexity of the United States patent system' (2002) 77 BUL rev. 77, JR Allison, EH Tiller. 'The business method patent myth' (2003) Berkeley Tech. LJ987, M Grimaldi, 'The patent portfolio value analysis: A new framework to leverage patent information for strategic technology planning' (2015) 94 Technological Forecasting and Social Change 286

⁷⁹² EPO Guidelines for Examination at <http://www.epo.org/law-practice/legal-texts/html/guidelines/e/index.htm>; C Webb et al., 'Analysing European and International Patent Citations: A Set of EPO Patent Database Building Blocks' (2005) OECD Science, Technology and Industry Working Papers 8 ("EPO search codes and their meaning: D Documents cited in the application i.e. already mentioned in the description of the patent application; L Documents cited for other reasons (e.g. a document that may throw doubt on a priority claim)")

are indeed a significant source of information.⁷⁹³ In particular, the number of citations per patent applications, or the type of citations (i.e. to scientific papers, to other patents, etc.), has been investigated to understand the quality of innovation in IT technological areas.⁷⁹⁴ Also citations have been studied referring to their relations and interactions, as already discussed in Chapter V.⁷⁹⁵

The best way to represent the entire patterns of relations among patents is to construct the corresponding network of patent citations, i.e. a network showing all patents and their relations in terms of citations. An example of how citations among patents can be transformed into, and represented as, a citation network is reported in Figure 5.

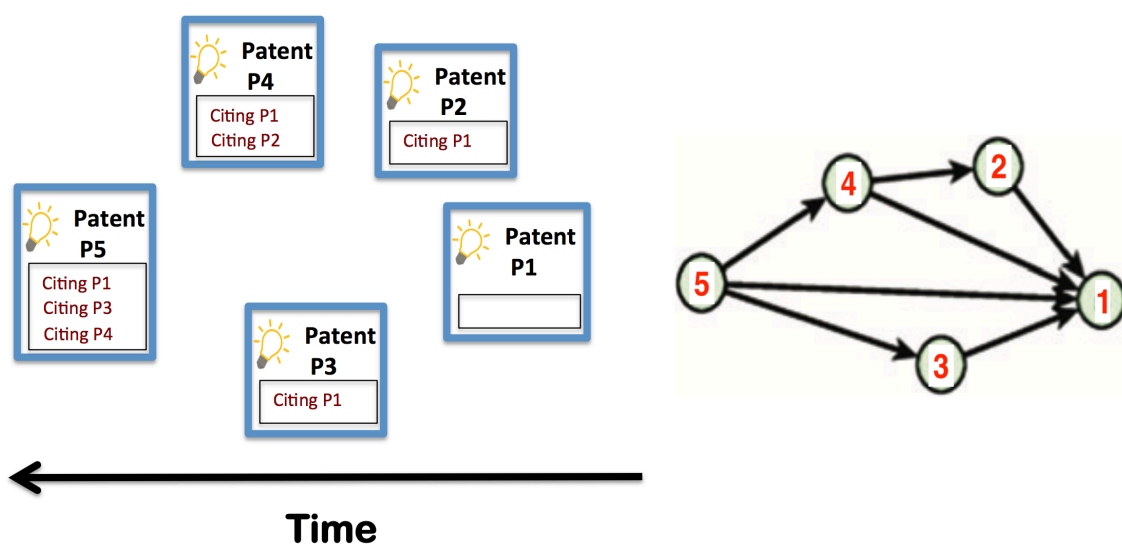


Figure 5. A network of citations among five patents is constructed from the document cited section of each patent (left), and is represented as a graph of $N=5$ nodes and $K=7$ directed links (right).

In the left hand side of the figure, five patents are shown together with their citations lists. The five patents, respectively indicated as P1, P2,

⁷⁹³ BH Hall, AB Jaffe, M Trajtenberg, 'Market value and patent citations' (2005) 36 RAND Journal of Economics 16, 18 ("These citations serve an important legal function, since they delimit the scope of the property rights awarded by the patent. Thus, if patent B cites patent A, it implies that patent A represents a piece of previously existing knowledge upon which patent B builds, and over which B cannot have a claim.")

⁷⁹⁴ P Almeida, 'Knowledge sourcing by foreign multinationals: Patent citation analysis in the US semiconductor industry.' (1996) 17 Strategic management journal 155; BH Hall, AB Jaffe, M Trajtenberg, 'The NBER patent citation data file: Lessons, insights and methodological tools' (2001) NBER Working paper n. w8498

⁷⁹⁵ Text to subsection 3.3 Chapter V

P3, P4 and P5, were numbered in temporal order of their submission. This means that P1 is the oldest patent, P2 is the second oldest one, and so on until the last patent P5. Only citations from a given patent to older ones are possible. For instance in the example reported, patent P2 cites patent P1, patent P3 cites P1, patent P4 cites patents P1 and P2, and lastly patent P5 cites P1, P3 and P4. Notice that citations of a patent are commonly divided into two classes, known as backward and forward citations. *Backward citations* are citations made from the patent to previous patents. *Forward citations* are instead all those citations that the patent has received by other patents.⁷⁹⁶ For instance, patent P4 in the example considered has two backward citations, namely to previous patents P2 and P1, and one forward citation, coming from patent P5.

The whole information contained in the left hand side panel can be schematically represented in a so-called *graph* (mathematical graph) reported in the right hand side panel. Graphs are the objects used in mathematics to describe networks.⁷⁹⁷ A graph, usually indicated by the symbol G consists of two sets, a set of N nodes or vertices representing the basic elements of the graph, and a set of K edges, where each edge consists of a unordered or of an ordered couple of nodes, according to whether the graph describes a network in which the directionality of links is relevant or not. Thus, graphs can be of two different types, respectively referred to as undirected graphs or as directed graphs. In the case of the graph G shown in the right hand side of Figure 5, patents are associated to nodes, and a directed link from node A to node B in G indicates that patent B is cited by patent A. The graph G has in this case $N=5$ nodes and $K=7$ directed links.

Drawing a graph, as done in the right hand side of the figure, is certainly the best way to highlight the basic features of the corresponding network: to show for instance the relations among its nodes, or the ar-

⁷⁹⁶ As it will be clear in the following, forward citations have an essential role in the analysis of the quality of a patent, as they quantify the extent of its impact.

⁷⁹⁷ Boccaletti et al, 'Complex networks: Structure and dynamics' (2006) 424 *Physics Reports* 175; V Latora, V Nicosia, G Russo *Complex Networks: Principles Methods and Applications* (Cambridge University Press, 2017)

chitecture of the system as a whole. Visualizations, however, are impossible when number of nodes and links in the graph are large, because the drawing that would be obtained in such a case would look too intricate to be useful, with too many packed nodes and crossing links. An alternative mathematical representation of graphs, which is also useful when a graph needs to be inputted into a computer software, for instance in order to evaluate numerically some of its properties, can be obtained by using a *matrix*, which in practice is a table of numbers. In particular, any graph G can be completely described by giving its so-called *adjacency matrix* A , which is a square table containing only 1 or 0, and telling whether for each pair of nodes in graph G there is a link connecting them or not.

The adjacency matrix of a graph is always a square matrix, i.e. is a table with the same number of rows and columns. Such a number is equal to the number of nodes in G . For instance, the adjacency matrix A of the graph in the right-hand side of the figure has $N=5$ rows and $N=5$ columns and reads:

$$A = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 0 & 0 & 0 \\ 1 & 0 & 1 & 1 & 0 \end{pmatrix}$$

There are seven values of the matrix equal to 1, because the graph has $K=7$ directed links. All the remaining values are set to 0. E.g. the value 1 in the fourth row and second column indicates that there is link from node 4 to node 2 in the graph, while in the fourth row and third column there is a 0 because there is no link from node 4 to node 3. This corresponds to saying that the entry, or element, a_{42} of matrix A is equal to 1, while a_{43} is equal to 0. Consequently one sets: $a_{42}=1$ and $a_{43}=0$. More formally, for any graph G with N nodes, the adjacency matrix of G is a $N \times N$ square matrix, i.e. a square table of $N \times N$ numbers, such that the element a_{ij} , i.e. the number in the i -th row and j -th column position ($i, j = 1, \dots, N$) is equal to 1 when there is a link from node i to node j , and

zero otherwise. Notice that each of the two labels i and j can take values from 1 to N . We indicate this as: $i, j = 1, \dots, N$. The diagonal of the adjacency matrix usually contains zeros if, as in the case shown in figure, it is not possible to have links from a node to itself. Otherwise, we can also have values equal to 1 in the diagonal positions. The adjacency matrix A of a generic graph G can then be written as:

$$A = \begin{pmatrix} a_{11} & a_{12} & a_{13} & \dots & a_{1N} \\ a_{21} & a_{22} & a_{23} & \dots & a_{2N} \\ a_{31} & a_{32} & a_{33} & \dots & a_{3N} \\ \dots & \dots & \dots & \dots & \dots \\ a_{N1} & a_{N2} & a_{N3} & \dots & a_{NN} \end{pmatrix}$$

Following, some basic graph definitions and quantities will be introduced. First, the focus will be on the graph nodes. The simplest way to characterize a node of a graph G is to count the number of its connections. Thus, a very important property of a node, known as the *node degree*, is its number of links. In the case of a directed graph, we can define two types of degrees for each node, namely the *out-degree*, equal to the number of links going out from the node, and the *in-degree*, equal to the number of links going into the node. The degrees of node i can be written in terms of the adjacency matrix of the graph. In fact, the out-degree of i , usually indicated as k_i^{out} , is equal to the sum of the elements in row i , while the in-degree of i , usually indicated as k_i^{in} , is equal to the sum of the elements in column i . They respectively read:

$$k_i^{out} = \sum_{j=1}^N a_{ij} \qquad k_i^{in} = \sum_{j=1}^N a_{ji}$$

The total degree k_i of node i is then the sum of its out-degree and its in-degree: $k_i = k_i^{out} + k_i^{in}$.

As an example, we can easily calculate the degrees of the nodes in the graph G in Figure 5 by summing respectively the values in the rows and in the columns of the corresponding adjacency matrix A , written above. We get:

$$k_1^{out}=0, k_2^{out}=1, k_3^{out}=1, k_4^{out}=2, k_5^{out}=3, \text{ and}$$

$$k_1^{in}=4, k_2^{in}=1, k_3^{in}=1, k_4^{in}=1, k_5^{in}=0.$$

Finally the total degrees of the five nodes are:

$$k_1 = 4, k_2 = 2, k_3 = 2, k_4 = 3, k_5 = 3,$$

which have been obtained by summing their in- and out-degrees.

Up to now, only networks where, for each pair of nodes, either there can be a link or not, have been considered. Such black or white, 0 (absence of link) or 1 (presence of link) situation, is an extreme case. Along with a complex connectivity structure, many real networks also display a large heterogeneity in the capacity and the intensity of their links. Examples are the existence of strong and weak ties among the individuals of a social network, unequal traffic in the Internet or in various transportation networks ⁷⁹⁸ or, as will be shown in the following sections of this chapter, also network of citations among firms.

Weighted networks can be represented in terms of so-called *weighted graphs*. A weighted graph is a graph such that a numerical value, namely a positive integer or a positive real number, is attached to each of its link. A weighted graph can be described by giving its weighted adjacency matrix W :

$$W = \begin{pmatrix} w_{11} & w_{12} & w_{13} & \dots & w_{1N} \\ w_{21} & w_{22} & w_{23} & \dots & w_{2N} \\ w_{31} & w_{32} & w_{33} & \dots & w_{3N} \\ \dots & \dots & \dots & \dots & \dots \\ w_{N1} & w_{N2} & w_{N3} & \dots & w_{NN} \end{pmatrix}$$

This is again a $N \times N$ matrix, where N is the number of nodes in the graph. The element w_{ij} , i.e. the number in the i -th row and j -th column position ($i, j = 1, \dots, N$) is different from 0 when there is a link from node i to node j , and zero otherwise. However, this time, the value of w_{ij} can be any positive number and denotes the intensity of the link, e.g. the number of contacts between two individuals in a social network or,

⁷⁹⁸ Boccaletti et al (797); Latora, Nicosia, Russo (797)

as in the case of interest for this research, the number of patents of a firm citing patents of another firm, in the network of firm citations.

The generalization of the concept of node degree is the so-called *node strength*. In the case of a directed graph, for a node we can define two types of strength, the *out-strength*, equal to the sum of the weights of the links going out from the node, and the *in-strength*, equal to the sum of the weights of the links going into the node. The strengths of node i can be written in terms of the weighted adjacency matrix of a graph. In fact, the out-strength of i , usually indicated as s_i^{out} , is equal to the sum of the elements in row i , while the in-strength of i , usually indicated as s_i^{in} , is equal to the sum of the elements in column i . They respectively read:

$$s_i^{out} = \sum_{j=1}^N w_{ij} \qquad s_i^{in} = \sum_{j=1}^N w_{ji}$$

The total strength s_i of node i is then the sum of its out-strength and its in-strength: $s_i = s_i^{out} + s_i^{in}$.

To conclude this section is useful to mention that the network approach to study citations has a long tradition, initially started with the pioneering works by Lotka in 1926 on the statistics of scientific citations.⁷⁹⁹ In 1965 Derek de Solla Price studied the first network of scientific articles at a world wide scale, obtained by linking each published article to the other articles mentioned in its footnotes or bibliography. It was in this work that a non-trivial power law was for the first time observed (and subsequently modelled) in both the in- and out-degree distributions of the citation network⁸⁰⁰. Since then, the statistical properties of the distribution of citations have been discussed in various works⁸⁰¹, and bibliographic references have been an object of great interest to identify influential publications and measure the impact of a work on the research community, but also to rank authors and scientific journals.

⁷⁹⁹ AJ Lotka, 'The frequency distribution of scientific productivity' (1926) 16 J Washington Academy of Science, 12

⁸⁰⁰ DJ de Solla Price, 'Networks of Scientific Papers' (1965) 149 Science 510

⁸⁰¹ S Redner, 'Citations Statistics from 110 years of Physical Review' (1998) 4 Eur. J. Phys. B 131.

Recently the power law behaviour of the in-degree distribution suggested the introduction of a novel indicator, the so-called *h-index* to quantify the impact of a scientist in the scientific community⁸⁰². Today comprehensive citations for papers published in academic journals, such as the *Science Citation Index*, can be searched through subscriptions, based on online platforms such as the Web of Science maintained by Thomson Reuters, while similar bibliographic databases, such as Google Scholar are freely available.

6. The network of firm citations

Networks of citations among patents have also been thoroughly studied, especially in the context of innovation and knowledge transfer, and patent analysis has become a vital tool for identifying technological trends.⁸⁰³ Patent citation networks, when studied at the most basic level, namely *at the level of citations among patents*, have been shown to exhibit statistical properties similar to those observed in networks of citations among scientific papers. This indicates that article citation networks and patent citation networks can share a common type of mechanisms.⁸⁰⁴ However, also features peculiar to patent citation networks have been discovered. As already discussed in chapter V, patent citation networks have been employed, *at the level of citations among firms*, to detect possible strategic use of patents.

Recent studies have adopted network methodology to investigate the strategic use of patents to build patent thickets. For instance, von

⁸⁰² JE Hirsch, 'An index to quantify an individual's scientific research output' (2005) 102 P. Natl. Acad. Sci. USA 16569

⁸⁰³ Hall, Jaffe, Trajtenberg (793); Hall, Jaffe, Trajtenberg (794); AB Jaffe, M Trajtenberg, *Patents, citations, and innovations: A window on the knowledge economy* (MIT press, 2002); BH Hall, D Harhoff, 'Recent Research on the Economics of Patents' (2012) NBER Working paper n. 17773 < <http://www.nber.org/papers/w17773> > accessed on the 20th June 2017, 541; D Harhoff et al. 'Citation frequency and the value of patented inventions' (1999) 81 Review of Economics and statistics 511; JO Lanjouw, M Schankerman 'Patent quality and research productivity: Measuring innovation with multiple indicators' (2004) 114 The Economic Journal (2004) 441

⁸⁰⁴ S Valverde et al, 'Topology and evolution of technology innovation networks' (2007) 76 Physical Review E, 056118.1.

Graevenitz et al. have analysed patent citations among firms to assess the degree of patent thickening.⁸⁰⁵ The basic idea is that important information on strategic use of patents can be extracted by looking at cases in which firm A cites a patent of a firm B, while firm B cites a patent of firm A. Such mutual citation links are deemed to be signals of firms that can block each other. Following this argument, when citations result in a bilateral relationship between firms, cross licensing is assumed as highly possible because it is the best way to avoid infringements and cost raising, allowing both firms to fully exploit all the patents related to the same technology. Thus, finding reciprocal citations in the network among firms can reveal, on one hand, possible market inefficiencies, but, on the other hand, the firms' propensity to reduce or eliminate those inefficiencies by reaching cross-licensing agreements.⁸⁰⁶

Even more complicate and worth of attention is the case of the so-called *triples* i.e. three firms, each owning patents that block patent applications of the other two firms. Reaching an agreement among three firms is more difficult, since the bargaining problem cannot be resolved through independent bilateral bargaining by each firm pair in the triple. Hence, hold-up and cost rising, i.e. market inefficiencies can occur more frequently in the cases of triples,⁸⁰⁷ unless a patent pool is created.⁸⁰⁸ All this considered, Georg von Graevenitz et al. have proposed to use the number of triples in the network of citations among patent applications at the EPO as way to identify inefficiencies in the market, thereby measuring the density of patent thickets.⁸⁰⁹ In this way, they

⁸⁰⁵ G von Graevenitz, S Wagner, D Harhoff 'How to measure patent thickets: A novel approach' (2011) 111 Economics Letters 6; BH Hall, G von Graevenitz, C Rosazza-Bondibene, 'A Study of Patent Thickets' (The Intellectual Property Office, 2013) <<http://www.ipo.gov.uk/ipresearch-thickets.pdf> > accessed at 20th June 2017

⁸⁰⁶ M Grimaldi et al, 'The patent portfolio value analysis: A new framework to leverage patent information for strategic technology planning' (2015) 94 Technological Forecasting and Social Change 286, 289

⁸⁰⁷ Hall, Graevenitz, Rosazza-Bondibene (805) 39

⁸⁰⁸ Ibid ("Where multiple triples arise within the same network of firms it is highly likely that these will overlap creating ever more complex bargaining problems that require recourse to patent pools or standards for their resolution.")

⁸⁰⁹ G von Graevenitz, S Wagner, D Harhoff (805) 7

have identified that patent thickets particularly affect complex technology areas.⁸¹⁰

In this work, a network analysis of the citation relations among firms in the context of business methods patents will be performed. In order to study the patterns of patent citations, the same data set described in Section 4 of Chapter 4 will be used. In particular, all patent applications published until the date of 2nd June 2014 under the category G06Q have been considered to construct a complex network. Notice that in this network, nodes would not represent patents, but firms, as in the studies by von Graevenitz et al. mentioned above. Namely, in the constructed network, nodes represent entities having filed at least one patent application in the considered category, and where there is a directional link from entity A to entity B if at least one patent application filed from A cites an application filed from B. To better clarify, since only patents and patent applications that have been quoted at the EPO register with an EP number have been taken into consideration, then the links between firms only map relationships in an European context. Notice also that the work by von Graevenitz et al. considered citations according to their blocking potential, i.e. to the probability that the user of one patent could infringe the cited one. For such a reason, only critical citations between patent applications were taken into account (namely citations of type X and Y)⁸¹¹, while in this work all citations, not only the critical ones will be considered.

⁸¹⁰ Ibid 8

⁸¹¹ Webb et al (792) (“EPO search codes and their meaning: X Particularly relevant documents when taken alone (a claimed invention cannot be considered novel or cannot be considered to involve an inventive step); Y Particularly relevant documents if combined with one or more other documents of the same category, - such a combination being obvious to a person skilled in the art; A Documents defining the general state of the art (but not belonging to X or Y); O Documents which refer to non-written disclosure ; P Intermediate documents - documents published between the date of filing of the application being examined and the date of priority claimed; T Documents relating to the theory or principle underlying the invention (documents which were published after the filing date and are not in conflict with the application, but were cited for a better understanding of the invention) E Potentially conflicting documents – Any patent document bearing a filing or priority date earlier than the filing date of the application searched but published later than that date, and the content of which would constitute prior art”)

The network produced in this way has $N=1,501$ nodes and $K=1,397$ links, and from now on will be referred to as the firm citation network of category G06Q at the EPO, notwithstanding the fact its nodes can be firms but also banks, universities and other entities, to stress its difference from a network where the nodes are patents. Notice that the number of nodes in the network is much smaller than the total number of entities in our data set, namely 14,230. This is due to the fact that the network contains only entities that have filed at EPO a patent application in the category G06Q in the period examined, but also have cited or received citations from other patent applications. Specifically, the network contains only those entities that have cited at least one of the previous patent applications in the same category, thus they have at least one backward citation, i.e. $k_{out} \geq 1$, or have been at least cited once, thus they have at least one forward citation, i.e. $k_{in} \geq 1$. This drastically reduces the number of entities, producing a network with 1,501 nodes, all of them active, i.e. with at least one in-going or out-going link, plus a set of other $14,230-1,501=12,729$ non-active entities which can be considered as the isolated nodes of the network, but will not be taken into account in the following analysis and, for simplicity, will not be shown in the following figures. Of the 1,501 active nodes in the network, we have 636 nodes with $k^{out}=0$ (no backward citations) and $k^{in} \neq 0$, 674 nodes with $k^{in}=0$ (no forward citations) and $k^{out} \neq 0$, and 191 nodes with both $k^{in} \neq 0$ and $k^{out} \neq 0$.

Figure 6 shows the out- and the in-degree distributions of the network.

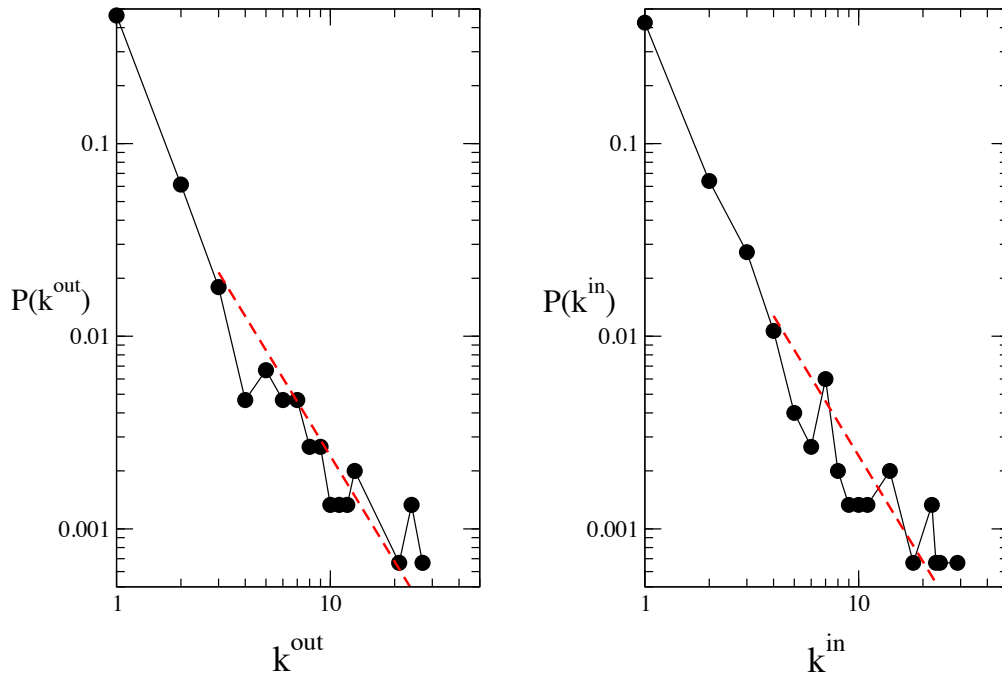


Figure 6. Out-degree (left) and in-degree (right) distributions of the firm citation network. The y-axis shows the probability of finding a node of out-degree k^{out} (left) or of in-degree k^{in} (right). A double-logarithmic scale has been adopted. The dashed lines are power-law fits to the tails of the distributions, of the form $P(k) \sim k^{-\gamma}$, with exponents $\gamma^{out} = 1.8$ and $\gamma^{in} = 1.9$.

The out-degree distribution has been constructed by computing the number $N(k^{out})$ of nodes in the network with out degree k^{out} , and then by evaluating the probability distribution as the ratio $P(k^{out}) = N(k^{out})/N$, where $N=1,501$ is the total number of nodes in the network. The in-degree distribution $P(k^{in})$ has been constructed analogously, from the number of nodes $N(k^{in})$ with a number of in-going links equal to k^{in} . The figure then shows on the y-axis the quantities $P(k^{out})$ and $P(k^{in})$, as a function respectively of k^{out} and k^{in} on the x-axis, and tells what is the probability of a finding a node of a given degree. For instance, the panel on the left hand side indicates that more than 40% of the nodes have out degree $k^{out} = 1$, while 7% of the nodes have $k^{out} = 2$, and only 2% have $k^{out} = 3$. Although such a distribution is decreasing, it is possible to find nodes with a large out degree, e.g. there is one company with $k^{out} = 27$, and two companies with $k^{out} = 24$. Analogously it is possible to find nodes with large in degree. In particular, there is one company with $k^{in} = 29$ in-going citations, and another one with $k^{in} = 24$.

The degree distributions are both *scale-free*. It is indeed possible to fit the long tails of the distributions with a power-law, i.e. a function of the form $P(k) \sim k^{-\gamma}$. The two exponents extracted are respectively $\gamma^{out} = 1.8$ and $\gamma^{in} = 1.9$, and are in agreement with other exponents found in the literature ⁸¹².

In this sense, the results confirm that, the same scale-free properties found in networks of citations among scientific papers, and in other complex networks (such as social networks, and the network of hyperlinks among Web pages in the Internet), also emerge in networks of citations among firms. Moreover, exponents close to a value equal to 2 denote that citation of patent application are very heterogeneously distributed among the various firms, so that only a few of them get the largest majority of citations. It can then be interesting to focus on the names of the firms in the tails of the degree distributions reported in Figure 6. This can be done by ranking the network nodes by their out- or in-degree, i.e. we can rank the corresponding companies by their number of citations to other patent applications in the same category (backward citations), or by the number of received citations (forward citations). The results, reported in the two lists in Table 3, indeed, confirm the significant role played by some well know companies in the IT sector. Consistently with other indications emerged in the analysis performed in Chapter IV, the large and almost equal numbers of backward and forward citations demonstrate the central role played by Google in the business method patent phenomenon in Europe. The same can be said for Research in Motion (Blackberry). In point of fact, Blackberry has developed a favourable approach to patents, as indicated recently.⁸¹³ And that could account for the key role played also in the

⁸¹² Boccaletti et al (797); Latora, Nicosia, Russo (797)

⁸¹³ J Mullin 'Blackberry enters a new era, files 105-page patent lawsuit against Avaya' (ARS Technica Uk 2016) <<https://arstechnica.co.uk/tech-policy/2016/08/blackberry-avaya-patent-lawsuit/>> accessed 7th August 2017 ("BlackBerry revolutionized the mobile industry," the company's lawyers wrote in their complaint. "BlackBerry... has invented a broad array of new technologies that cover everything from enhanced security and cryptographic techniques, to mobile device user interfaces, to communication servers, and many other areas.")

field of business methods. Regarding other firms, the two lists indicate less balanced approaches. For examples, Nokia is more interested in technologies that have been developed by other firms. In contrast, Visa seems to have filed applications that attract the attention of other firms.

1	Research in Motion	27		1	Visa Int.	29
2	Google	24		2	Research in Motion	24
3	Nokia	24		3	Microsoft	23
4	Samsung	21		4	Accenture	22
5	Microsoft	13		5	Google	22
6	Alcatel	13		6	Nec	18
7	Siemens	13		7	Fujitsu	14
8	LG Electronics	12		8	Sap	14
9	Visa Int.	12		9	Alcatel	14

Table 3. Companies in the top positions for out-degree (left) and in-degree (right) are listed together with their values of k^{out} (left) and k^{in} (right).

When looking more specifically at the structure of firm citation networks, it is important to notice that such networks can have properties very different from those of the networks of citations among patents. In fact, a patent citation network, i.e. a network whose nodes are patents, corresponds to what in mathematics is known as a directed acyclic graph (a network without directed cycles). In fact, patents have a temporal order associated and, because of temporal constraints, substructures in which a node A has a link to node B, node B has a link to node C, and also node C has a link to node A, cannot exist in patent networks. Conversely, directed cycles are well possible in networks of citations among firms, because it is possible that, at the same time, firm A cites a patent of firm B, firm B cites a patent of firm C, and firm C cites a patent of firm A. Also, in networks of citations among firms it is possible that firm A cites a patent of firm B, while firm B cites a patent of firm A. Differently from the networks previously constructed, the produced firm network can also be seen as a weighted network, meaning that a numerical value, the so-called link weight, can be associated to each link. Such a value has been obtained by counting the number of different patent applications of a firm citing patent applications of another firm (or of the same firm as well). This is because the number of citations is taken as a measure of how closely two firms operate in the same technological field and are interested in similar inventions. So that, if the link from firm A to firm B has a weight $w_{AB}=5$, this means that firm A holds 5 applications citing applications of firm B. If the self-link from firm A, i.e. the link connecting node A to itself has a weight $w_{AA}=3$, this means that firm A holds 3 applications citing applications of the same firm. Notice that, as it is possible that there is a link from node A to node B but vice versa the link from B to A does not exist, for most of couples of nodes A and B, the weight w_{AB} of the link from A to B is different from the weight w_{BA} of the link from B to A. Figure 7 shows the distribution of link weights observed. The plot reports the number of links of a given weight w , and indicates that most of the links, precisely 1,232 out of the total number $K=1,397$ have a weight $w=1$. This means that, most couples of connected companies A and B, represent cases in

which only one patent application of company A cites one patent application of company B. Then, there are 119 links with a weight equal to 2, and very few links with large values of their weights, for instance only three links with a weight larger than 10, respectively with exactly $w=12$, $w=22$ and $w=39$.

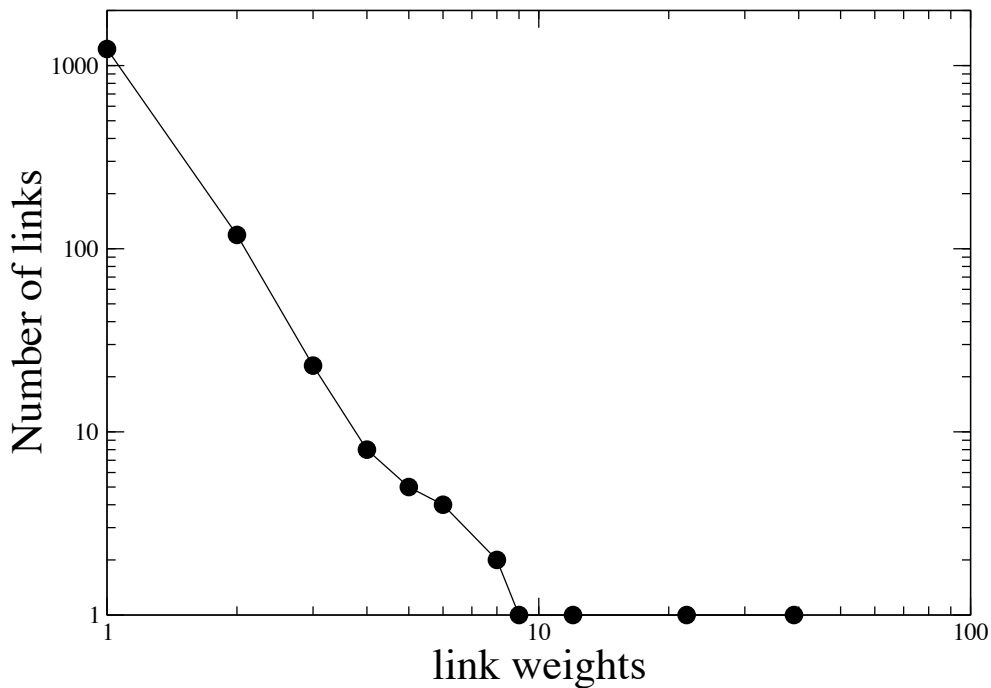


Figure 7. Link weight distribution of the firm citation network. The plot shows the number of links with a given weight w as a function of the link weight.

Interestingly, all the three largest weights correspond to self-links. More precisely, the link with $w=39$ is the self-link (loop) of the node representing Research in Motion, the link with $w=22$ is the self-link of the node representing Amadeus sas, while the link with $w=12$ is the self-link of the node Sap ag. This means, for instance, that Research in Motion has 39 citations going from some of its patent applications to some others of its patent applications. Self-citations are quite common in the constructed network. We have in fact found that 68 links correspond to self-citations. The number of reciprocated links is instead smaller. The network has in fact only 11 couples of firms, let say A and B, such that

the link from A to B is accompanied by the presence of the link from B to A. The 11 reciprocated couples are reported in Table 4.

Research in motion	Nokia
Research in motion	Samsung
Hitachi	Toshiba
Nokia	Microsoft
Research in Motion	Google
Siemens	Sap
Visa Int	Visa USA
Salamander	Mood_internat
Alcatel Lucent	IBM
Nec	Hitachi
Research in Motion	Vodafone

Table 4. The eleven pairs of reciprocated links in the firm citation networks. These correspond to pairs of firms, such that the first firm has at least one patent application citing a patent application of the second firm, and the other way around.

In a weighted network another interesting node property analogous to the node degree is the so-called *node strength*. While the degree is equal to the number of links of a node, the node strength is the sum of all the weights of the links of the node. In a directed weighted network as the one we are dealing with, each node is characterized by its out- and in-strength. Figure 8 reports respectively the out- and the in-strength distribution. The first distribution has been constructed by computing the number $N(s^{out})$ of nodes in the network with out strength s^{out} , and then by evaluating the probability distribution as the ratio $P(s^{out}) = N(s^{out})/N$, where $N=1,501$ is the total number of nodes in the network. The in-strength distribution $P(s^{in})$ has been constructed analogously, from the number of nodes $N(s^{in})$ with an in-strength equal to s^{in} . The figure then shows on the y-axis the quantities $P(s^{out})$ and $P(s^{in})$, as a function respectively of s^{out} and s^{in} on the x-axis, and tells what is the probability of a finding a node of given strength. For instance, the panel on the left

hand side indicates that about 40% of the nodes have out strength $s^{out} = 1$, while 9% of the nodes have $s^{out} = 2$, and only 2% have $s^{out} = 3$. It is however possible to find nodes with a large out strength, e.g. there is one firm with $s^{out} = 82$, and another one with $s^{out} = 36$. Analogously, it is possible to find nodes with large in degree. In particular, there is one firm with $s^{in} = 72$ in-going citations, one with $s^{in} = 42$, and another one with $s^{in} = 31$.

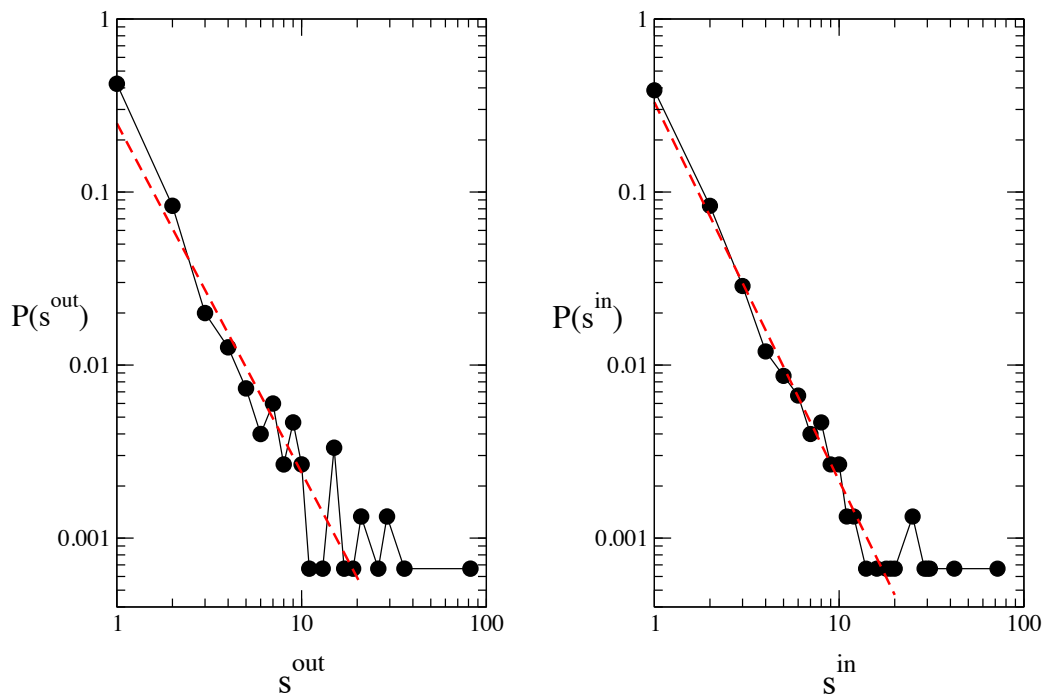


Figure 8. Out-strength (left) and in-strength (right) distributions. The y-axis shows the probability of finding a node of out-strength s^{out} (left) or of in-strength s^{in} (right). A double-logarithmic scale has been adopted. The dashed lines are power-law fits to the tails of the distributions, of the form $P(s) \sim s^{-\gamma}$ with exponents $\gamma^{out} = 2.0$ and $\gamma^{in} = 2.2$.

As for the case of the degree distributions, also the strength distributions are *scale-free*. It is indeed possible to fit the distributions with a power-law, $P(s) \sim s^{-\gamma}$, with the two exponents $\gamma^{out} = 2.0$ and $\gamma^{in} = 2.2$. Again this confirms the high heterogeneity of the nodes of the network. We can rank the firms in the network by their out- or in-strength. Firms in the top positions are reported in the two lists in Table 5.

1	Research in Mo- tion	82		1	Research in Motion	72
2	Amadeus	36		2	Microsoft	42
3	Samsung	29		3	Visa Int	31
4	Google	29		4	Accenture	30
5	Nokia	26		5	Google	29
6	Sap	21		6	Sap	25
7	Siemens	21		7	Amadeus	25
8	Microsoft	19		8	Siemens	20
9	Hitachi	17		9	Nec	19

Table 5. Companies in the top positions for out-strength (left) and in-strength (right) are listed together with their values of s^{out} (left) and s^{in} (right).

To have a more precise idea of the global structure of the firm citation network, it is possible to perform a component analysis of the corresponding graph, and to show graphically the resulting largest connected components. In a directed graph there are two possible types of components that can be extracted, namely the so-called *weakly-connected components* and the *strongly-connected components*. A *weakly-connected component* consists of all those nodes, such that from each node is possible to go to any other node, using links, but not taking into account the directionality of the links. The firm citation graph has 377 weakly-connected components. The largest weakly-connected component of the graph has $N=699$ nodes and $K=910$ directed links, and is much larger than all the others: for instance the second-largest weakly-connected component has only $N=8$ nodes. Also, the largest weakly-connected component has 67 triangles, i.e. triples of connected nodes, and the average distance between any couple of nodes is equal to 4.79. But unfortunately, the largest weakly-connected component of the graph is way too big to be drawn.

A *strongly-connected component* of a directed graph is instead a component made by those nodes such that, for each couple of node, let us say A and B, it is possible to go from A to B, but also from B to A, by following the graph links with their directionality. The firm citation network has 1463 strongly-connected components, the largest one with $N=38$ nodes and $K=111$ directed links, the second one with only $N=2$ nodes. Therefore, apart from the largest one, all the other strongly-connected components are very small, namely are made by two nodes or by single nodes. The graph corresponding to the largest strongly-connected component, having only $N=38$ nodes can be graphically shown and is reported in Figure 9.

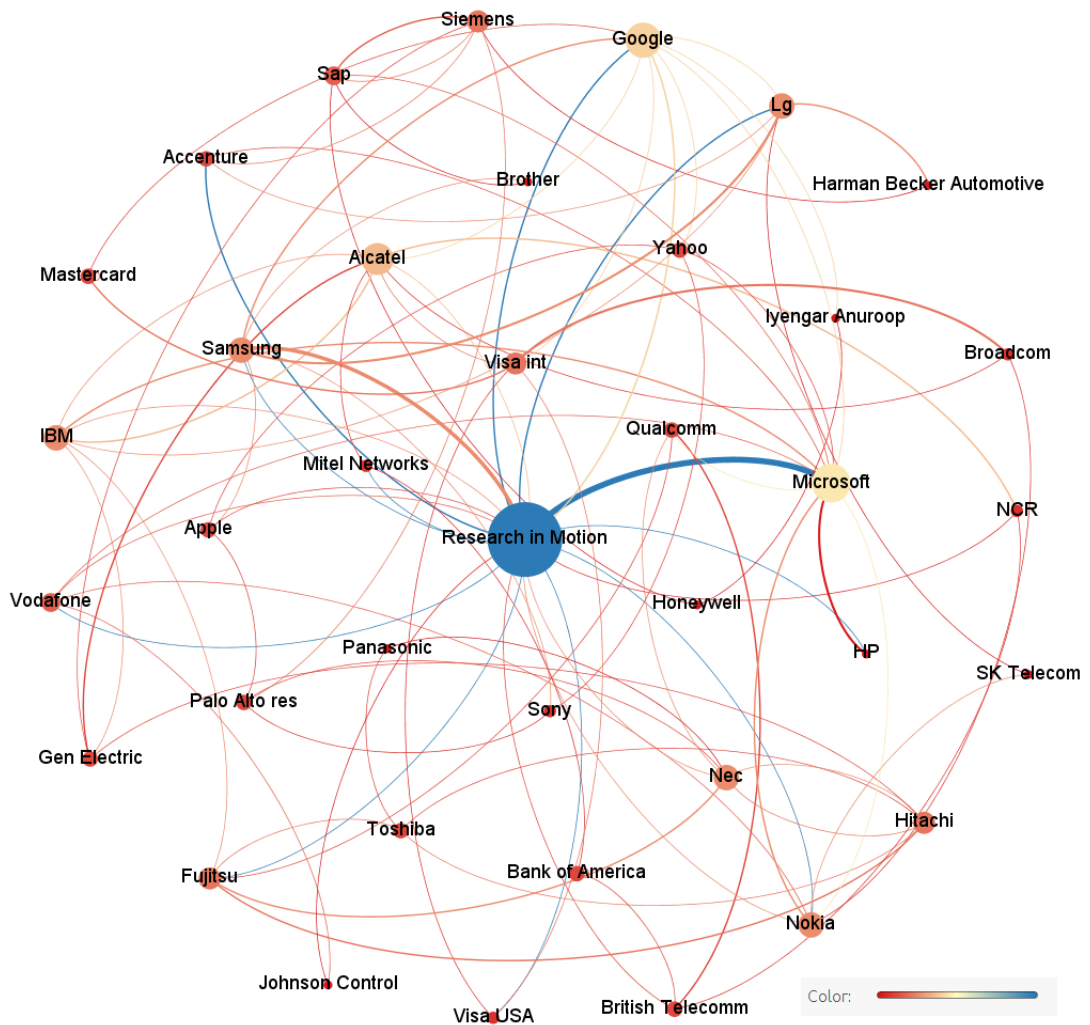


Figure 9. The largest strongly-connected component of the firm citation network has $N=38$ nodes and $K=111$ directed links. Each node is a company, and both size and colour of the node indicate the total degree of the node (i.e. the sum of the node out- and in-degree). Blue coloured nodes are those with large total degree, while red coloured nodes have small degree. Links are directed, so that there can be up to two links connecting the same couple of nodes. To graphically distinguish the two links, the out-going link of a node is coloured with the

same colour as the node. The link widths represent the weight of the links. For simplicity self-loops, i.e. links from a node to itself have not been shown.

The graph contains many relevant companies in the sector, and $K=111$ directed links among them, showing the activity of the companies in citing patents of other companies. The maximum distance between two nodes of the graph is equal to 8, while the average distance is 3.6. If we neglect the directionality of the links, the graph contains 31 triangles. The size of each node and its color in figure indicate the total degree of the node, i.e. the sum of the node out- and in-degree. The color code adopted is reported in the bottom right corner of the figure. In particular, blue coloured nodes are those with large total degree, while nodes with small degree are coloured in red. Links are directed, so that there can be up to two links connecting the same couple of nodes. To graphically distinguish the two links, the out-going link of a node is coloured with the same colour as the node. The link widths represent the weight of the links. For simplicity self-loops, i.e. links from a node to itself, have not been shown. We can further reduce the complexity of the plot by keeping of the 38 nodes of the largest strongly-connected component of the graph, only those nodes with a total degree larger or equal to 5. We get in this way the graph with $N=18$ nodes shown in Figure 10. Such a graph, although being only a portion of the entire network, can give interesting insights on the global relations between firms in the category G06Q according to patent applications filed at the EPO.

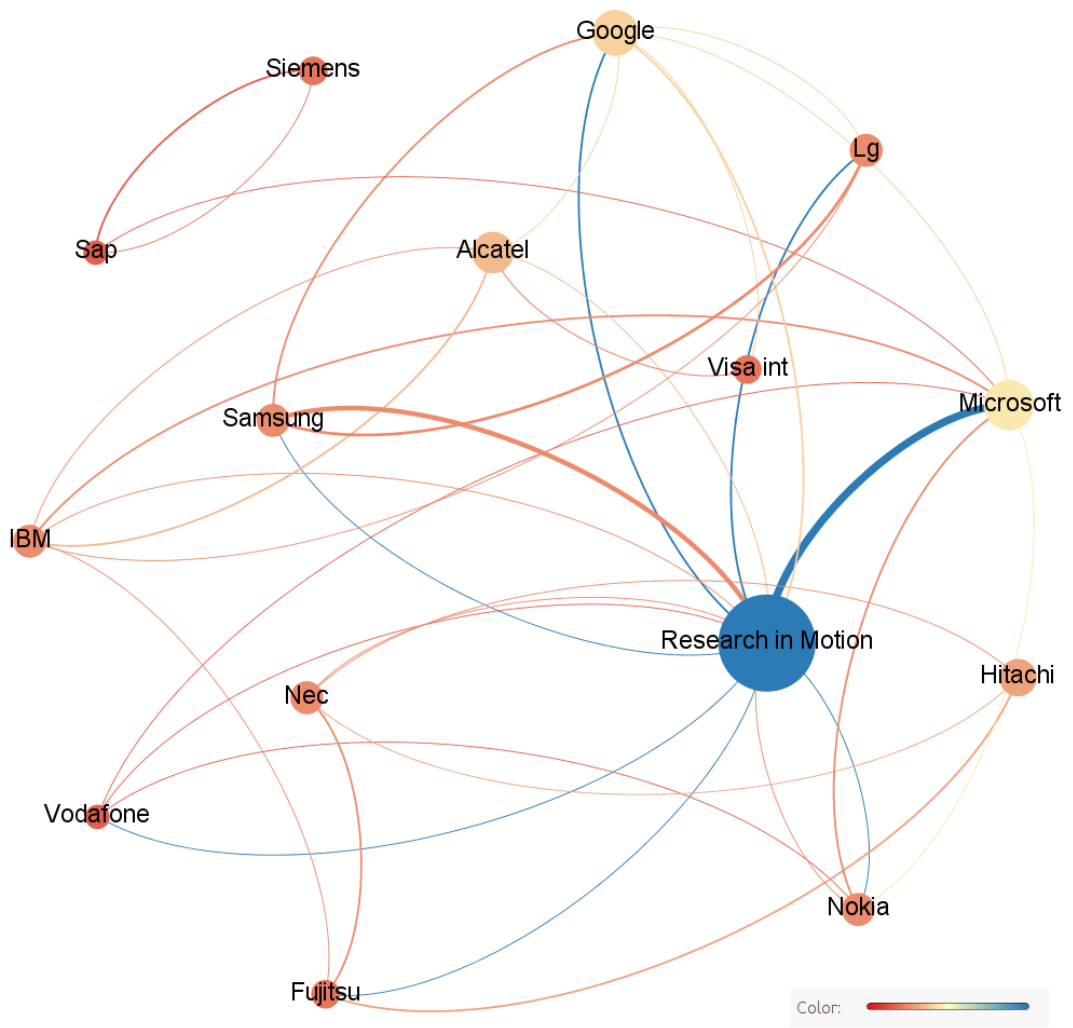


Figure 10. Portion of the largest strongly-connected component of the firm citation network, showing only the N=18 nodes with at least a total degree equal to 5, and the links among them. Same colour code for nodes and link as in the previous figure has been adopted.

According to Figure 9 and Figure 10, Blackberry represents the core of the network. Such a firm is directly linked to most of the other players in the business method context. In particular, Blackberry is connected with two of the other major players, namely Google and Microsoft, whose patents and patent applications seem to be mostly cited in the applications filed by Blackberry at the EPO.

Research in Motion	Nokia	Google
Research in Motion	Nokia	Vodafone
Research in Motion	Nokia	Samsung

Research in Motion	Nokia	Microsoft
Research in Motion	Google	Samsung
Research in Motion	Google	Vodafone
Research in Motion	Samsung	Vodafone
Nec	Toshiba	Hitachi

Table 6. The eight triples of nodes with five links in the network.

Instead, Samsung often cites patents and patent applications filed by Blackberry, which is quite understandable as both firms are involved in the mobile business.

The key role played by Blackberry is also confirmed by the results on the number of triples reported in Table 6. Since the network does not contain mutually locked triples of firms, i.e. triples of nodes connected by all the six possible links among them,¹ triples of nodes connected by five links have been investigated. Blackberry, indeed appears in seven of the eight triples with five links found in the network and reported in Table 6. Hence, it seems to occupy a blocking position in the market together with other well-know firm in the market of smartphones, such as Samsung or Hitachi. These firms are therefore at high risk of developing patent thicket behaviours.

Similar conclusions can also be reached with respect to strongly mutually connected couples of firms, such as Sap and Siemens or LG and Samsung, according to the quantitative analysis synthetized in the networks in Figure 9 and Figure 10. Indeed Sap and Siemens show to be bi-directionally coupled (blocked) with links of high weights. The same happens for the couple made by LG and Samsung.

Another significant result emerging from Figure 9 and Figure 10 is the lack of strong relationships between Google and Microsoft, which are the two firms with the highest number of patent applications in the cat-

¹ G von Graevenitz, S Wagner, D Harhoff (805) 39

egory G06Q. At least in theory, the possibility of having citations between patent applications filed by Google and those filed by Microsoft should be high. And, indeed, the two firms cite and are cited by most of the firms in the citation network. However, Microsoft and Google have no strong link between them. This can be quite reasonable when one considers that Microsoft is a technological firm involved in development of software, whereas Google is probably, mainly, a media company.² All this seems to corroborate the idea that business methods are a cross-cutting topic; as such, business method patents can cover a wide array of topics. Indeed, the lack of links between Google and Microsoft indicates that such two big firms develop their inventions in so diverse areas that innovations are developed independently from each other, even if patent applications are filed in the same category, the category G06Q. On the other hand, the absence of links between these two firms in the citation network seems to suggest a low risk of patent thickets between Microsoft and Google in the category G06Q at the EPO.

7. Some conclusions

The quantitative analysis provided in this chapter reinforces some of the conclusions reached in Chapter IV. The network of citations among firms that has been constructed and analyzed has given indication that a large variety of diverse types of inventions can be involved in the category G06Q at the EPO. As such, the category proves to be a cross cutting one. The category G06Q, therefore, seems not only to involve different type of entities, but also diverse kinds of inventions. Additionally, and more crucially, the quantitative analysis performed in this chapter seems to support the hypothesis that strategic reasons can explain the incredible interest to seek patent protection for business methods in Europe. In particular, the low rate of granted patents, the compelling interest in filing patent applications, as well as some interesting links among the firms involved in this technological area, are all arguments

² M Helft 'Is Google a Media Company?' *NYTimes* (New York, 10 August 2008)

that support this idea. In the following chapters, some ill effects of thicketing in business method patents will be described, whereas possible legal remedies will be investigated in Chapter VIII and Chapter IX.

Chapter VII

What inefficiencies created by business-method patent thickets?

1. Introduction

The quantitative analysis of Chapter VI has revealed the possible existence of strategic purposes hidden behind the popularity of business method patent applications at the EPO. Further, the investigation carried out in Chapter VI has confirmed that patent thicket behaviours have to some extent developed in the category G06Q at the EPO. Both the impressive number of patent applications filed in the category G06Q and the dense network of citations among patent applications of the major players in the field, have ultimately corroborated the hypothesis suggested in Chapter III that applications related to business methods category are filed not to grant patent protection to inventions, but to generate uncertainty, thereby strengthening the position of firms, especially the big ones, in the market.

As was briefly explained in Chapter V, strategic use of patents, specifically patent thickets, can result in some detrimental effects for firms that are forced to license several patents with a significant increase in their costs. But there is more: the practice of filing several patent applications and overlapping them can adversely affect also society. Indeed, innovation can be stifled and competition can be ultimately reduced or nearly eliminated in the market for technologies to which the patent thickets relate.¹ According to the indications provided in Chapter V, this chapter aims to focus on detrimental effects occurring specifically when patent thickets are developed in computer-implemented invention (CII)

¹ BH Hall, G von Graevenitz, C Rosazza-Bondibene, 'A Study of Patent Thickets' (The Intellectual Property Office, 2013) <<http://www.ipo.gov.uk/ipresearch-thickets.pdf> > accessed 20th June 2017, 44

areas, as it is the case of business methods. The chapter is organised into two parts. The first section will provide a general overview on the inefficiencies that are usually related to patent thickets developed in computer-implemented invention area. The second section, instead, will focus on some of those detrimental effects. In particular, effects such as hold-up,² double mark-up³ or tacit collusion, which are often castigated for creating market inefficiencies, will be examined.

2. Strategic patenting, inefficiencies and competition in computer implemented inventions

In the 1990s, the development of complex technologies, including software and computer technologies, resulted in filing of an ever-increasingly number of patent applications. In the US, the phenomenon was examined from the outset by the Carnegie Mellon survey, which was concluded in the early 1990s.⁴ The survey, in particular, put forward that the firm's resolution to patent was just not to do with profiting from their inventions.⁵ Among such other considerations were the blocking of rivals to patent related inventions, the preventing of infringement suits and the strengthening of position in negotiations.⁶ In particular, the so-called patent intensive firms, such as computer or electronics industries, were identified as a clear exponent of strategic patenting. Admittedly, new technology entrepreneurs used mostly patents "either to extract licensing revenue or to force inclusion in cross licensing negotiations".⁷ Moreover, antitrust worries started to be expressed, as the survey indicated that patents were often tools for maintaining an oligopolistic position in the market since "firms patent not only to protect their own technology, but to hold their rivals hostage

² Text to n.25 Chapter V

³ Text to n. 106

⁴ Text to n. 7 Chapter IV; W Cohen, J Walsh, R Nelson 'Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)' (2000) NBER working paper w7552 <<http://www.nber.org/papers/w7552>> accessed on the 20th June 2015

⁵ Ibid. 3

⁶ Ibid. 17

⁷ Ibid. 22

by controlling technology that they need.”⁸ In particular, small firm difficulties encountered when entering or remaining in the market were highlighted as possible drawbacks of intensive patenting.⁹

Similar concerns were voiced in an analysis regarding cumulative innovations performed in the same years.¹⁰ According to Gallini, firms were driven to file more than a single application for the same invention when innovative products or processes were based on previous inventions, as happened in software or business methods.¹¹ As already explained in Chapter V, filing several application related to the same invention can result in create difficulties in defining clear boundaries between patents, thereby causing uncertainty on what is ultimately covered by each application.¹² The study proved that this behaviour was seen as appropriate to avoid the infringement threat, according to the fact that large patent portfolios could efficiently serve defensive purposes.¹³ However, Gallini suggested that such a growth in number of patent applications had the effect to discourage firms from entering the market.¹⁴ Most obviously, small firms were deterred, as they could not afford to file several applications.¹⁵ Indeed, small firms were generally not strong enough to avoid infringement by others or to settle on the best terms due to the lack of large patent portfolio.¹⁶ Therefore, new entrepreneurs unable to reduce the threat of patent litigation ultimately decided not to implement their invention. Competition in the market was, thus, negatively affected.¹⁷

In the same way, an empirical analysis of the semiconductor industries revealed the tendency by those firms to accumulate large numbers of

⁸ Ibid. 26

⁹ Ibid. 27

¹⁰ NT Gallini, ‘The economics of patents: Lessons from recent US patent reform’ (2002)

¹⁶ The Journal of Economic Perspectives 131

¹¹ Ibid. 146

¹² Text to Chapter V

¹³ Gallini (10) 140

¹⁴ Ibid. 145

¹⁵ Ibid. 143

¹⁶ Ibid. 136

¹⁷ Ibid. 144

patents.¹⁸ Indeed, according to Hall and Ziedonis, big semiconductor firms were likely to amass patent portfolios for offensive and defensive reasons since, depending on their size, the benefits of accumulating a large number of patents outweighed costs.¹⁹ Nevertheless, concerns were raised as “a firm lacking a strong patent portfolio of its own with which to negotiate licensing or cross-licensing agreements could face a more rapid erosion of profits in an era when the costs and risks associated with infringement had increased”.²⁰ Consistent with this, a certain tendency to collusive practices was concluded by a study focusing on patent complementarity in complex technologies.²¹ In particular, firms involved in complex technologies were shown to be inclined to strategic interactions, often resulting in cartel behaviour. Specifically, evidence was provided that firms already in the market were more inclined to price fixing so that rival firms’ production efforts decreased and access of small firm in the market was hindered in the end.²² Maurer, also, reached consistent conclusions in his analysis of the patent thicket phenomenon in the US.²³ Significantly, the relation between “patent flood”²⁴ and rise of predatory behaviours, i.e. actions only done to exclude rivals, was the centrepiece of the study.²⁵ Further studies confirmed the suspicion of the some strategy behind patent thickening.²⁶ In particular, suggestion was made that broad claims in patent applications as well as the use of continuation²⁷ - resulting in the overlapping of several patents related to the same invention - were strategically

¹⁸ BH Hall, RH Ziedonis, ‘The patent paradox revisited: an empirical study of patenting in the US semiconductor industry, 1979-1995’ (2001) 32 *The RAND Journal of Economics* 101

¹⁹ *Ibid.* 110

²⁰ *Ibid.* 109 – 110

²¹ Harhoff et al, *The strategic use of patents and its implications for enterprise and competition policies - Tender for No ENTR/05/82* (European Commission, 2007) <https://ueaeprints.uea.ac.uk/37550/1/study-202852-2008_en_2475.pdf> accessed on the 20th June 2017, 109

²² *Ibid.* 112

²³ MJ Meurer, ‘Business Method Patents and Patent Floods’ (2002) 8 *Wash. UJL & Pol’y* 309

²⁴ Text to n. 132 Chapter III

²⁵ Meurer (23) 325

²⁶ N van Zeebroeck, B van Pottelsberghe de la Potterie, ‘Filing strategies and patent value’ (2011) 20 *Economics of innovation and new technology* 539

²⁷ Text to n. 161 Chapter V

placed to sue rivals for infringement, to settle extracting high royalties, to ultimately increase the market value of patents.²⁸

The fact that patent thickets are created with the aim of raising costs of rivals emerges as a well-known feature of the phenomenon according to the findings of the already discussed studies. In this respect, it should be noted that the possibility has been indicated that a dominant firm can strategically affect costs of competitors.²⁹ As such, rivals' cost is intentionally raised either to foreclose the market or to reduce competition by forcing competitors to raise their prices.³⁰ Most recently, Hall et al has demonstrated the relationship between patent thicketing and market inefficiency regarding to the UK experience.³¹ Specifically, a lower propensity to patenting has been indicated in those industries where patent thickets are denser.³² This points forward the idea that thickets can result in "some kind of barrier to entry in those technology areas in which they are present".³³ In particular, sunk costs, i.e. 'costs that protect incumbents against competitive entry'³⁴ are taken into consideration. In point of fact, patents can be sunk costs considering that newcomers in the market need to license them to implement the invention.³⁵ Thus, patents can result in fixed costs to enter the market. Nevertheless, sunk costs are not anticompetitive per se. Equally, patents are not anti-competitive per se. According to Hall et al, patents can result in detrimental effects on competition when it is necessary to acquire a large number of them, as it happens when patent thickets are built.³⁶ In such case, thus, 'patent thickets are barriers to entry, if they create important negative externalities for firms not in possession of

²⁸ van Zeebroeck, van Pottelsberghe de la Potterie (26) 560

²⁹ SC Salop, DT Scheffman, 'Raising rivals' costs' (1983) 73 *The American Economic Review* 267; SC Salop, DT Scheffman, 'Cost-raising strategies' (1987) *The Journal of Industrial Economics* 19

³⁰ Salop, Scheffman (1987) (29) 33

³¹ Hall, von Graevenitz, Rosazza-Bondibene (1)

³² *Ibid.* 59

³³ *Ibid.* 60

³⁴ *Ibid.* 12

³⁵ *Ibid.* ("A patent is the right to exclude others from practicing an invention. Therefore, in principle a patent will function to increase fixed (and most likely sunk) costs of entry into a market where the invention protected by the patent is practiced.")

³⁶ *Ibid.* 26

large patent portfolios and if no offsetting social benefits can be ascribed to the factors causing thickets to arise.³⁷

According to this brief overview on theoretical models as well as on empirical surveys, firms involved in computer implemented invention area, such as business method or software one, tend to use patents strategically. Indications are, also, provided that patent thicketing approach can result in inefficiencies in those technological areas. Investment in innovation can be discouraged as result of patent thicketing. The intentional uncertainty generated by patent thickets can also be used to increase rivals' cost, thereby to foreclose the market. Thus, patent thickets can easily produce detrimental effects for the society, especially when computer technology is involved.

3. Ill effects of patent thickets in business method patents

This research has already made plain that filing several patent applications as well as describing inventions via broad or overlapping claims are not illegal practices in and of themselves. Similarly, the exploitation of monopolistic rights is integral with the logic of patent protection.³⁸ Thus, it is perfectly legitimate. Nevertheless, when neutral actions, such as those just described, are used for strategic and eventually harmful purposes, doubts are cast and concerns are expressed on the need and effectiveness of patent protection.³⁹ Notably, this includes the case of business methods, which are routinely questioned considering the increase in number of patent applications and the spreading of intentional overlapping that is often correlated to patent offices' positive attitude towards business method patents.⁴⁰

³⁷ Ibid. 13

³⁸ Text to Section 2 Chapter IX

³⁹ Ex multis, DL Burk, MA Lemley, 'Policy levers in patent law' (2003) 89 Va. L. Rev. 1575; JR Allison, MA Lemley, DL Schwartz, 'Our Divided Patent System' (2015) The University of Chicago Law Review 1073.

⁴⁰ Ex multis, J Bessen, MJ Meurer, *Patent failure: How judges, bureaucrats, and lawyers put innovators at risk* (Princeton University Press 2008); Meurer (23)

Admittedly, as already discussed in chapter V, patent thickening can result in using patents and patent application strategically, i.e. beyond the purpose for which the law grants them. As such, strategic behaviours can ultimately undermine the effect sought by granting patent protection. Indeed, in the case of cumulative inventions it seems that the most important effect of patents could not be anymore an increase in innovation, always given as the overarching reason in according patent protection.⁴¹ Given this, it is important in the context of this research to analyse in more details some of the possible effects that can result from granting protection to computer implemented inventions, which are one of the most significant example of cumulative innovations. In particular, detrimental effects will be focused.

3.1 Less investment in research

Patent monopoly has been traditionally viewed in connection to R&D investments. According to literature reviewed in Chapter III, the prospect of monopolistic uses of inventions is one of the major drivers for firms invest in innovation and to devote significant amount of money toward R&D project. In particular, the more a firm eyes earning through the development innovative products, the more it is interested in patent protections and monopolistic use of inventions, the more it invests in R&D.⁴² Therefore, from the traditional point of view, patent protection directly influences motivation to invest in innovation, with beneficial effects on society.

Nevertheless, a recent study has reached the opposite conclusion regarding computer- implemented technologies.⁴³ For the purpose of the study conducted by Bessen, an economic theoretical model has been

⁴¹ Text to Section 4.1 Chapter III

⁴² S Scotchmer, 'Protecting early innovators: should second-generation products be patentable?' (1996) 27 *The Rand Journal of Economics* 322

⁴³ J Bessen, *Patent Thickets: Strategic Patenting of Complex Technologies* (SSRN, March 2003)

< <https://ssrn.com/abstract=327760> or <http://dx.doi.org/10.2139/ssrn.327760>> accessed on the 7th July 2017

developed regarding cumulative inventions, such as business method and other computer-implemented inventions. In particular, the model emphasises the firm's perception that patent protection can be rewarding when the "winner of the innovation race is also the sole winner of a monopoly patent right".⁴⁴ Most obviously, it is the common scenario when final products are based on a singular invention, i.e. on a singular patent. Conversely, in cumulative inventions, patents protect only a portion of the technology. Hence, in the latter situation profits emanating from innovation are shared among all patent holders, so that a firm's investment in innovation is often not efficiently remunerated.⁴⁵ According to this model, hence, firm propensity to invest in research seems to be negatively affected when innovation profits, i.e. profits emanating from marketing new products or licensing patents, should be shared with others. Indeed, in such a scenario it is firms' belief that patent rights are not able to generate positive outcomes.⁴⁶ Ultimately, the study correlates the finding on low-remuneration in cumulative innovation area with the high probability of patent thickening in these same areas. Therefore, suggestions are made that firms are less interested in patent protection and tend to put fewer resources into R&D, when patent thickening behaviours take place.⁴⁷

Decrease in R&D investment has been also linked to another aspect of patent thickening. In particular, correlation between patent thickets and increasing of legal costs has been often highlighted regarding cumulative inventions. As already covered in the chapter V, the practice of filing several patent applications related to the same invention can result in a lack of clarity in technology ownership that, together with low patenting standards, can give rise to firm possibility to assert or to be asserted.⁴⁸ With this in mind, speculation has been made that decreasing in investment in R&D can occur also as a result of aggressive

⁴⁴ Ibid. 13

⁴⁵ Ibid. 5

⁴⁶ Ibid. 19

⁴⁷ Ibid. 20

⁴⁸ Text to n. 69 in Chapter V

behaviours in litigation. Notably, in areas such as software and business methods, firms can easily understand the technology behind new products. Thus, the creation of competing products, which implement similar technologies, is simple and usually not expensive. Given it, firms are not prone to implement a “mutual non-aggression” strategy. Instead, they tend to file several lawsuits seeking to secure their head-start position in the market. Nevertheless, a significant part of their budget can be ultimately devoted to cover legal costs.

Recently, the correlation between investment in R&D and patent thickets has been analysed in an empirical research.⁴⁹ During the 1990s, software industries were scrutinized, with focus given to the rapid increase in the numbers of patent applications at the beginning of the Digital revolution. According to the study’s conclusions, this growth could not be connected to an increase in investment in innovation; rather, legal changes in processes to obtain patents were indicated as the main reason for that growth. Moreover, the relationship between the number of patent applications and aggressive strategic behaviour was put down to the new attitude toward patenting shown by firms, specifically by the “usual suspect” industries, i.e. industries seem using patents for strategic reasons.⁵⁰

3.2 Low quality patents

This research has already established that patent thicketing usually results in increasing the number of patent applications.⁵¹ Consistently, a recent survey has proved that the practice of forming ‘thickets’ of pre-existing patents and pending patents has led to an exponential growth in the number of applications in computer-implemented invention are-

⁴⁹ J Bessen, R Hunt, ‘An Empirical Look at Software Patents’ (2007) 16 *Journal of Economics & Management Strategy* 157

⁵⁰ *Ibid.* 184

⁵¹Text n. 1 Chapter V

as.⁵² However, as many have pointed out, patent offices worldwide were not ready for this rise in the number of applications.⁵³ As such, significant delays causing patent backlogs are often highlighted as one of the main difficulties encountered by patent offices over the world, specifically in software-related technologies where the practice of filing more than one application referring to the same invention, is most widely adopted.⁵⁴

The point has also been that patent offices flooded by this incredible number of applications have been often unable to devote the sufficient time to properly examine each application.⁵⁵ Hence, statutory patentability requirements, in particular novelty and the inventive step, have not been properly scrutinised.⁵⁶ Equally, it has been voiced that patent offices were not equipped to deal with digital technologies. Indeed, the lack of sufficiently large databases has been often criticized, especially at the outset of the software industries.⁵⁷ As such, it has been put forward that both the increasing in number of patent applications and the difficulties in finding all the existing previous art, have ultimately affected the quality of patent examinations. Thus, the quality of patents has ultimately been reduced, particularly in technological area, such as business method, where inventions are computer-implemented.⁵⁸

⁵²I Hargreaves, *Digital opportunity: a review of intellectual property and growth: an independent report* (2011) <<http://bipp.com/Portals/0/public/docs/Hargreaves%20Report.pdf>> accessed on the 20th June 2017, 54

⁵³ MA Lemley, C Shapiro, 'Probabilistic Patents' (2005) 19 J. Econ. Persp. 75, 83

⁵⁴B Mitra-Kahn et al *Patent backlogs, inventories, and pendency: An international framework* (UK Intellectual Property Office, 2013) <<http://www.ipo.gov.uk/propresearch.htm>> accessed 7 July 2017, 1 ("the term "backlog" as such is not well defined. To some it refers to all unexamined applications, to some all pending applications, and to some "excess" applications beyond office capacity."); Hall, von Graevenitz, Rosazza-Bondibene (1) 27

⁵⁵ Bessen, Meurer (40) 18-19

⁵⁶ AB Jaffe, J Lerner, *Innovations and Its Discontents: How Our Broken Patent System is Endangering Innovation and Progress, and What to Do About It* (Princeton University Press, 2004)

⁵⁷ Hall, von Graevenitz, Rosazza-Bondibene (1)10; Bessen, Meurer (40) 160-164; M Likhovski, 'Fighting the Patent Wars' (2001) E. I. P. R. 267, 270-272

⁵⁸ Hall, von Graevenitz, Rosazza-Bondibene (1) 26-27; RP Merges, 'As many as six impossible patents before breakfast: Property rights for business concepts and patent system reform (1999) Berkeley Tech. LJ577

The definition of patent quality is usually related to the capacity of a patent to meet the requirement of novelty, non-obviousness, and sufficiently description of the invention.⁵⁹ Additionally, the validity and the broadness of the claims have been indicated as features to be taken into account in the assessment of patent quality.⁶⁰ Most recently, the patent quality has been related to the tendency of patents to be questioned.⁶¹ Thus, the number of either patent opposition proceedings or cases involving patent infringement has been examined.⁶² Referring specifically to software, Allison et al indicate that computer implement inventions are litigated more often than other inventions, thereby assuming the low quality of these types of patents.⁶³ Conversely, analysing the EPO context, a recent empirical research has proved that low quality patents could not be necessarily involved in litigations.⁶⁴ In particular, Harhoff et al. indicates that firms are less likely to oppose rivals' patents when patent thicketing takes place.⁶⁵ Indeed, a counter-opposition is highly concerned according to the uncertainty generate by patent thicketing. Specifically, firms developing patent thicket approach seem to face fewer oppositions compared to others.⁶⁶ Hence, "post-grant opposition cannot be relied upon to reduce the effects of patent thickets on patent quality".⁶⁷ Therefore, all this appears to confirm that patent thicketing approach can negatively affect patent quality of computer implemented inventions, although an increase in litigation could not be

⁵⁹ R Polk Wagner, 'Understanding Patent-Quality Mechanisms' (2009)157 U. PA. L. REV. 2135, 2138 (The study provides the definition of quality patent as the "capacity of a granted patent to meet (or exceed) the statutory standards of patentability – most importantly, to be novel, non-obvious, and clearly and sufficiently described."); SW Graf, 'Improving patent quality through identification of relevant prior art: approaches to increase information flow to the patent office' (2007) 11 Lewis & Clark L. Rev.495, 499

⁶⁰ BH Hall, D Harhoff, 'Post-grant reviews in the US patent system—design choices and expected impact' (2004) Berkeley Tech. LJ989, 992

⁶¹ BH Hall, D Harhoff, 'Recent Research on the Economics of Patents' (2012) National Bureau of Economic Research Working paper n. 17773 <<http://www.nber.org/papers/w17773> > accessed on the 20th June 2017, 35-36

⁶² Hall, von Graevenitz, Rosazza-Bondibene (1) 26

⁶³ JR Allison, MA Lemley, J Walker, 'Patent quality and settlement among repeat patent litigants' (2010) 99 Geo.LJ 677, 702

⁶⁴ D Harhoff, G Von Graevenitz, S Wagner, 'Conflict Resolution, Public Goods, and Patent Thickets' (2015) 62 Management Science 704

⁶⁵ Ibid. 707

⁶⁶ Ibid. 715

⁶⁷ Hall, von Graevenitz, Rosazza-Bondibene (1) 26

always implied.

3.3 Asymmetry in bargaining positions and information

Reasoning on the cumulative nature of inventions and on constraints to use complex technologies,⁶⁸ the propensity for extensive patenting has been highlighted as one of the main features of software industry behaviour.⁶⁹ As already discussed in Chapter V, patent overlapping as well as the habit of filing low-quality patent applications has been observed as a consequence of the tendency of software and ‘new economy’ industries to collect and file numerous patent applications, often much more than they need to manufacture final products.⁷⁰ However, not every firm in those new markets can afford the costs of extensive patenting. Therefore, practices of building big patent portfolios can result in creating asymmetric positions in the market. Most obviously, firms with large patent portfolio have more ease in fixing licensing terms in their favour: getting “more chits to trade” is a useful mean to gain bargaining power.⁷¹ Significantly, software firms seem to be well aware of the bargaining power deriving from quantity instead of quality.⁷² As been indicated, these firms strategically use patent ownership to secure and increase their bargaining position not only in the patent but also in the downstream market, thus in final product market.⁷³ Hence, asymmetric bargaining power has been pointed out to be a common result of patent thickening, especially in computer- implemented invention areas.⁷⁴ As will discuss in the following subsections, inefficiencies, such as hold-up

⁶⁸ W Cohen, J Walsh, R Nelson ‘Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)’ (2000) NBER working paper w7552 <<http://www.nber.org/papers/w7552>> accessed on the 20th June 2015, 19 (“the key difference between a complex and a discrete technology is whether a new, commercializable product or process is comprised of numerous separately patentable elements versus relatively few.”)

⁶⁹ M Noel, M Schankerman, ‘Strategic patenting and software innovation’ (2013) 61 *The Journal of Industrial Economics* 481, 483

⁷⁰ Text to n.129 Chapter V

⁷¹ Noel, Schankerman (69) 483

⁷² CV Chien, ‘The Market for Software Innovation through the Lens of Patent Licenses and Sales’ (2017) 31 *Berkeley Tech. L.J.* (forthcoming) 22

⁷³ *Ibid.* 27

⁷⁴ Hall, Graevenitz, Rosazza-Bondibene (1); J Bessen, E Maskin ‘Sequential innovation, patents, and imitation’ (2009) 40 *The RAND Journal of Economics* 611

and tacit collusion, can be generated in the market as a result of asymmetric bargaining positions.

Furthermore, asymmetry in information has been viewed as a possible cause of inefficiency.⁷⁵ This is particularly evident in the issue of equal access to information related to cumulative innovation. Notably, the threat of being imitated is strongly perceived when new inventions can be built on the preceding one, as it often happens in software and digital contexts when new products are based on processes already patented.⁷⁶ As a result, firms are reluctant to share information relating to either technical or R&D costs.⁷⁷ Therefore, the possibility exists that firms strategically use unclear language when describing patent claims to impede their rivals to follow-up innovation processes.⁷⁸ Further, failures in licensing are often thought to be due to asymmetrical information in those contexts where innovation is cumulative. Ultimately, the lack of information, which rivals have on innovative process, can result in the setting of royalties that are not mutually profitable.⁷⁹

3.4 Hold-up

From an economic perspective, hold-up problems arise when parties intentionally refrain from cooperating, thus inefficiency results in the markets because parties ultimately agree on terms that are not the best that could be reached.⁸⁰ Regarding cumulative inventions, hold-up has

⁷⁵ MA Lemley, C Shapiro, 'Probabilistic Patents' (2005) 19 J. Econ. Persp. 75, 83

⁷⁶ MA Lemley, 'Software Patents and the Return of Functional Claiming' (2013) Wis. L. Rev. 905, 910-911

⁷⁷ CM Kalanje, 'Role of intellectual property in innovation and new product development' (WIPO, 2006) <http://www.wipo.int/sme/en/documents/ip_innovation_development_fulltext.html> accessed the 7th July 2017

⁷⁸ J Bessen, E Maskin, 'Sequential innovation, patents, and imitation' (2009) 40 The RAND Journal of Economics 611, 613

⁷⁹ Ibid. 626

⁸⁰ Department of Justice of United States, Federal Trade Commission of United States, *Antitrust Enforcement & Intellectual Property Rights: Promoting Innovation & Competition* (DIANE Publishing, 2007), 35 <<http://www.ftc.gov/reports/innovation/P040101PromotingInnovationandCompetitionrpt0704.pdf>> accessed the 7th July 2017, (The report describes the phenomenon from the investment point of view "The hold-up problem indicates the prospect of under-investment in collaborations in which parties must sink investments that are specific to the collaboration, investments that may be costly to redeploy or have a significantly

been linked to the practice of applying disproportionate royalty terms in licensing agreements. Computer – implemented inventions indeed, seem to lead obviously to market inefficiency, whereby fragmentation of patent ownership can facilitate the requirement of royalties that far exceed the economic value of the protected invention.⁸¹ Due to the firms necessity of licensing several patents to implement the technology, patent holders are more likely to engage in opportunist behaviours and to extract high payments, especially using the threats of legal action, i.e. the leveraging of injunctions.⁸²

As Shapiro highlighted, the risk carried by issuing a huge number of patents related to the same technology is that a single product or service could infringe on many patents, thereby the possibility of injunction increases as well as the propensity to pay greater royalties to avoid legal actions.⁸³ According to the US Supreme Court hold-up effects are particularly likely in patent thicketing because in such contexts “an injunction . . . can be employed as a bargaining tool to charge exorbitant fees.”⁸⁴ Notably, in cumulative inventions, any feature - even small or trivial- is important to fully implement the innovative technology. As such, injunctions pose a great threat once commercialization of the innovation is started because any changes could be very expensive, especially when a great deal of time and money has been spent to implement the invention.⁸⁵ Therefore, removing of any one single patented piece of a particular technology could block, if an injunction is issued, firms from producing or even marketing their

lower value if redeployed outside of the collaboration. The potential for one party to hold-up another party that has sunk investments specific to the relationship may discourage that other party from investing efficiently in the collaboration in the first place”)

⁸¹ MA Lemley, ‘Ten Things to Do About Patent Holdup of Standards (and One Not to)’ (2007) 48 BCL Rev. 149, 152

⁸² MA Lemley, C Shapiro, ‘Patent Holdup and Royalty Stacking’ (2007) 85 Tex. L. Rev. 1991, 1992

⁸³ C Shapiro, ‘Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting’ (2001) 1 Innovation Policy and the Economy 119, 121

⁸⁴ *eBay Inc. v. MERCEXCHANGE, LL*, 547 U.S. 388 (2006), 396 (Kennedy, J., concurring).

⁸⁵ Shapiro (83) 121

products.⁸⁶ Several examples of tactic use of injunctions can be found in the newspapers over the last years, especially among firms that are competitors in the same market.⁸⁷ All this considered, the risk of being sued for infringement and the threat of being blocked ultimately in using lawful components could hugely incentivise rival firms to sign agreements, often cross-licensing ones, even when licensing can result in paying high royalties or multiple royalties, i.e. royalty stacking.⁸⁸ The upshot is undoubtedly detrimental for consumers and competition.⁸⁹

However, the risk of hold-up is significantly different depending if licensing, in particular cross licensing, is agreed before or after that patent applications are filed.⁹⁰ Specifically, *ex post* cross licensing can lead to markedly different outcomes when compared to *ex ante* one. *Ex ante* cross licensing, in particular, is often resorted to a possible solution of hold-up problems.⁹¹ The sharing of information and knowledge resulting from cross licensing during the development of new technolo-

⁸⁶ Ibid. 121-122

⁸⁷ J Halliday, 'Apple ruling blocks Samsung Galaxy Tab shipments across EU' *The Guardian* (London, 4 July 2012), <<https://www.theguardian.com/technology/2011/aug/10/samsung-galaxy-tablets-seized>> accessed on the 2nd August 2017; C Arthur, 'HTC victory over Apple in latest round of patent battle' *The Guardian* (London, 4 July 2012), <<https://www.theguardian.com/technology/2012/jul/04/htc-apple-patent-ruling>> accessed on the 2nd August 2017; C Arthur, 'HTC sales may be banned in UK after Nokia wins patent dispute' *The Guardian* (London, 3 December 2013), <<https://www.theguardian.com/technology/2013/dec/03/nokia-patent-dispute-htc-sales-banned-uk>> accessed on the 2nd August 2017

⁸⁸Lemley, Shapiro (82) 1993 ("Royalty stacking refers to situations in which a single product potentially infringes on many patents, and thus may bear multiple royalty burdens. The term "royalty stacking" reflects the fact that, from the perspective of the firm making the product in question, all of the different claims for royalties must be added or "stacked" together to determine the total royalty burden borne by the product if the firm is to sell that product free of patent litigation. As a matter of simple arithmetic, royalty stacking magnifies the problems associated with injunction threats and holdup, and greatly so if many patents read on the same product.")

⁸⁹ CV Chien, MA Lemley, 'Patent Holdup, the ITC, and the Public Interest' (2012) 98 *Cornell L. Rev* 1,6; EPO Scientific Advisory Board, *Patent Aggregation and Its Impact on Competition and Innovation Policy* (EPO,2014) (The report expresses concerns about patent hold-out (also called "reverse hold-up" ("patent hold-out occurs when companies routinely ignore existing patents and resist taking the necessary licenses from patent owners, because they perceive the probability of being compelled to pay as small. Such practices impede many licensors' efforts to license and leave many small inventors, but also large companies, without appropriate compensation.")

⁹⁰ Text to Section 2.c in Chapter VIII for a definition of cross licensing

⁹¹ Shapiro (83) 129

gies can reduce opportunistic behaviour.⁹² As will be explained in Chapter VIII, fair royalties and the equal sharing of patent values among firms using the same technology often derive from cross licensing - especially of essential patents - when agreements are reached before products are manufactured.

Conversely, *ex post* cross licensing is often connected to aggressive practices mainly consisting in infringement actions brought against firms after they have invested of creating, developing or commercializing a specific technology.⁹³ As discussed in chapter V, patents and patent applications can be used to increase rivals' costs, ultimately forcing competitors out of the market.⁹⁴ On this purpose, an injunction can be sought more to extract exorbitant value from patents than to stop others from using the invention itself. According to the "building-up" nature of these types of inventions, firms sued for infringement tend to agree on paying high royalties, thereby leading to unbalanced cross licensing, which is eventually set in order to continue selling products or using key features that contain possible infringing components.⁹⁵ Hence, possible distortion in competition has been highlighted as a result of holdup behaviours in *ex post* cross licencing, especially when non-practice entities are involved in.⁹⁶

Concerns have been particularly raised in connection to licensing agreements resulting from settlements that involves patent assertion entities (PAEs), i.e. firms mainly engaged in the business of patent ac-

⁹² Ibid.

⁹³ S Scotchmer, 'Protecting early innovators: should second-generation products be patentable?' (1996) 27 *The Rand Journal of Economics* 322; Shapiro (83)

⁹⁴ Text to n. 119 in Chapter V

⁹⁵ Lemley, Shapiro(82) 2010 (Referring to the additional leverage in licensing due to hold-up, scholars indicates that "The leverage comes from the ability of a patent owner to capture value that has nothing to do with its invention. It results from the inability of the accused infringer to separate the infringing component from the non-infringing ones after the fact.")

⁹⁶ Federal Trade Commission of United States, *The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition*. (Federal Trade Commission Report, 2011), 226

quisition and assertion rather than the using of patents in practice.⁹⁷ Such concern centres on the fact that parties are not in equal bargaining positions, when PAEs assert patents against alleged infringers implementing the patented technology.⁹⁸ Indeed, PAEs do not manufacture or market any products so they are not worried of possible counter claims.⁹⁹ What is more, PAEs' litigation costs are lower since PAEs tend to use repetitive revenue models.¹⁰⁰ All this allows PAEs to enter in to licensing negotiations with a strong bargaining position due to high switching costs that their opponents might have to pay.¹⁰¹ Therefore, this asymmetry of litigation risks can often result in greater hold-up effects; ultimately, inefficiency in the market and detrimental consequences for the consumers are high probably when PAEs are involved.¹⁰²

3.5 “Raising rivals’ costs” schemes

Generally, royalty rates are expected to be adjusted to maximize both profits and selling. It naturally happens when patent-holder (upstream) firms and good-manufactured (downstream) firms are integrated. In this scenario, indeed, royalties are set at a level that ensures the highest possible profits for both upstream and downstream firms, without decreasing final product quantity in the downstream market.¹⁰³ When

⁹⁷ Ibid. 67-70

⁹⁸ JJ Williams, MV Campagna, OE Marbutt, ‘Strategies For Combating Patent Trolls’ (2010) 17 *Journal of Intellectual Property Law* 367, 368

⁹⁹ R Barr *Testimony at the US Federal Trade Commission/Department of Justice Hearings on Competition and Intellectual Property Law and Policy in the Knowledge-Based Economy*, (Berkeley, 28 February 2002) <https://www.ftc.gov/sites/default/files/documents/public_events/competition-ip-law-policy-knowledge-based-economy-hearings/020228ftc.pdf> accessed the 2nd August 2017, 679–80

¹⁰⁰ JE Bessen, MJ Meurer, JL Ford ‘The private and social costs of patent trolls’ (2011) Boston Univ. School of Law, Law and Economics Research Paper No. 11-45. <<https://ssrn.com/abstract=1930272> or <http://dx.doi.org/10.2139/ssrn.1930272>> accessed the 2nd August 2017

¹⁰¹ Executive Office of the President of the United States, *Patent Assertion and U.S. Innovation Report* (United States, 2013) <https://obamawhitehouse.archives.gov/sites/default/files/docs/patent_report.pdf> accessed 2nd August 2017

¹⁰² A Layne-Farrar, KM Schmidt ‘Licensing Complementary Patents: “Patent Trolls” Market Structure, and “Excessive” Royalties’ (2010) 25 *Berkeley Tech. LJ* 1121, 1124

¹⁰³ Ibid. 1129

firms are not integrated, however, upstream firms could decide to set royalties higher than the ones securing the best balance between revenues and quantity. As such, rivals' costs result to be raised.¹⁰⁴ Thus, market inefficiencies can ultimately result, such as reduction in quantity sold or increasing of final prices.¹⁰⁵ This is the case when "double mark-up" or "complementary effects" phenomena take place, which have been, indeed, blamed for resulting in charging inefficient royalties.

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Regarding "double mark-up", this phenomenon occurs when patent holders, i.e. upstream firms, tend to maximize their profits, so to charge royalties regardless of the effects on downstream firms' final costs. Forced by the high royalties, downstream firms are driven either to reduce their marginal profits or to increase prices of the products. Mostly obviously, selling of the final product tend to fall. Thus, downstream firms can easily lose interest in staying in the market. Hence, "double mark-up" phenomenon can ultimately affect competition.¹⁰⁷ Particularly, concerns have been raised when patent holders, which are also in the downstream market, strategically decide in favour of raising royalties in order to achieve advantageous positions - namely monopoly - in

¹⁰⁴ SC Salop, DT Scheffman, 'Raising rivals' costs' (1983) 73 *The American Economic Review* 267; SC Salop, DT Scheffman, 'Cost-raising strategies' (1987) *The Journal of Industrial Economics* 19

¹⁰⁵ SC Salop, DT Scheffman 'Raising Rivals' Costs'(104), 268

¹⁰⁶ Lemley, Shapiro (82) 2013-14 (Lemley and Shapiro provide a definition of both these phenomena "Unfortunately, the stacking of running royalties for a product sold at a positive margin by the downstream firm combines the inefficiencies associated with two well-known pricing problems in industrial organization: "double marginalization," which arises when input suppliers with market power (here, the patentees) sell to a downstream firm that also has some power over price, and the Cournot-complements effect, which arises when multiple suppliers with market power sell complementary products. Together, these problems cause prices to be higher than would be set by an integrated monopolist who owned all of the patents and sold the downstream product. Formally, these two problems are very similar; both involve multiple markups in the value chain, set in an uncoordinated fashion. While double marginalization refers to situations in which there are two such markups, with royalty stacking the number of markups can be much larger.")

¹⁰⁷ H Hovenkamp 'Antitrust and the Patent System: A Reexamination.' (2015) 76 *Ohio St. LJ* 467, 503.

the final product market.¹⁰⁸ Undoubtedly, fragmentation of patent ownership, which usually occurs in patent thickets, increases the number of upstream firms involved in the process. Thus, the chance increases that downstream firm can be charged with high royalties as well as the possibility is enhanced that upstream firm, which are also involved in downstream market, can decide for high royalties to increase costs of rivals, ultimately to squeeze them out of the market.¹⁰⁹

According the “complementary effect” phenomenon, fixing excessive royalties can certainly have an impact on competition, regarding also to the upstream market. This is the case, in particular, when several firms hold patents that should be used together in the same products.¹¹⁰ As such, the fixing of high royalties by one of the upstream firms can affect the marginal profit of the other upstream firms.¹¹¹ Most obviously, any reduction in the sale of final goods brought about by higher prices can also drive down licensing revenues for firms that operate in the same upstream market and own patents implemented in the same product.¹¹² Thus conceived, an high - royalty strategy can be caught by competition law when high royalties are intentionally used to increase rivals costs by firms, which are involved in the upstream market of complementary patents.¹¹³

3.6 Tacit collusion

Collusions among firms are generally described as intentional coordination. As such, collusive behaviours usually involve repeatedly interactions, either explicit or tacit, among firms. When collisions take

¹⁰⁸ Layne-Farrar, Schmidt (102) 1131 (“a vertically integrated firm has a natural inclination to use its royalty rate to raise the costs of its rivals in order to increase its profits in the downstream market.”)

¹⁰⁹ Ibid. 1132; Lemley, Shapiro (82) 2013-14; MA Lemley, AD Melamed, ‘Missing The Forest For The Trolls’ (2013) 113 Colum. Law Rev. 2117

¹¹⁰ Layne-Farrar, Schmidt (102) 1129

¹¹¹ DL Rubinfeld, R Maness ‘The strategic use of patents: Implications for antitrust’ in F Leveque and H Shelanski (eds), *Antitrust, Patents And Copyright: EU And US Perspectives* (Edward Elgar 2005), 92

¹¹² Layne-Farrar, Schmidt (102) 1128

¹¹³ Ibid. 1133

place between firms that are competitors in the same market, concerns arise according to the possible effect on the market. From the economic perspective, indeed, collusion ‘is a market conduct that enables firms to obtain supra normal profits, where “normal” profits corresponds to the equilibrium situation’.¹¹⁴ Therefore, collusion can result in inefficiencies in the market, specifically when competitors agree on maintaining high prices in the market or low quantity of products. For that reason collusive agreements are not allowed, similarly tacit collusion, i.e. collusive conducts, is usually contrasted.

Collusion is seen as a possible result of patent thicketing, especially when the ownership of patents related to a cumulative technology is spread among several firms.¹¹⁵ This is down to the fact that the ownership of patents related to the same technology help to foster relationship among firms. As such, firms are more likely to cross-licensing with collusive intents.¹¹⁶ Firms involved in same technology, indeed, can easily predict the likely conduct of their rivals in the market, especially regarding future products and final prices.¹¹⁷ As confirmed by the European Commission, the possibility of sharing information as well as the reciprocal knowledge of market strategies can facilitate “friendly” behaviours in fixing product final prices as well as in coordinating sale turnover.¹¹⁸ All this seems to confirm that firms are more likely to engage in tacit collusion in patent thicket context.¹¹⁹ Thus, in patent thicketing it is likely that prices and output might be

¹¹⁴ J Tirole et al, ‘The Economics of Tacit Collusion: Implications for Merger Control’ in V Ghosal and J Stennek (eds) *The Political Economy of Antitrust* (Elsevier Science 2007), 219 (“Tacit collusion can arise when firms interact repeatedly. They may then be able to maintain higher prices by tacitly agreeing that any deviation from the collusive path would trigger some retaliation..”)

¹¹⁵ F Jell, J Henkel, M W Wallin. ‘Offensive patent portfolio races’ (2016) Long Range Planning 1

¹¹⁶ M Eswaran, ‘Cross-licensing of competing patents as a facilitating device’ (1994) *Canadian Journal of Economics* 689, 690; C Fershtman, MI Kamien ‘Cross licensing of complementary technologies’ (1992) 10 *International Journal of Industrial Organization* 329

¹¹⁷ Guidelines on the application of Article 101 of the Treaty on the Functioning of the European Union to technology transfer agreements 2014/C 89/03 (TT Guidelines) [2014] OJ C 89/3, para 45

¹¹⁸ Joined Cases 40-48, 50, 54-56, 111, 113 and 114/73 *Suiker Unie v Commission* [1975] ECR 1663, paras 173-4

¹¹⁹ J Tirole et al. (114)

different from that which firms would probably generate in the attempt to adapt “intelligently” to the existing and anticipated conduct of their competitors.

Nevertheless, collusion not only can generate inefficiencies in the market, but “concerted practices”,¹²⁰ i.e. fixing high prices as well as limits on output, can function as barrier to market entry by potential rivals.¹²¹ This can be the case of computer-implemented invention area, i.e. the technological areas where invention can be easily copied. In such contexts, to be the first mover is perceived to be crucial to gain higher patent revenues and force rivals to increase patent procuring and enforcing costs.¹²² However, the prospect of a patent race can drive rivals to strengthen cartel practises, especially when a limited number of firms are in the market and each firm has a good knowledge of other firms’ market strategies. Thus, firms can intentionally interact to increase sunk costs, i.e. costs to enter the market, and ultimately to foreclose the market.¹²³

4. Some conclusions

As illustrated in this chapter, although originally designed as instruments to increase innovation and competition, patents can be used to achieve the opposite effect, i.e. they can prevent innovation and competition, and can deter the entry of other firms into the market. This can be the case when patents and patent applications are used strategically, and patent thickets are built. As such, the ill effects of patent thicket behaviours on society and economy have been discussed, as well as their specific detrimental effects on the market and competition. In par-

¹²⁰ *Suiker Unie v Commission*, para 178 (“ an important element in the legal concept of a “a concerted practice” is the is that causal connexion which must exist between the alleged concerted action and the practices which were adopted’ and which is absent ‘if these practices are the natural consequence of market conditions which would have been the same even if there had been no contacts between producers.’.)

¹²¹ D Harhoff, ‘The strategic use of patents and its implications for enterprise and competition policies’ (European Commission, 2007) 112

¹²² Jell, Henkel, Wallin (115), 13

¹²³ *Ibid.*

ticular, focusing on the possible negative effects of patent thickets the analysis has revealed that one of the main concerns related to patent thicket behaviours is the possible use of such practices to foreclose the market. Ultimately, tacit collusion, as well as hold-up or complementary effects, can be used to increase rivals' costs, thereby creating barriers that impede others to enter the market.

Admittedly, patent thickets and reduction of competition are arguments usually used to support hostility to business method patents. According to the real nature of business methods, patent thicket behaviours are indicated as highly probable in this technological area. Empirical analysis in Chapter VI has provided evidence that patent thicket behaviours have been partially developed also at the EPO. Therefore, strategic uses resulting in reducing competition are often highlighted as possible outcomes in the decision of patenting business methods in Europe. However, there are means that can neutralize or at least reduce the risk that business method patents are used to create inefficiencies in the market ultimately impeding rivals to enter the market. In the next chapter, namely Chapter VIII, mutual-licensing agreements will be analysed, in order to investigate whether the coordination in the exploitation of patents and patent applications can secure the efficient use of inventions, ultimately discouraging firms to develop anti-competitive behaviours.

Chapter VIII

Can mutual licensing agreements prevent patent-thicket inefficiencies in business method?

1. Introduction

This research in the previous chapter has already made plain that patent thickets are a quite common phenomenon in technological areas related to IT innovations. By and large, firms involved in exploiting computer-implemented inventions have developed the habit of filing numerous patent applications related to the same invention. In point of fact, the number of patent applications has gone up dramatically over the last twenty years. The upshot has been the growth of uncertainty both on the ownership of technologies and on the true extent of patent protection of innovations. Admittedly, evidence of intentionality in this growing of uncertainty appears from the tendency to use patent protection beyond its proper purposes.¹ As emerged in Chapter V, patents have started to be used by firms not only to secure their inventions, but also strategically. In the last decades, particularly, patent thicket phenomena have been associated to patent strategic uses resulting in detrimental effects on economy and society. The decrease of investments in innovation, as well as the increase in licensing costs, has been pointed out.² However, major concerns have been expressed on the possibility that patent thickets are intentionally built to foreclose the market, i.e. to impede rivals to enter the market.

Mark-up as well as hold-up phenomena have been often shown as inherent problems linked to the development of patent thickets. The occurrence of overcrowd patent markets can affect economic efficiency.

¹ U Hanns, 'Patent Protection in Europe: Integrating Europe into the Community or the Community into Europe?.' (2002) 8 *European Law Journal* 433

² Ex multis, W Cohen, J Walsh, R Nelson 'Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not)' (2000) NBER working paper w7552 <<http://www.nber.org/papers/w7552>> accessed on the 20th June 2015

In particular, bringing new products to the market can require to reach various licensing agreements and to pay a plethora of royalty fees, when several patents cover the same technology. Additionally, the creation of final products in the context of complex technologies may become impossible, if only one of the patent holders refuses to license. Moreover, royalties can be fixed deliberately high especially with regard to patents that are essential to implement cumulative inventions. Thus, essential patent holders' leverage increases as well as their opportunities to take the most of the final profit.³ Therefore, patent thicket can undermine market efficiency. Nevertheless, licensing agreements, specifically mutual licensing, can be useful in solving inefficiencies created by patent thickets.

If innovation is cumulative, firms are more likely to share their knowledge. Several patents should be exploited to implement a technology that is cumulative, thus firms have a reciprocal interest in using each other patents. As such licensing agreements involving patent sharing among competitors, i.e. mutual licensing, are usually welcomed as they can result in setting reasonable royalties, reducing transaction costs and avoid infringement litigations. Accordingly, mutual licensing is of capital importance, whereby inefficiencies, which are due to the uncertainty intentionally created by filing several patent applications, occur. Facilitating patent sharing, cross licensing and patent pool are favourably considered and are now encouraged as good ways to reduce royalty costs and the infringement problem.

This part of the thesis is aimed at analysing licensing agreements, specifically mutual licensing agreements, in order to investigate their positive impact to solve market inefficiencies due to patent thickets. Thus, beneficial effects of licensing agreements on avoiding infringe-

³ ex multis, Department of Justice of United States, Federal Trade Commission of United States, *Antitrust Enforcement & Intellectual Property Rights: Promoting Innovation & Competition* (DIANE Publishing, 2007) <<http://www.ftc.gov/reports/innovation/PO40101PromotingInnovationandCompetitio nrpt0704.pdf>> accessed the 7th July 2017

ments and reducing transactional costs will be mainly discussed in this chapter. Therefore, the chapter will focus on relationship among firms holding patents related to the same cumulative inventions and how it can be addressed to eliminate inefficiencies due to new patenting habits related to cumulative innovation. This chapter is organised into three sections. In the first one, definitions of licensing and mutual licensing agreements will be provided. The next two sections, instead, will deal with cross-licensing and patent-pool agreements and their contribution in solving market inefficiencies due to patent thickets. In particular, a brief outline will be traced of the US Supreme Court decisions that eventually recognized the importance of mutual licensing (i.e. cross licensing and patent pools) in producing beneficial effects, such as reducing litigation costs, helping in integrating complementary technologies and avoiding patent blocking positions. By focusing on some aspects of mutual licensing agreements, then, the main features of licensing agreements will be discussed, specifically referring to which patents could legitimately be included and the effects of including some kind instead of others, i.e. essential, complementary, substitute patent classifications.

2. Licensing agreements, technology transfer agreements and mutual licensing

2.1 Licensing agreements

According to WIPO “a licensing agreement is a partnership between an intellectual property rights owner (licensor) and another who is authorized to use such rights (licensee) in exchange for an agreed payment (fee or royalty)”.⁴ Usually, IP holders are interested in reaching licensing agreements to expand in new geographic and product markets that cannot be otherwise profitably entered. Nevertheless, licensing agreements are also means to get value from the invention rapidly. Referring

⁴WIPO, *Licensing of Intellectual Property Rights*
<http://www.wipo.int/sme/en/ip_business/licensing/licensing.htm > accessed 7th August 2017

to patents, a patent holder can decide either to exploit the patent alone or to grant to someone else the right to use it. In particular, the right of patent holders to conclude licensing agreement is recognized in the TRIPS, namely in the Article 28.⁵ However, the TRIPS does not detail on licensing agreement contents; thus, terms of the use of the patent in licensing agreement mainly depend on the will of the parties.⁶ For example, the licensor can give to the licensee the right to use the patent to a full extent, or the patent rights can be granted limited to some fields of use or to specific applications of the licensed technology. Moreover, parties can agree about the exclusive or not exclusive use of the licensed patent; thus, even the licensor is excluded to exploit the invention when the parties agree on an exclusive licensing. As well, licensees and licensors can agree on territorial restriction, whereby licenses can be global in nature or limited to some countries or regions. License agreements usually detail, also, about the payment of the royalty that licensee is due to pay to the licensor for the use of patent rights. In particular, clauses can provide that royalties are calculated depending on how much the licensed technology is exploited by the licensee or according to licensee's final output.

2.2 Technology transfer agreements

Beneficial effects, such as the economic growth or the spurring of innovation, are usually related to licensing agreements. In particular, licensing is likely to lead to positive effects for society when the parties not only intends to secure the use of a patent, but they agree more generally on the possibility to mutually exploit and implement their patents. When it happens, indeed, licensing can result not only in allowing the use of patent rights, but also in sharing of knowledge and

⁵URUGUAY ROUND AGREEMENT: TRIPS Article 28

⁶ An overview on contents of patent licensing agreement in CJ Furman, 'Drafting Intellectual Property License Agreements: Issues Overview' (MacPherson Leslie & Tyerman LLP, 2010) < <http://documents.jdsupra.com/a34ab85c-6f3d-4e5e-ab93-1672de75d0b2.pdf>> accessed the 7th August 2017

expertise related to the patented technology.⁷ In this case, thus, the agreement between a licensor and a licensee will result in a sort of a co-operative arrangement aimed at efficiently using patents, especially patents related to the same innovation. Ultimately, agreements resulting in a coordinate use of patents will support and improve the patented technology. As will be better discussed later, both spread of knowledge and incentive to invest in innovation seems to be positively affected by this type of contracts. Because of these, licensing, especially when meets the features of the above described technology transfer agreements, tends to be seen in a “favorable light”.⁸

Nevertheless, the definition of what should be a technology transfer agreement has been the subject of a wide debate.⁹ In general terms, the transfer of a technology is ‘the process by which science and technology are diffused throughout human activity’.¹⁰ According to the Standing Committee on the Law of Patents (SCP) of the World Intellectual Property Organization, transfer technology can result from technology licensing due to the fact that “the actual use of the patented technology by the licensee may facilitate better understanding of the relevant technology and increase the capacity of the licensee to absorb new technology.”¹¹

In the EU law framework, technology transfer agreements are usually associated with licensing. According to the TT Guidelines “ the concept of ‘transfer’ implies that technology must flow from one undertaking to

⁷ WIPO, *Successful Technology Licensing* (IP Assets Management Series, 2015) <http://www.wipo.int/edocs/pubdocs/en/licensing/903/wipo_pub_903.pdf> accessed 7th August 2017, 6

⁸ P Regibeau, K Rockett, *Assessment of potential anticompetitive conduct in the field of intellectual property rights and assessment of the interplay between competition policy and IPR protection* (European Commission, Competition Report COMP/2010/16, 2011),11

⁹ D M Haug ‘The International Transfer of Technology: Lessons that East Europe Can Learn from the Failed Third World Experience’ (1992) 5 *Harvard Journal of Law & Technology* 209.

¹⁰ H Brooks ‘National science policy and technological innovation’ in R Landau and N Rosenberg (eds) *The Positive Sum Strategy* (National Academy Press Washington DC, 1986) 119.

¹¹ WIPO, Standing Committee On The Law Of Patents *Transfer Of Technology* (SCP/14/4, 2009) para 24

another”.¹² Further, the TT Guidelines highlights that “Such transfers normally take the form of licensing”.¹³ From the EU perspective, hence, technology transfer agreements are chiefly licensing agreements that secure “to operate inside the scope of the exclusive right of the patent”¹⁴ with the purpose “to seek appropriate remuneration for successful projects” or “required to recoup the investment”.¹⁵ Therefore, the fundamental quality of a technology transfer agreement is indicated in facilitating a more efficient implementation of innovations, i.e. the exploitation of all the patents related to a technology.

The implementation of innovation is really achieved when licensing agreements are aimed at exploiting the technology “for the purpose of producing goods and services”.¹⁶ Additionally, in the category of the technology transfer agreement can also be listed those agreements “where the licence creates design freedom for the licensee by allowing it to exploit its own technology without facing the risk of infringement claims by the licensor”.¹⁷ Consistently with this definition, according to the EU perspective, technology transfer agreements generally result in licensing between two firms, which can agree on either mutually sharing their patents or enabling only one of them in exploiting a specific technology.¹⁸ On the other hand, the TT Guidelines does not exclude that technology transfer agreements can result in multiparty agreements or in bilateral agreements that allow to license to a third party, although these type of agreements will not be specifically cover by block exemptions ex TTBER.¹⁹

2.3 Mutual licensing agreements

¹² Communication from the Commission Guidelines on the application of Article 101 of the Treaty on the Functioning of the European Union to technology transfer agreements (TT Guidelines) [2014] OJ C 89/03, para 51

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Ibid. para 8

¹⁶ Ibid. para 58

¹⁷ Ibid. para 59

¹⁸ Ibid. para 98

¹⁹ Ibid. para 56-57

The idea of mutual licensing agreements usually epitomizes both patent pools and cross-licensing agreements. As explained in further details in the following sections, mutual licensing agreements result in allowing a coordinate use of a technology by more than one entity at the same time. Ultimately, these agreements are typified by providing a patents' reciprocal exploitation. As such, mutual licensing agreements, i.e. cross licensing and patent pools, fall in the definition of technology transfer agreements provided in the EU legal framework.²⁰ In particular, cross-licensing agreements are commonly identify in contracts between patent holders mainly agreeing to reciprocally exploit their patents. Providing the right to use each other's patents, thus, cross licensing are aimed at securing beneficial effects to both the parties.²¹ Indeed, cross licensing can be crucial in areas where several patents cover a technology, as it happens in cumulative invention contexts. In such cases, the efficient exploitation of technologies can occur only when parties agree on licensing each other the use of their respective patents. As such, cross-licensing agreements secure firms in continuing to exploit their invention without the threat of litigation or infringement.

More often than not, granted patents are the objects of cross-licensing agreements. Nevertheless, pending patent applications or promises to share future patents can also be included within this type of contracts. Regarding possible clauses of cross-licensing agreements, patent holders can reciprocally provide detailed indication about the extent of patent exploitation, i.e. limitations, for example, on field or territorial use. Conversely, parties do not create a separate entity to jointly manage patents in cross licensing. Thus, agreements do not usually contain clauses about joint sale of patents or joint setting of royalties. Similarly, cross licensing frequently do not provide specific clauses on how to ar-

²⁰ Text to n. 19

²¹ TR Beard, DL Kaserman 'Patent thickets, cross-licensing, and antitrust' (2002) 47 *The Antitrust Bull* 345, 357-358

range future licensing to third parties, as parties tend to license its own patent independently to third parties in the majority of the cases.

Regarding patent pools, they are signed by two or more parties to share their complementary technologies and to collaborate in arranging to license the patents related to those complementary technologies as a package to third parties.²² Mainly, patent pools serve the purpose to allow a “one stop shopping”.²³ Thus, once the pool is formed, both parties of the pool and third parties get the possibility to grant permission to use all the patented technologies in the pool, signing only one license agreement instead of several with each patent holders. As such, patent pool agreements are designed to create a common portfolio containing all the patents related to the standard of a specific technology.²⁴ Given it, once the patent pool is created, one of the patent holders or a common organization is designed to coordinate the conclusion of future licensing agreements and to collect, and afterward distribute, the royalties related to all the patents in the package. Thus, patent pools can reduce transactional costs, which subsequently results from reaching only one agreement to license several patents. Similarly, the amount of royalties to be paid can significantly decrease in patent-pool contexts; indeed, royalties are more reasonable setting for a group of patents than for a single one. Additionally, patent-pool agreements can reduce the risk of patent infringement and ultimately avoid expensive litigation.²⁵

3. Market efficiency and mutual licensing

As discussed in the previous subsection, mutual licensing agreements are mainly aimed at allowing parties in using the same technology, serving the reciprocal interest of licensors and licensee to use each other

²² R Raysman et al. *Intellectual property licensing: forms and analysis* (Law Journal Press, 2011) 6

²³ RJ Gilbert ‘Ties that bind: Policies to promote (good) patent pools’ (2010) 77 *Antitrust Law Journal* 1, 19

²⁴ A Layne-Farrar et al., ‘Pricing Patents for Licensing in Standard-Setting Organizations: Making Sense of FRAND Commitments’ (2007) 74 *Antitrust L.J.* 671, 688-89

²⁵ C Shapiro, ‘Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting’ (2001) 1 *Innovation Policy and the Economy* 119, 123-124

patents. Cross licensing and patent pools, therefore, tend to be reached when none of the parties could exploit and implement a specific technology alone; thus, an agreement that allows all the parties to jointly use several patents is seen as the best way to secure future profits, avoiding the risk of infringement. Nevertheless, both cross licensing and patent pool agreements not only can produce beneficial effects for the parties, but also economic growth can be stimulate by this type of contacts.²⁶ In particular, firms are encouraged in giving information about their products and technologies even to competitors as cross- licensing or patent-pool agreements are reached. Thus, the mutual exchange of data is facilitated in a technology transfer context, so that the creation and dissemination of knowledge is ultimately achieved. Moreover, both patent pools and cross licensing agreements often involve joint efforts in implementing invention; thereby, patents are thought to be exploited more effectively when patent holders enter in a cross licenses or in a patent pool, especially when these type of contracts are signed by firms involving in the same technological market.²⁷ Further, beneficial effects on consumer, such as reduction of costs and development of new products, have been highlighted as result of agreements resulting in sharing of technologies among firms.

WIPO has recently made a strong statement on this point.²⁸ In particular, the opportunity of virtuous circles generated by mutual licensing agreements have been emphasized. Regarding the joint use of patents, it has been shown the importance of mutual licensing because not only such agreements allow the shared use of patented technologies, but also secure improvements in the technological implementation and investments in further innovation and collaborative research efforts.²⁹ In particular, WIPO has indicated the beneficial effect produced by mutual licensing agreements, giving prompt consideration to some of them. First, it has been highlighted that cross-licensing and patent pools tend

²⁶ DOJ (3) 64; TT Guidelines (12) para 244-247

²⁷ DOJ (3) 57

²⁸ WIPO-SCP(11)

²⁹ Ibid. para 19

to promote firm collaborations and cooperation between competitors, thereby the technical expertise and know-how increases and competitiveness is ultimately improved.³⁰ Additionally, society as a whole is affected according to the fact that the mutual licensing increases competitiveness of industry and boosts the creation of local industries as well as encouraging the circulation of knowledge and further implementation of technologies.³¹ Last but not least, the opportunity to get advanced products at low costs generated by mutual licensing agreements can have valuable effects on consumer welfare.³²

Also the EPO has recently stressed the role of patent aggregation³³ in encouraging dissemination of technical knowledge and in improving investment in innovation.³⁴ As such, the EPO offers a different perspective toward the well-know practice of building up patent pools. Some positive effects of patent aggregations are highlighted. Third parties, for example, are facilitated in accessing patented technologies when patents related to the same technology or to similar innovative processes are jointly managed; indeed, transaction costs as well as hold-up behaviours can be taken under control.³⁵ At the same time, in the case of *combinatorial innovations*,³⁶ patent aggregation can offer the opportunity for early revenue and more efficiently licensing because of the better coordination that can be achieved between the parties interested in patent exploitation.³⁷ Ultimately, patent pools and cross licensing are indicated

³⁰ Ibid. para 26

³¹ Ibid. para 17

³² P Giuri et al, *Report of the Expert Group on Patent Aggregation* (European Union, 2015),31

³³ EPO, *Patent aggregation and its impact on competition and innovation policy* (EPO, 2014)

<[http://documents.epo.org/projects/babylon/eponot.nsf/0/ddf1c588a052305dc1257e27002e70e0/\\$FILE/esab_patent_aggregation_workshop_report_en.pdf](http://documents.epo.org/projects/babylon/eponot.nsf/0/ddf1c588a052305dc1257e27002e70e0/$FILE/esab_patent_aggregation_workshop_report_en.pdf)> accessed on the 7th August 2017, 7 (“ Patent aggregation describes any activity where patents that were previously owned by a number of different parties, are brought under the control of a single actor or entity. Control essentially means the right to decide which party gets access to the patents and under what terms.”)

³⁴ Ibid. 14

³⁵ Ibid. 11

³⁶ Ibid. 7

³⁷ Ibid. 10

as useful in improving the commercialisation of new product.³⁸ Moreover, mutual licensing can avoid the risk of duplication of innovation linked to patent overlapping, whereby aggregation works to encourage firms to share information and knowledge.³⁹

4. The US debate on beneficial effects of mutual licensing agreements

The recognition of beneficial effects of mutual licensing agreements is, however, a recent outcome. In particular, as will be explained in the next chapter, namely Chapter IX, EU legislation has developed this positive attitude towards the mutual licensing agreement only in the last decades, thereby establishing a specific set of rules. The Technology Transfer Block Exemption Regulation (TTBER) has been introduced, indeed, to encourage entities operating in the European context to share their technologies by means of licensing patents and other IP rights. This approach, nevertheless, owes much to the US experience on this area as mutual licensing has been long discussed on the other side of the ocean. Specifically, the effect of these types of agreements have been lauded or condemned as beneficial or detrimental from time to time.

The debate on the issue has been mostly provoked by concerns about the possible use of IP rights, especially the monopolist prerogative secured to IP holders, to decrease competition in the market. Thus conceived, the positive or negative approach toward the practice of reaching agreements on sharing of patent prerogatives has been regarded in according to mutual licensing potentially in interfering with antitrust regulations. A specific overview on interferences and correlations between patent and antitrust legislations will be provided in the next chapter. Chapter IX, indeed, will be mainly devoted on discussing European legislation about licensing agreements, especially from the prospective of competition law. With this in mind, the issue of the interface between IP rights and competition law will be intentionally ignored

³⁸ Ibid. 11

³⁹ Ibid. 12

in the following subsection. Thus, the analysis in the following sections will be narrowed on the reasons put forward to recognize legal protection to mutual licensing agreements. On this purpose the American experience will be taken into consideration according to the fact that the results of the US debate has been fully embraced by the EU institutions, especially by the Court of Justice of the European Union.

4.1 The hostile approach

In the US the way toward the full recognition of the beneficial effect of cross-licensing and patent-pool agreements can be broadly divided into three stages. The first of these stages can be placed at beginning of last century when the jurisprudence of the US Supreme Court consistently recognized patent holders' rights to license their patents even mutually. An excellent example of this trend was the *Bement v. National Harrow* decision.⁴⁰ The case related to an agreement among several patent holders reached to assign to a new entity, National Harrow, all the patents (85 in total) referring the same technology, i.e. float spring tooth harrows. In particular, the parties agreed that the new entity would have licenced the patents at uniform terms and fixed royalties. The purpose was to avoid future infringements as well as to improve the manufacture and sell of the shared technology, a particular harrow. However, it happened that one of the parties, Bement, refused to pay the required royalties arguing that the agreement ultimately restrained the use of patents. Arguments were putted forward that licensees were deterred to exploit patents, even their own patents, as they were forced to pay price that was already fixed, thereby not depending on the market trends.⁴¹ Nevertheless, the Supreme Court rejected the argument, recognising implicitly the beneficial effects of the agreements resulting from the lessening in litigation.⁴² Additionally, the Court took the oppor-

⁴⁰ *Bement v. National Harrow Co.*, 186 U.S. 70, 91 (1902) (“the general rule is absolute freedom in the use or sale of rights under the patent laws The fact that the conditions in the contracts keep up the monopoly or fix prices does not render them illegal.”)

⁴¹ *Ibid.* 74

⁴² *Ibid.* 93

tunity to emphasise the nature of patent rights and their property prerogative.⁴³ Thus, fixing royalties either was considered lawful because of patent holders' rights to decide how to exploit their patents.⁴⁴

However, it did not take long that the Court changed its opinion. A decade later, in *Standard Sanitary Manufacturing* case,⁴⁵ the Supreme Court ruled against a mutual licensing agreement and invalidated the patent pool formed by manufacturers of enamelled sanitary ironware. In particular, the Court pointed out that the agreement was ultimately put in place by firms to control the output and price of final products.⁴⁶ Thus, the Court started to point out about the possible detrimental effects of mutual licensing, additionally developing the idea that patent rights could be exercised beyond their proper use.⁴⁷ Conclusively, the Court ruled that licensing agreements, especially mutual licensing, could go beyond what was necessary 'to protect the use of the patent or the monopoly which the law conferred upon it'.⁴⁸ Similarly, the Court held in *Standard Oil Co.* decision.⁴⁹ In this case, the attention was drawn to some cross licensing agreements reached by the holders of patents covering methods of cracking crude oil to yield larger quantities of gaso-

⁴³ Ibid. 91

⁴⁴ Ibid. 93

⁴⁵ *U.S. v. Standard Sanitary Manufacturing Co.* 220 US 20 (1912).

⁴⁶ Ibid. 47-48

⁴⁷ Ibid. 48; more about of patent misuses doctrine in the US in JM Mueller, 'Patent misuse through the capture of industry standards' (2002) 17 Berkeley Tech. LJ 623, 671 ("The misuse doctrine has its genesis in judicial decisions that predate any significant development of U.S. antitrust law. Different policies ground patent misuse and antitrust doctrine. Misuse focuses primarily on the patentee's behavior in expanding the scope of its rights beyond the statutory patent grant, while antitrust measures the impact of that behavior on the marketplace."). Referring to the abuse of right doctrine, MA O'Rourke, 'Toward a doctrine of fair use in patent law' (2000) 100 Colum. Law Rev. 1177, 1248-49 ("While antitrust law shapes an intellectual property rightholder's expectations with regard to how it may exercise that right, patent fair use is still necessary. Patent fair use would address situations in which the antitrust laws may not be implicated and therefore have no impact on the patentee's decision to license... Antitrust law, then, is not a substitute for patent fair use, but rather a supplement to it. It is a part of the public law that should be sensitive to the pro-competitive benefits that private licensing institutions, including patent pools, may offer, and the role of fair use in encouraging these solutions and safeguarding against their abuse.")

⁴⁸ *U.S. v. Standard Sanitary Manufacturing Co* (45) 48.

⁴⁹ *U.S. v. Standard Oil Co.*, 283 US 163 (1931); R Peritz JR 'Competition policy and its implications for intellectual property rights in the United States' in SD Anderman (ed) *The interface between intellectual property rights and competition policy* (Cambridge University Press, 2007), 178

line. In particular, the case referred to some oil companies that had agreed to use their patents reciprocally in order to reduce the risk of infringement.⁵⁰ Among the terms of the mutual licensing, the firms had also agreed on the amount of royalties to be paid for using patents. In contrast to its previous decisions, the Court expressed concerns about this type of clauses.⁵¹ In particular, it was underlined the role that royalty clauses could have played in allowing patent holders to arrange not only the amount of royalties to be paid, but also to fix the price of final products, in that case the gasoline. Therefore, the Court decided against the agreement, conceiving of the possible detrimental effect of mutual licensing agreements on competition.⁵²

Nevertheless, the *Standard Oil Co.* decision was a double-edge one. The detrimental effect of cross licensing was stressed; especially, the restraint of trade resulting from mutual licensing agreements was focused. However, the decision clarified that mutual licensing agreements not only were not per se illegal, but they could also be crucial when patents were complementary, i.e. several patents covering the same technology.⁵³ As such, the Court empathized the increase of infringement lawsuits under these circumstances because of the simultaneous and independent development of the same manufacturing process.⁵⁴ Thus, the Court suggested that cross licensing could be of the utmost importance “to avoid litigation and losses incident to conflicting patents” when innovation was cumulative.⁵⁵ The Court, therefore, concluded that cross license agreements were “frequently necessary if technical advancement is not to be blocked by threatened litigation”.⁵⁶ Consequently and in summary, *Standard Oil Co.* decision clarified that mutual patent agreements could offer beneficial effects both creating certainty about rights on patent implementation and per-

⁵⁰ Ibid. 167 - 168

⁵¹ Ibid. 171

⁵² Ibid. 179

⁵³ Ibid. 171

⁵⁴ Ibid.

⁵⁵ Ibid. 168

⁵⁶ Ibid. 171

mitting each firm to continue technological development and production.⁵⁷ However, the decision definitely also asseverate that cross-licensing agreements could result in restraining trade “unduly”, namely in increasing prices, in reducing output, and reducing quality.⁵⁸

The conclusions drawn in the *Standard Oil Co.* case were consistently confirmed over the years. In particular, the decision held in *Line Materials* case⁵⁹ emphasised that cross licensing could be allowed ‘only when both patents could be lawfully used by a single maker could the public or the patentees obtain the full benefit of the efficiency and economy of the inventions’.⁶⁰ Therefore, the Court held that the

Arrangements between two patentees for cross-licensing of their interdependent product patents...[which] were intended to and did control the prices at which products embodying both patents were sold...transcends the limits of the patent monopoly granted to each of them, no matter how advantageous it may be to stimulate the broader use of the patents.⁶¹

The US Supreme Court also expressed its doubts about mutual licensing agreements, ruling in the *Hartford-Empire* case.⁶² The case was about a patent-pool agreement reached by firms representing the ninety-four per cent of the US market for glass production. According to the patent-pool dominant position, concerns were cast on the possible use of mutual licensing agreements to impede competitors to enter in glass market. Thus, the ill effects of patent pool on trade were pointed out.⁶³ However, some beneficial effects of the patent-pool were recognized in decreasing the rate of infringement.⁶⁴ Additionally, the Court took a new approach as it was concluded for the unlawfulness of the agreement,

⁵⁷ Text to n.53

⁵⁸ *U.S. v. Standard Oil Co.* (49) 169

⁵⁹ *U.S. v. Line Materials Co.*, 333 US 287 (1948).

⁶⁰ *Ibid.* 291

⁶¹ *Ibid.* Syllabus.

⁶² *U.S. v. Hartford-Empire Co.*, 323 U.S. 386 (1945)

⁶³ *Ibid.* 453

⁶⁴ *Ibid.* 419

unless firms accepted that patents could be licensed at standard royalties.⁶⁵ Nevertheless, the *Hartford-Empire* decision was not able to affect the negative attitude towards mutual patent licensing, which remained essential unchanged.⁶⁶ Over the following forty years, therefore, the US Supreme Court persisted in declaring the unlawfulness of mutual licensing agreements as they resulted in restraining trade unduly.⁶⁷

In the 1970's, moreover, some clauses commonly added in mutual licensing agreements were listed by the US Department of Justice in the so-called "Nine No-No's" list.⁶⁸ The clauses in the list (among them, for example, tying and grant-back clauses)⁶⁹ were considered to be unlawful *per se*. Indeed, the agreement was deemed to produce ill effects because of the clauses' potentiality in negatively affecting the competitiveness in the market. Hence, if one of the clauses of the "Nine No-No's" list was included in a licensing agreement, the US Department of Justice did not need to prove the impact of the agreement on trade.⁷⁰ As such, parties of a licensing agreement included the banned clauses were ultimately asked to change the terms of their arrangement or produce evidences on the positive impact of the licensing on the economic

⁶⁵ Ibid.

⁶⁶ Ibid, 406

⁶⁷ DP Homiller, 'Patent misuse in patent pool licensing: from national harrow to" the nine NO-NOs" to not likely' (2006) 7 Duke L. & Tech. Rev.20, 28

⁶⁸ The list was presented by Bruce Wilson, Special Assistant to the Assistant Attorney Gen., Antitrust Div., Department of Justice at the Fourth New England Antitrust Conference *Patent and Know-How License Agreements: Field of Use, Territorial, Price and Quantity Restrictions* (6th November 1970). See also, R Gilbert et al. 'Antitrust issues in the licensing of intellectual property: The nine no-no's meet the nineties' (1997) Brookings Papers on Economic Activity. Microeconomics, 283; H Ullman, 'A modern look at the nine 'no-nos' of patent licensing under U.S. antitrust law: the first four 'no-nos' (Antitrustwatch, 2013) <<http://blogs.orrick.com/antitrust/2013/02/04/a-modern-look-at-the-nine-no-nos-of-patent-licensing-under-u-s-antitrust-law-the-first-four-no-nos/>> accessed the 7th August 2017

⁶⁹ Tying clauses provides for selling a patented technology on the condition that another technology will also be purchased. Grant-back clauses consist in an agreement that allows the licensor to use the improvements made by the licensee to the licensed technology

⁷⁰ KM Frankel, MS Zhai, 'A Return to the DOJ's "Nine No-Nos"?' (The AIPLA Antitrust News, 2013) <<http://www.finnegan.com/resources/articles/articlesdetail.aspx?news=9324c489-94fe-4bb0-a499-8a8817794e44> > accessed the 7th August 2017

growth.⁷¹ However, this strict approach was heavily criticised.⁷² Finally, substantial changes occurred when in 1995 the US Department of Justice together with the US Federal Trade Commission edited the new “Antitrust Guidelines for the Licensing of Intellectual Property”.⁷³ Ultimately, beneficial effects of cross licensing and patent pools, such as reducing cost litigation, helping in integrating complementary technologies and avoiding blocking position, were recognised.⁷⁴

4.2 The turning point

The “Antitrust Guidelines for the Licensing of Intellectual Property” issued in 1995 by the DOJ and the FTC offered a completely new point of view. Significantly, not only the possibility of building patent pools and reaching cross licensing was expressly stated, but also it was emphasised that mutual agreements could positively affect the market. The Guidelines underlined that those licensing transactions could better result in providing new products and low price service to final consumers when combining several patents, specifically blocking ones.⁷⁵ Thus, improvements in product quality and increase in efficiency of technological processes were showed as significant main effects of joining complementary inventions.⁷⁶ Hence, the hostile approach was definitively abandoned. In particular, the assumption was challenged and eventually discarded that mutual licensing agreements *per se* could confer market power and negatively affect competitiveness of the market.⁷⁷ On the contrary, the US Department of Justice together with the Federal

⁷¹ JD Wright, DH Ginsburg, ‘Patent Assertion Entities And Antitrust: A Competition Cure For A Litigation Disease?’ (2014) 79 *Antitrust Law Journal* 501, 520

⁷² RA Posner, ‘The Chicago School of antitrust analysis’ (1979) 127 *University of Pennsylvania Law Review* 925

⁷³ United States, Department of Justice (DOJ), Federal Trade Commission (FTC), ‘Antitrust Guidelines for Intellectual Property Licensing’ (1995) <<https://www.justice.gov/atr/archived-1995-antitrust-guidelines-licensing-intellectual-property>> accessed the 7th August 2017

⁷⁴ *Ibid.* para 5.5

⁷⁵ *Ibid.*

⁷⁶ JI Klein, ‘Cross-licensing and Antitrust Law’ (American Intellectual Property Law Association, San Antonio, Texas, May 1997) <<http://www.usDOJ.gov/atr/public/speeches/speeches.htm>>, accessed 7th August 2017

⁷⁷ DOJ (3) 22

Trade Commission endorsed that ‘intellectual property licensing allows firms to combine complementary factors of production and is generally precompetitive’.⁷⁸ Henceforth, the 1995 US Guidelines outlined that patent holders could agree on clauses that could affect trade, for example laying down temporary limits in commercializing or producing goods, when such limitations placed in cross licensing or patent pools happened to be essential for the development of new products and, ultimately, to benefit costumers.⁷⁹As will be discussed in the next Chapter, similar conclusions have been reached in Europe as the distinction between existence and exercise of an IP rights has been focused. According to this, both licensing and pooling have been indicated as means to enable the technology to be used. As such, licensing is an existence issue, whereas terms, which have effects on pricing, production limits, or which deal with licensing to third parties, are deemed to be related to exercise issues.

Consistently with the Guidelines, both the DOJ and the FTC implemented the new favourable approach in the following years.⁸⁰ In particular, from 1997 to 1999, the DOJ issued three Business Review Letters. The letters mainly refer to competition issues according to the inherent nature of “one-stop shop” of the patent pools involved. Nevertheless, the letters also emphasise the significance of mutual licensing in solving market inefficiencies related to the cumulative nature of some recent inventions. The first one was related to a patent pool on technologies about compression and transmission of digital video/audio signals (MPEG LA).⁸¹ In particular, asked to initiate an enforcement action against the pool, the Department pointed up the positive effects of combining and integrating *MPEG* patent in a patent pool as the agreement could result in providing an easier access to the patented technology,

⁷⁸ Antitrust Guidelines for Intellectual Property Licensing (73) para 2.0.

⁷⁹ Ibid 5.5; see also J Lerner, J Tirole, ‘Efficient patent pools’ (2004) 94 *The American Economic Review* 691

⁸⁰ DOJ (3) 64-66

⁸¹ United States, Department Of Justice (DOJ), Antitrust Division, *Business Review Letter* (26 June 1997) < <https://www.justice.gov/atr/response-trustees-columbia-university-fujitsu-limited-general-instrument-corp-lucent> > accessed the 7th August 2017.

especially allowing non-discriminatory term licensing.⁸² Equally, it was suggested that beneficial effects for consumers could come from the patent pool agreement given to the decrease in final product prices, which resulted from the reduction in the amount of royalties paid for using the shared technology.⁸³ Additionally, the letter stressed the absence of grant-back obligations in the agreements. As such, licensors were not allowed to use improvements made by the licensee to the licensed technology; thereby the development of rival products and technologies was eventually encouraged.⁸⁴ Therefore, the DOJ concluded that the pool did not inhibit innovation; on the contrary, the DOJ outlined that the licensing agreement provided significant cost savings and pro competitive effects.⁸⁵

Based upon the conclusion reached in this first Business Review Letter, the DOJ approved other two pools created to combine patents about DVD technologies.⁸⁶ In both decisions, in particular, the US Department underlined that the two *DVD* pools, like the *MPEG* pool, were aimed at mutual licensing patents related to DVD standard technologies, thereby only patents that were essential for the implementation of the DVD technologies were exclusively assigned to pools.⁸⁷ Thus, any antitrust concerns related to the two *DVD* pools was ultimately discharged according to the fact that both the patent-pool agreements preserved the patent holders' right to continue licensing its own patents also outside the pool.⁸⁸ Accordingly, the DOJ decisions on *DVD* pools strongly underlined the positive outcome achieved by these agreements in reducing the transitional costs of firms that were interested in implementing DVD

⁸² Ibid. Part II, para B 1.1

⁸³ Ibid. Part II, para B 1.3

⁸⁴ Ibid.

⁸⁵ Ibid. Part III

⁸⁶ United States, Department Of Justice (DOJ), Antitrust Division, *Business Review Letter* (16 December 1998) < <https://www.justice.gov/atr/response-koninklijke-philips-electronics-nvs-sony-corporation-japans-and-pioneer-electronic> > accessed the 7th August 2017; US Department Of Justice, Antitrust Division, *Business Review Letter* (10 June 1999) in < <https://www.justice.gov/atr/response-hitachi-ltds-matsushita-electric-industrial-co-ltds-mitsubishi-electric-corporations> > accessed the 7th August 2017.

⁸⁷ DOJ (10 June 1999) (86) Part II, para A

⁸⁸ Ibid. Part III, para A.

technologies. In particular, it was highlighted the pool's commitment to license the patents essential to implement DVD technologies, if an interested party so request; similarly, the "one shop stop" policy supported in the agreements was held in high esteem.⁸⁹

Notwithstanding, doubts were cast on some terms of the patent pool agreements. Concerns, in particular, were expressed referring to those clauses that laid down the indivisibility of the package of patents related to DVD technology. As such, firms, which were interested in the production of DVD players and discs or in implemented their products through DVD discs, were forced to license all the patents related to that technology, even if they did not need all of them to develop their products.⁹⁰ Despite these concerns, the DOJ conclusively recognised that cross licensing and pool agreements were effective means for the dissemination of technologies, and their action could result in price reduction and growth in performance and functionality of the final products.⁹¹

The FTC reinforced this positive stance in the decisions regarding the allegations against the *Summit Technology* and *VISX's* patent pool.⁹² These two firms were leaders in laser technologies and had agreed in pooling in a partnership the existing and future patents for photo refractive keratectomy (PRK) vision correcting eye surgery. The Commission complaints rose about the effects of that partnership on competition. Indeed, in creating the pool, the two firms had agreed in giving each other the right to prevent the pool from licensing any of the

⁸⁹ Ibid.

⁹⁰ Ibid. Part III, para A

⁹¹ Ibid. Conclusion. See also, DG Raymond, 'Benefits and Risks of Patent Pooling for Standard-Setting Organizations' (2002) 16 Antitrust 41; J Lerner, M Strojwas, J Tirole. 'The design of patent pools: The determinants of licensing rules' (2007) 38 The RAND Journal of Economics 610

⁹² *Summit Tech., Inc. & VISX, Inc., Complaint n. 9286* (24 March 1998) <https://www.ftc.gov/sites/default/files/documents/cases/1998/03/summit.cmp_.htm> accessed the 7th August 2017. All documents related to *Summit Technology, Inc. and VISX, Inc.*, <<https://www.ftc.gov/enforcement/cases-proceedings/summit-technology-inc-visx-inc-matter>> accessed the 7th August 2017.

pooled patents to third parties.⁹³ Thus, the Commission outlined that this licensing agreement, unlike other contracts, resulted in restricting other firms' access to PRK technology.⁹⁴ Additionally, the pool agreement set a fee to be paid to the partnership each time a laser vision perfection procedure was performed.⁹⁵ Given it, the Commission underlined the ill effect of the pool resulting in fixing the final price that consumers were to pay for PKR eye surgery.⁹⁶ Thus, the Commissions decided against the partnership between *Summit Technology* and *VISX's*, ultimately highlighting the differences between this patent pool agreement and the ones capable of producing efficiencies in the market, indeed, allowed by the DOJ.⁹⁷

5. Key issues in recognising beneficial effects of mutual licensing agreements

According to the brief overview of the US case law, the current positive approach to mutual licensing agreements is the result of the progressive identification of the beneficial effects that sharing of knowledge and expertise can have in implementing innovation, increasing competition, and ultimately benefiting consumers. However, some terms and contents more than others are deemed to be crucial in influencing this positive attitude towards mutual licensing agreements. Firstly, a greater legal protection seems to be offered to those agreements that allow both licensors and licensees to use complementary patents and to develop rival goods.⁹⁸ Therefore, identifying patents as complementary or substitute is thought to be a key factor to determine the extent of legal protection for mutual licensing agreements.⁹⁹

⁹³ Ibid. para 12-13

⁹⁴ Ibid. para 27-30

⁹⁵ Ibid. para 25(a), 27(b).

⁹⁶ Ibid. para 13

⁹⁷ *Summit and VISX Settle FTC Charges of Violating Antitrust Laws* Press Release (21 August 1998) < <https://www.ftc.gov/news-events/press-releases/1998/08/summit-and-visx-settle-ftc-charges-violating-antitrust-laws>> accessed the 7th August 2017

⁹⁸ DOJ (3) 66

⁹⁹ Ibid. 77

In the past, mutual licensing agreements were mainly used with dissemination purpose, thus sharing of knowledge as well as of patented inventions were often behind the firms' decision to reach cross-licensing and patent pool agreements. Thus, as indicated by the case review performed in the previous sections, mutual-licensing agreements involved mainly patents related to the same technology. In recent years, however, this type of agreements tend to be used strategically by firms, mostly by large firms, in order not only to share patents and technologies, but also to gain market power and, ultimately to exclude independent competitors.¹⁰⁰ In this new context, hence, the risk increases that competition can be harmed by mutual licensing agreements, whereby agreements resulting in bringing the most significant patents related to a technology under the control of a small number of firms.¹⁰¹ All this considered, defining substitute and complementary patents, and among these, blocking and essential patents is a key point to identifying when mutual licensing agreements can result in beneficial effects, thereby solving inefficiencies due to patent thicketing.

5.1 Substitute and complementary patents

The difference between substitute and complementary patents is usually based on infringement, i.e. the probability to be sued for infringements. In particular, each patent can be alternatively used to implement the same of technology, when patent are substitute.¹⁰² Thus, in a substitute patent context, patent holders do not fear to be sued from infringement by the owners of the patents, which cover the same technology. Conversely, the risk of infringement is worriedly high, when patents are complementary. Patents are described as complementary

¹⁰⁰ Ibid. 61-62

¹⁰¹ MH Morse, M. Howard 'Cross-Licensing and Patent Pools: Legal Framework and Practical Issues (2002) 3 Antitrust and Intellectual Property 42

¹⁰² Text to n 99; also the difference between complementary and substitute patents is described by Shapiro referring to Cournot theory, Shapiro (25) 145 ("Cournot assumed that the two inputs, copper and zinc, were required in certain fixed proportions for the production of brass. If one input can be substituted for the other, they have properties of substitutes as well as complements, in which case competition between the two input owners can go far to solving the problem posed here.")

when the development of a technological process or product requires the use of more than one patent. As already explained in Chapter VII, patents have to be used together to offer a new good or service in the market when innovation is cumulative.¹⁰³

In the light of the above, substitute patents seem to be naturally suited to increase innovation and ultimately competition in the market, whereas complementary patents can be easily used to block the normal flow of the economic growth. Hence, licensing, namely cross licensing and patent pools, is deemed to be a key factor in avoiding any detrimental use of complementary patents.¹⁰⁴ Indeed, sharing complementary patents has been seen to be essential non only in reducing infringement, but also in leading to more efficient exploitation of technologies both allowing the development of new product and the reduction of costs. All this considered, patent pool and cross-licensing agreements are encouraged in the case of complementary patents.¹⁰⁵

On the contrary, mutual licensing agreements are viewed with suspicious when patents are substitute. Firms are deemed to be naturally inclined to exploit and implement their own patents when they can bring substitute goods in the market. As such, firms tend to invest in innovation and to develop new products in substitute innovation context. Being the first-mover, i.e being the first to apply for patent protection, is considered pivotal to maintain the position in the market.¹⁰⁶ Given it, patent beneficial effects on economic growth are considered to be inherently in the exploitation of the singular substitute patent; thus, further patent sharing, namely mutual licensing agreements, are commonly deemed to be not needed by firms to maximize profit or to avoid infringements. Hence, some tactics and strategies, specifically

¹⁰³ Text to n. 46 Chapter VII

¹⁰⁴ G Graevenitz, S Wagner, D Harhoff, "Incidence and growth of patent thickets: The impact of technological opportunities and complexity" (2013) 61 *The Journal of Industrial Economics* 521, 526

¹⁰⁵ DOJ (3) 64; TT Guidelines (12) para 17

¹⁰⁶ H Hovenkamp, 'Antitrust and the Patent System: A Reexamination' (2015) 76 *Ohio St. LJ* 467, 503

foreclosing the market to competitors, could be the real reasons behind the reaching of mutual licensing agreements when firms hold substitute patents.¹⁰⁷

5.2 Essential and blocking patents

Among complementary patents, another distinction has been drawn between blocking and essential patent to underline the possible effects of mutual licensing on innovation and competition. Generally, patents are thought to be blocking when they are not only complementary but also absolute indispensable to implement a technology, so that patent holders can exploit their invention only using patents that are held by other firms.¹⁰⁸ Hence, as observed by the US Supreme Court “A patent may be rendered quite useless, or “blocked,” by another unexpired patent which covers a vitally related feature of the manufacturing process”.¹⁰⁹ In blocking patent context, therefore, “a commercially acceptable product” cannot be produced utilizing one patent but not infringing the others.¹¹⁰ Thus conceived, the chance to be sued for infringement as well as the possibility to sue someone for infringement is extremely high in those technological areas where patents tend to be blocking.¹¹¹ Therefore, mutual licensing should be welcomed as it could solve the issue of infringement. Nevertheless, cross-licensing in blocking patent context is often perceived negatively regarding the possible use of these type of agreements to strengthen the position of firms, specifically the large ones, in the market. Hence, blocking patents are commonly asso-

¹⁰⁷ DOJ (3) 74

¹⁰⁸ Shapiro (25) 134; H Hovenkamp, M Janis, MA Lemley, ‘Anticompetitive settlement of intellectual property disputes.’ (2002) 87 Minn. L. Rev. 87 1719, 1726 (“Consider the case of so-called “blocking patents,” in which each party would have the right to exclude the other from the market if the competing patents are held valid”)

¹⁰⁹ *U.S. v. Standard Oil Co.*(49) para 171

¹¹⁰ *International Mfg. Co. v. Landon*, 336 F.2d 723, 729 (9th Cir. 1964)

¹¹¹ Charles River Associates Ltd., *Report on Multiparty Licensing*, (London, 22 April 2003)

<http://ec.europa.eu/competition/antitrust/legislation/multiparty_licensing.pdf >
accessed 7th August 2017

ciated with decrease in competition and innovation when large firm are involved.¹¹²

Essential patents are identified in those complementary patents that are necessary to implement a technology according to a fixed technical standard.¹¹³ Firms involved in development of the same technology can, indeed, decide to fix some criteria, methods or processes in order to ensure a certain degree of uniformity regarding the performance or quality of final products. As such, patents related to these standards become essential and cannot be substitute by others, if a firm decides to implement that specific technology.¹¹⁴ Ultimately, firms, which own essential patents, can achieve competitive advantages. However, in order to avoid distortion on competition, firms establishing a technical standard are encouraged to agree in packing all the related patents in a joint licensing program.¹¹⁵ As already discussed in the previous sections, patent – pool agreements are supported by policy makers.¹¹⁶ Especially, some beneficial effects are appreciated such as the possibility to reach a single licensing agreements referring to all the essential patents or the fixing of fair and reasonable royalties.¹¹⁷

Important clarifications on this issue, i.e. the identification of essential patents and beneficial effects, have been given in *Philips v. ITC* by the

¹¹² Shapiro (25) 123

¹¹³ MA Lemley, C Shapiro, 'Patent Holdup and Royalty Stacking' (2007) 85 Tex. L. Rev. 1991, 1991; RP Merges, 'As Many As Six Impossible Patents Before Breakfast: Property Rights for Business Concepts and Patent System Reform' (1999) 14 Berkeley Tech. L.J. 577, 585

¹¹⁴ Hovenkamp (106) 504

¹¹⁵ EPO (33) 11

¹¹⁶ Ibid.; WIPO, Secretariat *Patent Pools And Antitrust – A Comparative Analysis* (WIPO, March 2014) <http://www.wipo.int/export/sites/www/ip-competition/en/studies/patent_pools_report.pdf > accessed 7th August 2017

¹¹⁷ EPO, Economic and Scientific Advisory Board, *Workshop on Patent Thickets* (EPO 2013) <[http://documents.epo.org/projects/babylon/eponot.nsf/0/B58781F239B083CEC1257B190038E433/\\$FILE/workshop_patent_thickets_en.pdf](http://documents.epo.org/projects/babylon/eponot.nsf/0/B58781F239B083CEC1257B190038E433/$FILE/workshop_patent_thickets_en.pdf) > accessed on the 20th June 2017, 14 ("Standard-setting organizations normally require contributors to agree to license on fair, reasonable and non-discriminatory (FRAND) terms as a means of preventing excessive rent-seeking, hold-ups, or anti-competitive practices from those members who hold IP elements of the standard.")

US Federal Circuit.¹¹⁸ The affair started in 2002, when Philips filled a complaint with the International Trade Commission (ITC), alleging that several companies had infringed its patents related to recordable (CD-R) and rewritable (CD-RW) CD technologies, which were identified as essential in the so-called *Orange Book* and aggregated in a patent pool.¹¹⁹ However, the infringing companies argued that the patent pool was strategically deployed by Philips in order to pack together both essential and not essential patents.¹²⁰ Additionally, Philips's competitors highlighted that they were asked to pay "flat rate" royalties to the pools, i.e. a fixed amount of royalties. As such, royalties were paid regardless of the quantity of patent exploited and even if not essential patents were used to manufacture the final product.¹²¹ According to competitors, therefore, Philips used the patent pool to restrain competition in the CD market.¹²² All this considered, the ITC decided against Philips based on the circumstance that potential licensees were not put in the position to license singular patents; instead, Philips used the pool to force them to license the entire package of patents, even if they wanted to use only a patent that was not essential considering *Orange Book* on CD standard technologies.¹²³

In the decision, the ITC underlined that at the beginning the pool had offered a single package of patents; changes occurred later, so that the pool's offer was gradually diversified into a number of packages combining essential and non-essential patents.¹²⁴ Nevertheless, the Commission highlighted that those changes did not resolve the antitrust issue as concerns were raised about the definition of "essential patents" used by the pool. In particular, the formula used ("essential as a practical matter") was seen as too wide.¹²⁵ As such, the pool could have labelled as essential also substitute patents, whereby used by the ma-

¹¹⁸ *U.S. Philips Corp. v. International Trade Commission*, 424 F.3d 1179 (Fed. Cir. 2005).

¹¹⁹ *Ibid.* 1182 - 83

¹²⁰ *Ibid.*

¹²¹ *Ibid.* 1189

¹²² *Ibid.* 1185

¹²³ *Ibid.* 1184

¹²⁴ *Ibid.* 1192

¹²⁵ *Ibid.* 1188

majority of the firms.¹²⁶ Hence, essential patent advantages were ultimately conferred to patents that were not strictly required to implement the CD-R or CD-RW standards.

Nevertheless, the US Federal Circuit reversed the decision of the Commission. The Court underlined that mutual licensing agreements were perfectly lawful, no matter if the arrangement covered more patents than ones indispensable to the licensee. Indeed, a patent license

does not obligate the licensee to do anything; it simply provides the licensee with a guarantee that it will not be sued for engaging in conduct that would infringe the patent in question.¹²⁷

The US Court, therefore, emphasised the significance of patent pools in avoiding the threat of infringement and linked that positive effect to others pro-competitive benefits that could result from mutual licensing. In particular, the Court highlighted that cross licensing and patent pools could “integrating complementary technologies, reducing transaction costs, clearing blocking positions, and avoiding costly infringement”.¹²⁸ Thus, the Court concluded that mutual licensing always provided that kind of certainty in using and exploiting patent rights that could beneficially affect investments.¹²⁹ Notwithstanding, the Court overshadowed the Commission’s conclusions on the broad definition of “essential patent” used in the agreement and cleared Philips of any wrongdoing based on the circumstance that Philips ultimately had

¹²⁶ Ibid. 1195

¹²⁷ Ibid. 1193

¹²⁸ Ibid. 1192

¹²⁹ Ibid. 1193 (“[P]ackage licensing provides “the parties a way of ensuring that a licensing fee will cover all the patents needed to practice a particular technology and protecting against the unpleasant surprise for a licensee who learns, after making a substantial investment, that he needed a license to more patents than he originally obtained.”)

not charged its licensees anything additional for the non-essential patents.¹³⁰

Hence, there remain concerns on how essential patents should be identified. Two points has been seen as crucial. On one hand, technical standards are usually fixed at the onset of a technology development. However, essential patents can change over time as standards can change, according to modifications in technical and manufacturing processes.¹³¹ As such, the identification of a patent as essential should be reviewed over the years. On the hand, several features have to be taken into consideration in identifying a patent as essential referring to a technology. Thus, a patent can be deemed essential in relation to specific technology, whereas the same patent is substitute referring to a different technical process.¹³²

6. Some conclusions

In recent years the perception of mutual licensing agreements has completely changed. Formerly opposed, cross licensing and patent pools are now encouraged. In accordance with the US Department of Justice approach, mutual licensing is now sponsored as an effective means to improve efficiencies and competition in the market. Indeed, firms can spend less time in negotiations and reduce royalty costs when several patents are licensed all in one package. Furthermore, the risk of infringement is significantly reduced, whereby the extent of patent rights is clearly defined by the good practice of reaching mutual licensing agreements between competitors. Thus, the uncertainty, which is creat-

¹³⁰ Ibid. 1192. See also S Bhattacharyya, 'US Philips Corp. v. International Trade Commission: Seeking a Better Tie Between Antitrust Law and Packaging' (2006) 40 Colum. JL & Soc. Probs. 267; Homiller (67)

¹³¹ R Bekkers, R Bongard, A Nuvolari, 'An empirical study on the determinants of essential patent claims in compatibility standards.' (2011) 40 Research Policy 1001, 1002

¹³² European Commission, 'Standard-essential patents' (Competition Policy, June 2014) <http://ec.europa.eu/competition/publications/cpb/2014/008_en.pdf> accessed 7th August 2017

ed by the strategic use of patents, is dispelled once patent pools and cross licensing are put in place. Similarly, the threat of infringement is significantly reduced, as well as costs of legal actions are sharply minimised.

In the light of this, mutual licensing can be effective also in reducing inefficiencies produced by patent thickets in business method patents arena. Similarly to other kind of cumulative inventions, business method patents can result in overlapping and uncertainty that mutual licensing can help to eliminate. In particular, blocking positions can be cleared by mutual licensing agreements, especially by cross-licensing agreements, so far as holders of business method patents decide to share their knowledge, thereby reducing risks of infringements and transaction costs. Nevertheless, hostility has been expressed in the past to mutual agreements according to their potential to control prices and product quantity, ultimately impeding rivals to enter in the technology area.

These concerns are still addressed. As such, mutual licensing effects on competition are still a major issue. Mutual licensing can solve problem between firms holding patents related to particular technology, but can it deal with the issues faced by those who would like to enter that technology arena? All this considered, the EU legal framework regarding mutual licensing agreements will be thoroughly discussed in the next chapter. In particular, the EU competition law, namely the TTBER and the TT Guidelines, will be analysed to understand whether the EU current legislation can contrast efficiently the detrimental effects of patent thicketing, whereby enhanced by mutual licensing agreements.

Chapter IX

The EU competition law, mutual licensing agreements and business method patents

1. Introduction

The analysis provided in the previous chapter, namely Chapter VIII, has indicated the development of a new positive attitude towards mutual licensing agreements, i.e. cross-licensing and patent pools. These agreements are now considered to be useful in encouraging innovation and competition. In particular, the beneficial effect of mutual licensing agreements seems to be amplified in technological areas where patents are cumulative and patent thicket approaches are adopted. Nevertheless, concerns have been raised about the possibility that mutual agreements can be used strategically. On the pretence of securing the efficient use of the shared technology, for example, parties could agree on limitations on the amount of output or on restrictions in the field of use. In such a case, firms could use cross licensing or patent pooling not only to eliminate or reduce patent-thicket inefficiencies, but also to interfere with the market development. Thus, mutual licensing could ultimately impede other firms to enter the market. Therefore, it cannot be excluded that firms, especially those involved in patent thicketing, could conceal behind the coordination in the exploitation of inventions, which is deemed inherently positive, other purposes.

These concerns arise even more when business method patents are involved.¹ As discussed at length in this research, business method patents are a clear examples of cumulative patents. The result is that

¹ RC Dreyfuss, 'Are business method patents bad for business' (2000) 16 Santa Clara Computer & High Tech. LJ 263.

either implementing or developing a business method often requires the exploitation of several patents, each of them covering just a little piece of the full process. In the business method patent area, therefore, some firms can gain strong bargaining positions, ultimately blocking the others to fully exploit their inventions. Indeed, it is likely that some of the algorithms already patented are critical to perform a new business method, when business methods are computer implemented. Another usual concern about business method patents is related to the extent of the protection ultimately granted. In point of fact, traditional patents gain a monopoly over particular ways of implementing a process; instead, business method patents tend to give a monopoly over the process itself. Therefore, traditional patent leaves competitors free to devise new ways of implementing that process, whereas business method patents usually result in granting a wide patent protection that impedes rivals to developing not only the same process, but also any other process similar to the patented one. Thus, patent thickening has been often linked to business method patents. Real threats to competition are also being warned when business method patents are involved, especially when granting patent protection to a well-known business technique can result in securing blocking positions in the market, i.e. positions that impede rivals to fully exploit their patents, ultimately foreclosing the market.

The quantitative analysis performed in Chapter IV and in Chapter VI has revealed possible strategic uses of business method patents and patent applications in Europe. In particular some of the features identifying the patent thicket phenomenon, such as large numbers of patent applications and a close web of relations among patent citations, occur in the category G06Q. Thus, concerns arise because of the risk that business method patents and patent applications could be used, for example, to hold-up rivals or to strategically raise their costs, thereby affecting competition. However, as suggested in Chapter VIII, mutual licensing agreements might help in clearing some of these detrimental effects. Ultimately, the coordination among firms in

exploiting and developing business method patents can forestall the development of strategic behaviours. Nevertheless, as already mentioned above, coordination can lead to tactics and collusion, thus mutual-licensing agreements can result in reducing competition.

This chapter, therefore, is mainly devoted to understand whether the EU competition law can effectively constrain the strategic use of business method patents and patent applications, especially neutralizing the detrimental effect on competition generated by mutual licensing agreements tactically reached. On this purpose, the chapter will be divided into three sections. Referring specifically to the EU legal framework, in the first section, a brief overview will be provided on the interface between patent legislation and competition law with specific regard to the interaction between Article 101 TFEU and licensing agreements. The analysis will highlight that both the European Commission and the CJEU have admitted the pro-competitive effect of mutual licensing, ultimately matching the US conclusion already discussed in Chapter VIII. Accordingly, a specific Regulation has been established, namely the Technology Transfer Block Exemption Regulation (TTBER), to control mutual licensing agreements.

In the second section, this piece of law, together with the Technology Transfer Guidelines (TT Guidelines), will be examined. Indeed, assessments ex Article 101 (1) and ex Article 101(3) are faces of the same coin; thus, indications about exempt agreements can give evidence also on how the European Commission will act in assessing the non-exempt agreements. As such, this section will highlight the importance of the TT Guidelines on what extent mutual licensing agreements between large firms may be caught by Article 101 (1) TFEU. In the following sections, instead, singular provisions of the TTBER and the TT Guidelines will be analysed. Attention will be paid especially to those detrimental effects already discussed in Chapter VII, namely hold-up, tacit collusion and raising rivals' costs schemes,

which are common outcomes of patent thicket practices. All this to understand whether the current EU legal framework on mutual licensing agreements offers effective means to constrain the strategic use of business method patents and patent applications resulting in reduction of competition.

2. The interaction between IP rights and competition law

The relationship between IP rights and competition law has been one of the most debated issues over the recent years.² The potential conflict, particularly, has been highlighted between IP monopolistic prerogatives and market efficiency. As is widely known, monopoly rights are one of the main features of patent protection. Thus, patent holders have the right to exploit their own invention and to exclude others to use it, unless a licensing agreement is reached. The analysis in Chapter III has already revealed that granting the exclusive use of a patent to the patent holder can be worthy for the society, especially conceiving the push towards increasing investment on innovation and on the development of new technologies, which usually results.³ Nevertheless, it must not be ignored that the exercise of IP prerogatives can affect competition. For example, either refusing to license or including quite severe restriction terms on price, sales or territories could affect the efficiency in the market and the consumer welfare. Hence, the right to exploit inventions could be used not only to exclude others to implement the same invention, but also to avoid them to develop similar technologies.

Discussions on this issue have been centred on an “apparent antinomy” between patent-holder exclusive rights and fair competition in the market.⁴ According to some scholars, an insoluble conflict

² SD Anderman (ed) *The interface between intellectual property rights and competition policy* (Cambridge University Press, 2007)

³ Text to para 2 Chapter III

⁴ G Ghidini, E Arezzo, ‘On the intersection of IPRs and competition law with regard to information technology markets’ in CD Elherman, I Atanasiu (eds) *European Competi-*

arises between antitrust and IP legislations as the first strongly oppose any type of monopoly, while patent protection results in granting monopolistic position to patent holders.⁵ On the contrary, other scholars recognise that both antitrust and IP legislations are equally aimed at encouraging firms to compete fairly in the market.⁶ Nevertheless, the possible clash between IP rights and competition law takes on particular interest in the EU context, according to the peculiarities of the EU legislation. In particular, the completion of the Single market is of critical importance both in the EU protection of IP prerogatives and in the EU competition law. Mainly aimed at securing the free movement rights, the TFEU recognizes IP rights. As such, the Article 36 TFEU allows restrictions in trade due to the IP prerogatives, although IP right restrictions that result in ‘a means of arbitrary discrimination or a disguised restriction on trade between Member States’ are ultimately prohibited. Similarly, the EU antitrust legislation are devoted to protect fair competition not as value in its one, but as a means to achieve economic integration and avoid discrimination.⁷

2.1 Article 101 TFEU

Article 101 TFEU fully reveals the above-mentioned tension of the EU competition law toward the completion of the Single Market. As known, Article 101 and 102 TFEU constitute the core of the EU competition law. If the role of Article 102 is to avoid that firms can abuse of their dominant position in the market, Article 101 focuses on agreements that could result in preventing, restricting or distorting

tion Law Annual 2005: The Relationship Between Competition Law And Intellectual Property Law (Hart Publishing 2006)

⁵ V Korah, ‘The Interface Between Intellectual Property and Antitrust: The European Experience’ (2001) 69 *Antitrust L. J.* 801, 805

⁶ P Régibeau, K Rockett, *Assessment of potential anticompetitive conduct in the field of intellectual property rights and assessment of the interplay between competition policy and IPR protection (COMP/2010/16)*(Office of the European Union 2011) <http://ec.europa.eu/competition/consultations/2012_technology_transfer/study_ipr_en.pdf> accessed the 20th June 2017, 10 -12

⁷ A Jones, B Sufrin, *EU competition law: text, cases, and materials* (OUP, 2014)

competition in the market. As such, the Article is basically divided into two parts. Article 101 (1) TFEU castigates agreements affecting the fair competition in the market. Instead, Article 101(3) TFEU provides criteria to be applied in order to save those agreements, which reduce competition but ultimately result in encouraging an integrated economic growth of the Member States. According to Article 101 TFEU, therefore, the European Commission (EC), and eventually the Court of Justice of the European Union (CJUE) should decide on the possible balance between pro-competitive and anti-competitive effects in agreements between firms, thereby allowing restrictions on competition whether necessary to achieve increasing innovation and in economic growth within the EU.

On the purpose of expanding the scope of Article 101 TFEU, an economic approach has been developed in the last decades, finally stigmatized in the so-called *modernisation* process.⁸ As such, the relationship between the parties as well as the identification of the relevant market have been emphasized; thus, the market position, both real and potential, has been indicated as a crucial feature in the assessment of infringements of competition. In particular, the anti-trust assessment has to take into consideration both the object and the effect of agreements.⁹ Additionally, the European Commission has stressed the importance of assessing the market share, especially when restriction on competition is not the object of the agreements, but the effect of the agreement itself. Moreover, relationship among the parties is put forward as crucial, according to the indications of the Commission.¹⁰

According to the economic approach, therefore, some features regarding the relationship of the parties are analysed to understand if an

⁸ M Monti, 'European Competition for the 21st Century' (2000) 24 Fordham Int'l LJ 1602.

⁹ Communication from the Commission Guidelines on the application of Article 101 of the Treaty on the Functioning of the European Union to technology transfer agreements (TT Guidelines) [2014] OJ C 89/03, para 11-12

¹⁰ Ibid. 79

agreement fall or not under the EU antitrust umbrella. Apart from the generic division based on the fact that parties are direct competitors or not, specific attention is paid to the inter-brand competition, i.e. parties are suppliers of competing brands, and intra-brand competition, i.e. parties are distributors of the same brand.¹¹ Even potential competition between parties has to be taken into account when agreements are reached between intra-brand or inter-brand competitors. However, the assessment ex Article 101 (1) TFEU could be slightly different. In the inter-brand competition, “examination of competition in the absence of the agreement” is considered “particularly necessary” to assess what would have been the parties’ position in the market without the agreement.¹² In an intra- brand competition context, instead, parties can secure their agreements giving evidence that it does not even potentially interfere with their position in the market as well as it does not strengthen their role in the market.¹³

Nowadays, therefore, a deeper insight in the positions of the parties in market is generally required in applying article 101 (1) TFEU.¹⁴ Similar, the definition of the relevant market, i.e. the identification of substitutive goods, is specially focused according to the new economic approach in the application of Article 101(1).¹⁵ All this is consistent with the aim of encouraging the development of a dynamic competition that can best serve the “completion of the Single Market” purpose.¹⁶ Ultimately, the competition issue is deal with differently according to the new point of view. Hence, whilst anti-competitive agreements tend to be avoided, pro-competitive effects are utmost encouraged.

¹¹ Ibid. 78

¹² Case T 328 /03 *O2 (Germany) GmbH & Co. OHG v Commission of the European Communities* [2006] ECR 2006 II-01231, paras 71 – 72

¹³ Jones, Sufrin (7) 233

¹⁴ Case T-111/08 *MasterCard and Others v Commission* [2012] ECLI 2012:260

¹⁵ TT Guidelines (9) 79

¹⁶ GJ Sidak, DJ Teece, ‘Dynamic competition in antitrust law’ (2009) 5 *Journal of Competition Law & Economics* 581

2.2 Article 101(3) TFEU

This “modernized”¹⁷ approach focusing more on the economic effects of agreements has ultimately complicated the relationship between article 101 (1) TFEU and article 101(3) TFEU.¹⁸ As mentioned above, Article 101 (3) TFEU indicates the criteria to be applied to assess the balance between pro-competitive and anti-competitive effects of agreements between firms affecting trade between Member States. On this purpose, four effects of the agreement should be taken into consideration and namely 1. the agreement must lead to an improvement in the production or distribution of goods or the promotion of technical or economic progress, 2. the agreement must allow consumers to fairly share the resulting benefit, 3. the agreement should impose only restrictions that are indispensable to the attainment of these objectives 4. the agreement does not afford the parties the possibility of eliminating competition in respect of a substantial part of the products in question.¹⁹ With its four requirements, thus, Article 101 (3) TFEU is scoped to objectively detect the beneficial effect of agreements in enhancing consumer welfare and ensuring an efficient allocation of resources.²⁰ As such, the agreement assessment on the balance between pro-competitive and anti-competitive effects should be to be placed only under Article 101(3) TFEU. However, scholars have suggested that some recently decisions of the CJEU have introduced some aspects of the pro-competitive effect assessment also under Article 101(1) TFEU, especially with regard to the assessment on the potential competition in intra and inter-brand agreements.²¹ Nevertheless, this arguments has been dismissed based on the observation that article 101 (1) TFEU does not contains any criteria to be applied in order to perform an assessment of the pro-competitive ef-

¹⁷ Text to n. 8

¹⁸ Jones, Sufrin (7) 267

¹⁹ Article 101 (3) TFEU

²⁰ TT Guidelines (9) 33

²¹ Jones, Sufrin (7) 266

fect resulting from trade agreements. As such, it is now an established opinion that article 101(1) TFEU only refers to examination on the agreement's anti-competitive effect, i.e. object or effect the prevention, restriction or distortion of competition, whereas the agreement's assessment under Article 101(3) TFUE is the one designated to identify agreement's efficiencies, i.e. pro-competitive effects.²² However, as it will better discussed below, the antitrust assessment ex Article 101 (1) TFEU should be taken into account the indication provided with regard to the assessment ex Article 101 (3) TFUE. As dynamic competition approach suggested, they are two side of the same coin.²³

2.3 Article 101 TFEU and pro-competitive effects in mutual licensing agreements

The role played by Article 101 (3) TFUE to combine fair competition, consumer welfare and deployment of free movement is emphasised in the scenario of licensing agreements. Indeed, as already discussed in Chapter VIII, licensing agreements can result in improving innovation and fostering the economic growth. According to their inherent features, therefore, licensing agreements are likely to produce market efficiencies. However, licensing agreements could be used to reach different, or even opposite, results. In such cases, licensing agreements are caught by the EU legislation, namely the EU competition law. This is the conclusion drawn in the so-called Christmas Message, where it was clarified that licensing agreement could be caught by article 101 (1) TFUE when their provisions go beyond the 'scope of the patent'.²⁴ At the outset, indeed, the European Commission developed a quite strict attitude toward licensing agreements.²⁵ The CJEU

²² Ibid. 267

²³ Sidak, Teece (16)

²⁴ European Commission, Notice On Patent Licensing Agreements (The So-Called Christmas Message) 24 December 1962 [1962-1963] Jo 2922/62, withdrawn by O.J. C 220/14 (1984)

²⁵ D Grosh, Patent 'Licensing Agreements and Anti-Trust in the EEC: Recent Decisions of the EEC Commission' (1973) 49 Notre Dame Law 392, 392

approach was also utmost severe at the beginning, as demonstrated by the *Costen and Grundig* decision.²⁶ In particular, the Court made clear that “[t]he Treaties shall in no way prejudice the rules in member states governing the system of property ownership”.²⁷ Nevertheless, licensing agreements fell under Article 101 when going beyond their scope and resulting in reducing competition.²⁸ However, a more positive perspective was developed in the 1980s, which ultimately matched with the US favourable approach already discussed in Chapter VIII. In the pivotal *Nungesser KG* decision,²⁹ the Court stressed the importance of licensing agreements in avoiding that investments in innovation could fall apart with detrimental effects on the dissemination of knowledge and technique in the Community.³⁰ As such, the beneficial effect of licensing was clearly recognized, especially in improving the development of new products and ultimately in increasing the competition in the market.³¹

Accordingly to this positive attitude toward licensing agreements, the European Commission has also adopted a favourable approach toward mutual licensing agreements. Significantly, in some decisions regarding patents pools, the European Commission based its decision on the beneficial effects of licensing underlining that “this patent pool helps to promote technical and economic progress by allowing quick and efficient introduction of the MPEG-2 technology...the pool has beneficial effects for the consumer”³². Similarly, relating to DVD technologies, the European Commission approved the patent pool agreement underlining that “this patent pool would help promote

²⁶ Cases C-56/84 and 58/64, *Consten and Grundig v Commission* [1966] ECR 299. The case mainly discusses on territorial exclusivity and reduction in competition between licensees in different territory.

²⁷ *Ibid.* 345

²⁸ *Ibid.* 339

²⁹ Case 258/78 *Nungesser KG v Commission of the European Communities* [1982] ECR 2015.

³⁰ *Ibid.* 2045

³¹ *Ibid.* 2072

³² European Commission, ‘Commission approves a patent licensing programme to implement the MPEG-2 standard’ (Press Release IP/98/1155 18 December 1998) <http://europa.eu/rapid/press-release_IP-98-1155_en.htm> accessed 7th August 2017

technical and economic progress by allowing quick and efficient introduction of the DVD technology”.³³ Furthermore, deciding on the Philips and Sony agreement on CD technologies, the Commission stressed the importance of mutual patent agreement; thus, it was outlined that “The adoption of the system [CD system] by music companies and consumer electronics manufacturers was strongly facilitated by the availability of the combined patents of Philips and Sony under reasonable and non-discriminatory terms”.³⁴

The positive approach developed by the EU Institutions toward licensing agreements, particularly toward mutual licensing agreements, is coherent with the idea that both the IP and competition law serve the same purpose. As such, the EU Commission has often pointed out that competition law and intellectual property protection pursue the same goals, even with different approaches.³⁵ In particular, both IP and competition laws have been introduced to increase efficiency of resource allocation and to encourage innovation, development and economic growth. Thus, the Commission argues, the two bodies of law are not antithetic at all, since either legal patent protection and antitrust law are aimed at ensuring a genuine competition in the market, by promoting an efficient use of inventions.³⁶ These ideas have been strongly promoted over the years. The Technology Transfer Block Exemption Regulation (TTBER) established by the European Commission provides a clear example of this, when it states that

Such agreements will usually improve economic efficiency and be pro-competitive as they can reduce duplication of research

³³ European Commission, ‘Commission approves a patent licensing programme to implement the DVD standard’ (Press Release IP/00/1135 9 October 2000) < http://europa.eu/rapid/press-release_IP-00-1135_en.htm > accessed 7th August 2017

³⁴ European Commission, ‘Commission clears Philips/Sony CD Licensing program’ (Press Release IP/03/1152 7 August 2003) < http://europa.eu/rapid/press-release_IP-03-1152_en.htm > accessed 7th August 2017

³⁵ TT Guidelines (9) paras 8-9; European Commission, ‘Communication from the Commission Guidelines on the application of Article 101 of the Treaty on the Functioning of the European Union to horizontal cooperation agreements [Guidelines on horizontal agreements] [2011] OJ C11/01, para 269

³⁶ TT Guidelines (9) para 7

and development, strengthen the incentive for the initial research and development, spur incremental innovation, facilitate diffusion and generate product market competition.³⁷

3. The Technology Transfer Block Exemption Regulation

In recent years, the European Commission has increasingly adopted specific regulations with the purpose of providing clear rules about the implementation of Article 101 (3) TFEU. For example, regulations on the implementation of article 101(3) TFEU to vertical agreements (i.e. agreements between parties active at different levels in the economic supply chain),³⁸ as well as regulations on the application of Article 101(3) to research and development agreements³⁹ have been established. Often indicated as block-exemption regulations, these pieces of legislations are intended to identify those agreements that are pro-competitive, thereby exempted from antitrust assessments ex Article 101 (1) TFEU.

According to their more recent development, block-exemption regulations identify and list clauses that express *per se* an anti-competitive attitude, i.e. restrictions. Additionally, thresholds are fixed to recognize firms' positions that can affect the market efficiency. Therefore, once a block exemption regulation is adopted, all the agreements that do not contain restrictions and do not exceed the fixed threshold are held pro-competitive; thus, these agreements are told to be in the *safe harbour* of the regulation and the assessment under article 101(1) TFEU is not required. Conversely, firms, who decided to agree on clauses that are not exempt, take the risk that the agreement

³⁷Commission Regulation (EU) No 316/2014 of 21 March 2014 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to categories of technology transfer agreements (TTBER) [2014] OJ L 93/17, 17

³⁸ Commission Regulation (EU) No 330/2010 of 20 April 2010 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to categories of vertical agreements and concerted practices [2010] OJ L 102/1

³⁹ Commission Regulation (EU) No 1217/2010 of 14 December 2010 on the application of Article 101(3) of the Treaty on the Functioning of the European Union to certain categories of research and development agreements [2010] OJ L 335/36

could be voided, when resulting in reducing competition. Similarly, an assessment on the effect of the agreement is necessary when the parties' market share exceed the fixed threshold. All this confirms the importance of the block – exemption regulations that not only establish a specific regulation on the assessment ex Article 101 (3) TFEU, but provide indirect indications also on the assessment ex Article 101(1) TFEU.

Consistently with the block-exemption framework, the European Commission has established also a regulation regarding the implementation of Article 101(3) in the specific context of licensing agreements, namely the Technology Transfer Block Exemption Regulation (TTBER).⁴⁰ Thus, licensing agreements meeting the requirements of the TTBER are in the safe harbour of the pro-competitive effects ex Article 101(3), whereas the others need to be assessed by the Commission. On this purpose Article 2 (1) of TTBER clearly states, “ Pursuant to Article 101(3) of the Treaty and subject to the provisions of this Regulation, Article 101(1) of the Treaty shall not apply to technology transfer agreements”. Nevertheless, both Article 2 and the current TTBER, namely Regulation n. 316/2014 of 21 March 2014, are the culmination of a long process.

3.1 At the beginning of the TTBER

A first attempt at drawing lines in the implementation of Article 101 (3) in the IP licensing agreement context was made in 1984. On this purpose, the Regulation n. 2349/84 was established with specific regard to “patent licensing agreements, and agreements combining the licensing of patents and the communication of know-how, to which only two undertakings are party”.⁴¹ The Regulation listed some clauses that could be part of this type of agreements. In particular, a

⁴⁰ TTBER (37)

⁴¹ Commission Regulation (EEC) No 2349/84 of 23 July 1984 on the application of Article 85 (3) of the Treaty to certain categories of patent licensing agreements [1984] OJ L219/15, 15

so-called “white list” was presented in Article 1, which included clauses that were considered to be *per se* pro-competitive. On the other hand, Article 3 presented a so called “black list”, including clauses that were to be considered to fall always within antitrust restrictions, such as clauses that provide on the obligation not to challenge the validity of licensed patents or that fix prices of products based on the licensed technology. Other clauses were listed in Article 2, the so-called “grey list”. According to this provision, a licensing agreement could produce pro-competitive effects outweighing ill effects on competition that could result from clauses providing on minimum royalties, restrictions for fields of use or patent further exploitations.⁴²

This sharp distinction between “black” and “white” clauses was maintained in the subsequent version of the TTBER adopted with the Regulation n. 240/96.⁴³ However, some changes were made. The new Regulation was applied also to pure know-how licensing agreements,⁴⁴ although patent pools and joint ventures remained excluded.⁴⁵ Some clauses were added to the “white list”,⁴⁶ whereas the “black” one was shortened.⁴⁷ Nevertheless, the “list” approach developed in both the 1984 and 1996 Regulations was regarded as too theoretical and incapable of considering all possible effects of licensing agreements on competition.⁴⁸ According to this approach, the assessment *ex Article 101 (3)* should be carried out *ex ante*, especially looking at the matching between the term of the agreement and clause lists pro-

⁴² WL Fugate, ‘Antitrust Aspects of International Patent and Technology Licensing’ (1984) 5 JL & Com 433, 447

⁴³ Commission Regulation (EC) No 240/96 of 31 January 1996 on the application of Article 85 (3) of the Treaty to certain categories of technology transfer agreements [1996] OJ L31/2

⁴⁴ *Ibid.* 2

⁴⁵ *Ibid.* Article 5

⁴⁶ *Ibid.* Article 1

⁴⁷ *Ibid.* Article 2

⁴⁸ EC Commission, ‘Evaluation Report on the Transfer of Technology Block Exemption Regulation 240/96’ (Evaluation Report) [2001] COM/2001/0786, para 76 (“The TTBE is perceived as being too formalistic and rigid”); H Hovenkamp, *IP and Antitrust: An Analysis of Antitrust Principles Applied to Intellectual Property Law* (Aspen Law & Business 2001) 45–28

vided in the Regulations.⁴⁹ Hence, neither the relationship between parties or their potential position in the market was taken into specific account. As such, it was suggested that the Regulation could have ‘the effect of forcing companies into a legal straitjacket which may discourage dissemination of technologies or deter more efficient transactions’.⁵⁰ Thus, a new version of the TTBER - this time accompanied by a set of interpretative guidelines - was drafted by the European Commission in an attempt to simplify the structure of the regulation, take into consideration parties’ market position and widen the application of block exemptions to most of technology transfer agreements.

3.2 A new approach to the TTBER

In April 2004, the Regulation n. 772/2004 was finally adopted ‘to move away from the approach of listing exempt clauses and to place greater emphasis on defining the categories of agreements which are exempted up to a certain level of market power and on specifying the restrictions or clauses which are not to be contained in such agreements’.⁵¹ Significantly, the new TTBER showed important changes in the criteria for the application of block-exemption regulations and the assessment ex Article 101 (3) TFEU. Especially, the relationship between parties was focused. Thus, different market-share thresholds were set depending on whether licensing agreements were reached between competitors or non-competitors. Therefore, only licensing agreements between competitors whose market share total holding does not exceed 20% could be exempted.⁵² As such, licensing agree-

⁴⁹ M Hansen, O Shah ‘The New EU Technology Transfer Regime-Out of the Straitjacket into the Safe Harbour?’ (2004) 25 *European Competition Law Review* 465, 466

⁵⁰ Evaluation Report (48) para 76; SD Anderman, J Kallaughner. *Technology transfer and the new EU competition rules: intellectual property licensing after modernisation* (OUP, 2006).

⁵¹ Commission Regulation (EC) No 772/2004 of 27 April 2004 on the application of Article 81(3) of the Treaty to categories of technology transfer agreements [2004] OJ L 123/01, 1

⁵² Ibid. Article 2

ments between competitors were believed to pose more risks for the competition than those between non-competitive firms.⁵³

With regard to the contents of the licensing agreement, most of the clauses listed in the previous versions of the Regulation were arranged in the new TTBER, though lexicon was changed. In particular, the Regulation n.772/2004 separated “hard-core” restrictions from the “excluded” ones. According to Article 4 of the 2004 TTBER, exemptions ex Article 101 (3) TFEU never apply to licensing agreements between competitors that included “hard-core” restrictions, such as clauses that restricted the ability to determine selling prices or limited the amount of products to be produced and sold. On the other hand, Article 5 of the 2004 TTBER named the “excluded” restrictions, i.e. clauses needed be individual assessed when included in transfer technological agreements, such as clauses providing obligations on licensee to grant an exclusive license to the licensor in respect of licensed technology improvements (so-called grant-back clauses), or not to challenge the validity of the IP rights held by the licensor (so-called non-challenge clauses) or to terminate the contract in the event that the validity of licensed IP rights was challenged (so-called termination clauses).

Significantly, in 2004 the Commission decided to accompany the TTBER with a set of guidelines. Hence, the Technology Transfer Guidelines (TT Guidelines) were published with the purpose to provide some guidance in interpreting and applying the TTBER to licensing agreements between two parties, but not only.⁵⁴ The TT Guidelines also provided a set of principles to be applied to licensing agreements falling outside the TTBER – i.e. agreements containing hard-core restrictions or exceeding the market share’s threshold- and

⁵³ Guidelines on the application of Article 81 of the EC Treaty to technology transfer agreements [2004] OJ C 101/02, para 26

⁵⁴ Guidelines (53)

to licensing agreements reached between more than two parties.⁵⁵ Ultimately, the Guidelines suggested a more effective approach to the Article 101 (3) TFEU assessment, thereby considering, for examples, the market position of parties or the existence of previous barriers to entry in the market.⁵⁶ The new approach was ‘unambiguously welcomed’.⁵⁷ Especially, it was praised the focus brought on the dynamic aspects of competition as well as the opportunity of individual assessments.⁵⁸ However, the Regulation n. 772/2004 received criticisms. In particular, practical difficulties in calculating the market share’s threshold emerged as well as ambiguities in the definition of the relevant market.⁵⁹ Moreover, doubts were casted on the approach of the Regulation and the Guideline towards incentives to innovation.⁶⁰

3.3 The EU Regulation n.316/2014 of 21 March 2014

In March 2014, a new version of TTBER has been established, though the new TTBER, namely Regulation n.316/2014.⁶¹ The 2014 TTBER mostly repeats the framework of the previous version. Consistently, the new TTBER offers two different lists of “hard-core” and “excluded” restrictions.⁶² The new Regulation also establishes two different market share’s thresholds, whether the agreement is reached between competitors or non-competitors.⁶³ The effect is ultimately to provide a “safe harbour” from antitrust scrutiny to those licensing agreements

⁵⁵ Ibid. para130

⁵⁶ Ibid. para 54

⁵⁷ S Bishop, D Gore, ‘From Black and White to Enlightenment? An Economic View of the Reform of EC Competition Rules on Technology Transfer’ in CD Ehlermann and I Atanasiu (eds) *Competition Law Annual 2005* (Hart Publishing Oxford 2007) 142.

⁵⁸ Ibid, 159 – 60; MR Patterson, ‘Revision of the New Technology Transfer Block Exemption Regulation: convergence or capitulation?’ in H Ullrich (ed) *The Evolution of European Competition Law: Whose Regulation, Which Competition?* (Edward Elgar Cheltenham, 2006) 70

⁵⁹ H Ullrich, ‘The interaction between Competition Law and Intellectual Property Law: an Overview’ in CD Ehlermann and M Marquis (Eds.) *10th European Competition Law Annual 2007 - A Reformed Approach to Article 82 EC* (Oxford 2007); FL Fine *The EC Competition Law on Technology Licensing* (Sweet & Maxwell London 2006) 53.

⁶⁰ Jones, Sufrin (7) 728

⁶¹ TTBER (37)

⁶² Ibid. Article 2 and Article 4

⁶³ Ibid. Article 3

that do not contain “hard-core” restrictions and are agreed between two firms that do not have relevant market power. Few adjustments have been made in the 2014 TTBER compared to previous versions. In particular, passive sales limitations are now considered always among the “hard-core” restrictions. Similarly, a more rigid approach is adopted regarding grant-back⁶⁴ and non-challenge⁶⁵ clauses, which are now more widely assessed. Regarding market-share’s thresholds, Article 3 of the Regulation n. 316/2014 confirms by and large what already established in the 2004 Regulation. However, the new Regulation clarifies that competitor market share’s threshold should be met also when parties are not current, but potential competitors, whereby the entry in the same market is “not just a mere theoretical possibility”.⁶⁶

3.4 The TT Guidelines of 28 March 2014

A new version of the TT Guidelines has been also introduced in March 2014.⁶⁷ As with the former TT Guidelines, the new ones offer indications on how the TTBER will be interpreted and applied by the European Commission. Additionally, the TT Guidelines give important indications about balancing between pro-competitive and anti-competitive effects regarding those IP licensing agreements falling outside the TTBER.⁶⁸ Thus, the TT Guidelines are utmost important for understanding on what extent mutual licensing agreements, specifically those between big competitors in the market, are allowed according to the EU competition law. However, it has to make

⁶⁴ TT Guidelines (9) para 129 (“exclusive grant backs (that is to say an exclusive licence back to the licensor of the licensee's improvement) or assignments to the licensor of improvements of the licensed technology”)

⁶⁵ TT Guidelines (9) para 133 (“non-challenge clauses, that is to say, direct or indirect obligations not to challenge the validity of the licensor's intellectual property, without prejudice to the possibility, in the case of an exclusive licence, for the licensor to terminate the technology transfer agreement in the event that the licensee challenges the validity of any of the licensed technology rights.”)

⁶⁶ W van Weert, D Henry, ‘Assessing Technology Transfer Agreements under the EU Anti-Trust Rules: Revised TTBER—Assessment and Outlook’ (2014) 4 Computer and Telecommunication Law Review 108,108; TT Guidelines (9) para 162

⁶⁷ TT Guidelines (9)

⁶⁸ Ibid. para 156

clear that the CJEU is not bound to apply the TT Guidelines.⁶⁹ In point of fact, the TT Guidelines bind only the Commission, as their role is to clarify the criteria that will be used by the Commission when the assessment ex Article 101 (3) is performed in licensing agreements. Thus, decisions on dispute involving the Commission and undertakings on application of Article 101 TFEU to IP licensing agreement will be based only on the current TTBER.⁷⁰

4. The EU competition law, ill effects of patent thickets and business method patents

The analysis in the previous section has made clear the major aim of the TTBER and the TT Guidelines, which is to balance the IP prerogatives with the protection of competition.⁷¹ Therefore, A positive approach toward mutual licensing agreements has been developed according to the dynamic competition perspective.⁷² Matching the US attitude about cross licensing and patent pool agreements, therefore, the EU competition law has finally emphasis the pro-competitive effects of the licensing agreement, particularly of the mutual licensing agreement⁷³

as it leads to dissemination of technology and promotes innovation by the licensor and licensee(s). In addition, even licence agreements that do restrict competition may often give rise to pro-competitive efficiencies, which must be considered under Article 101(3) and balanced against the negative effects on competition (10). The great majority of licence agreements are therefore compatible with Article 101.⁷⁴

⁶⁹ Ibid. para 4

⁷⁰ Ibid. para 2

⁷¹ Ibid. para 15-17

⁷² Ibid. para 8-9; SB Opi, 'The approaches of the European Commission and the US antitrust agencies towards exclusivity clauses in licensing agreements' (2000) 24 BC Int'l & Comp. L. Rev. 85.

⁷³ For example, TT Guidelines (9) para100 or para 104

⁷⁴ Ibid. para 9

It is with this in mind that this part of the thesis aims to examine whether the European competition legal framework, namely the TTBER and the TT Guidelines, can effectively counteract those patent-thicket ill effects that result in reducing competition. This is a pivotal point. The displayed hostility - mainly in Europe - toward business method patents is linked to the fear that granting patent protection to such inventions may result in increasing the patent thicket phenomenon. As already discussed in Chapter VII, the spread of patent thickets is often linked to inefficiencies in the market. In point of fact, patent thickets can be strategically put in place to create uncertainty about what is covered by patent protection and what is not. This lack of clarity, in particular, can result in increasing final costs. As such, firms can be encouraged to reach licensing agreements, specifically mutual licensing agreements to reduce patent-thicket inefficiencies. However, patent thickets can result in social inefficiencies whereby mutual licensing agreements serve the purpose of discouraging new firms to enter the market. Hence, patent thickets can affect the level of competition in the market and, indeed, the decrease of competition is considered one of the most probable outcomes if a favourable attitude towards business method patents would be adopted in Europe.⁷⁵

In the business method area, in particular, the ill effect on competition created by patent thicket behaviours seems to be ever more amplified. In point of fact, business method patents tend to cover large areas of knowledge. Usually claims in business method patents describe the entire process rather than the specific way in which the method is implemented. Referring to computer-implemented business methods, for example, it is usually stressed the fact that patents tend to cover not just the specific implementation of the algorithm, but the

⁷⁵ ex multis, C Shapiro, 'Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting' (2001) 1 *Innovation Policy and the Economy* 119; BH Hall, G von Graevenitz, C Rosazza- Bondibene, '*A Study of Patent Thickets*' (The Intellectual Property Office, 2013) <<http://www.ipo.gov.uk/ipresearch-thickets.pdf> > accessed 20th June 2017

algorithm itself. As such, business method patents are often accused to grant a too broad patent protection, thereby increasing the risk of overlapping among patents. Hence, uncertainties are likely to happen in the technological area of business methods. Especially, concerns arise about the practice of well-know firms to filing a large amount of business method patent applications, given the risk of creating uncertainty to be used to strengthen the market position of large companies to the detriment of start-ups.

In Chapter VIII, however, it has been made clear that it is commonly believed that coordination among patent holders can reduce or even solve the patent thickets issue. Cross-licensing or patent pools, in particular, are indicated as useful means in improving coordination. As such, mutual licensing agreement can encourage the sharing of knowledge and information among firms, with the positive effect of clearing uncertainties. Made the case of a firms that owns a patents about processing data to manage margin brokerage and another firm that has obtain patent protection for a system that covers some aspects of the customer dealing instruction related to the same margin brokerage management. In point of fact, each firm could block the other threatening infringement action. As such, hold-up and cost increasing could easily result. However, reaching a cross-licensing agreement could allow both firms to exploit and implement the margin-brokerage management system.⁷⁶ Thus, mutual-licensing agreements can be helpful and, perhaps indispensable, for ensuring efficiencies in the market and encouraging the spur of innovation, thereby promoting competition and consumer welfare. Given it, mutual licensing agreements are boosted in Europe (and in the US, too), as discussed in the previous section.

Nevertheless, the risk exists that mutual agreements are put in place for with strategic reasons, ultimately amplified the same ill effects of

⁷⁶ LB Allen, 'The Patentability of Computer Programs: Merrill Lynch's Patent for a Financial Services System' (1983) 59 Ind. LJ 633

patent thickets and ultimately affecting competition. As WIPO stressed, referring to cross licensing:

'limitations in licensing agreements, such as territorial limitations or limitations as to the field of use, may be pro-competitive under certain circumstances', though 'a competition law concern may arise if a licensing agreement contains restraints that adversely affect competition among entities that would have been competitors in the relevant market in the absence of the license'.⁷⁷

In such a case, the beneficial effect of a coordinate patent exploitation could be not only reduced, but also eliminated. In particular, the hypothesis can be done of a player in the market of business method patents that negotiates a cross-licensing agreement to share the use of some technologies. Using the umbrella of the EU competition law, which encourage this type of contracts, some restriction on competition could be allowed in the agreement, but what happens when restrictions are used to strengthen the position in the market? In our hypothesis, one party could use the uncertainty created by patent thickets, and the threat of legal actions to force the other firm to pay high royalties or to produce only a limited amount of output. Ultimately, market inefficiencies would result, as already discussed in Chapter VII. Additionally, detrimental effect on competition can be created, thereby discouraging new players to enter the market of business methods. All this considered, it is essential to investigate whether mutual licensing agreements are caught by Article 101 (1) TFEU even though they are reached to solve ill effects of patent thickets. For this purpose, the following sections are mainly aimed to analyse patent thicket behaviours, i.e. hold-up, tacit collusion and raising rivals' price scheme, from the point of view of the TTBER and

⁷⁷ WIPO, Standing Committee on the Law of Patent, *Transfer Of Technology* (SCP/14/4, 2009) <http://www.wipo.int/edocs/mdocs/scp/en/scp_14/scp_14_4.pdf> accessed 7th August 2017, 128.

the TT Guidelines. All this to investigate on what extent mutual licensing agreements can solve market inefficiencies created by patent thickets without undermine or weaken competition in the market.

With regard to the analysis of the TTBER and the TT Guidelines, which will be performed in the next sections, some comments are needed. It has made clear in the first section of this Chapter that the European Commission's proceedings ex Article 101 TFEU could be brought either to investigate the anti competitive effects of an agreements ex article 101 (1) or its pro -competitive effects ex Article 101 (3). In particular, the TTBER and the TT Guidelines serve the purpose of clarify what agreements can be caught by Article 101 (3), thereby identifying licensing agreements to be exempted from the Commission assessment ex Article 101(1). However, the two assessments, i.e. the one ex Article 101(1) and the other Article 101(3), are the two side of the same coin. Thus, the analysis of the TTBER and, in particular, the examination of the TT Guidelines can offer useful information also about how the European Commission will act in the antitrust assessment regarding mutual licensing agreements that fall out of the TTBER umbrella.

On the other hand, the importance of the analysis is not diminished because of the different enforceability of the TTBER and the TT Guidelines. In particular, the TTBER establishes a set of rules immediately applicable in all Member State, i.e. enforceable by rivals too, defining what technology transfer agreements are exempt from the anti-trust assessment; instead, the role of the TT Guidelines is to provide criterion that the Commissions has to take into consideration in performing the assessment ex Article 101 (3) TFEU, regarding not only the exempted agreements but all licensing agreements. Indeed, the TT Guidelines bind only the European Commission; other EU or national institutions, and even the CJEU can interpret the TTBER without prejudice of the TT Guidelines. Nevertheless, the TT Guidelines could have a great deal of influence in practice. In point of fact, it is the Commission that generally brings proceedings ex Article 101 TFEU and the Commis-

sion has to conduct the assessment according the Guidelines. Thus, the TT Guidelines ultimately operate like a law, at least until a court decides otherwise. Therefore, the indications provided by the TT Guidelines on mutual licensing agreements are utmost important to understand whether the patent thicket ill effects are caught by article 101 (1) TFEU.

4.1 Clauses resulting in “raising rivals’ cost scheme” or “hold-up”

One of the main concern related to patent thickets, as discussed in Chapter VII, is the possibility that patent holders can use the uncertainty intentionally created around the boundaries of their patents to force rivals or downstream firms to license a bundle of patents, which are not all necessary to implement a process or a method. Similarly, the uncertainty produced by patent thickets can be used to increase apprehensions about possible infringements, ultimately forced firms to accepted high royalties. This could be the case when a patent is needed to implement a specific technology (blocking patent); thus, firms, which want to enter that market or are already involved in the market, could accept to pay high royalties to license blocking patents and to avoid any risk of infringements. Most obviously, high royalties ultimately influence the final cost of service or products in such a way that competitors and newcomers are discouraged to enter the market or are forced to leave it. In the following subsections, some clauses that can be used to create “hold-up” or “raising rivals’ costs scheme” will be analyzed together with the solution offered by the EU Competition law.

a. Running royalties

When the amount of the royalties to be paid is linked to the number of product sale or - taking the example of the margin-brokerage management system – to the share transactions, royalties are called

“running royalties”.⁷⁸ The contract term providing running royalties is carefully considered, given the risk of resulting in a “raising rivals’ costs scheme”.⁷⁹ Indeed, the rate of the royalty affects directly the cost of each unit of output, when parties agree on running royalties; thus, the final price of the product is inevitably affected, with consequences on the consumer welfare. Given this, inefficiencies in the market can easily occur when running royalties are provided. Furthermore, running royalties can revealed some unbalanced positions between the parties. In particular, firms that play a significant role in the market, i.e. blocking-patent holders, are facilitated to pressure other market players to accept running royalties. In such cases, downstream firms that want to remain in the market are forced to increase final product prices or to reduce their final output.⁸⁰ Nevertheless, it is also possible that firms can decide to leave the market. Especially, small firms, which cannot bear high costs, could find more effective to leave the market than to stay with low profits.

The TT Guidelines frames the issue in para 100, referring the practice of running royalties to those that can be caught by Article 4 (1) (a) TTBER. In particular, the TT Guidelines highlight the reduction in competition, especially resulting when running royalties are applied reciprocally to cross licensing between competitors.⁸¹ Therefore, technology transfer agreements between competitors that include running royalties are out of the TTBER safe harbor. Nevertheless, parties can prove the pro-competitive effect of the agreement, even if a running royalty clause is included. In that case, the agreement is considered valid.⁸² Similarly, referring to licensing agreements falling outside TTBER, it is pointed out in para 185 that

⁷⁸ TT Guidelines (9) para 100

⁷⁹ Shapiro (75) 130

⁸⁰ ML Katz, C Shapiro, ‘On the licensing of innovations’ (1985) *The RAND Journal of Economics* 504

⁸¹ Text to n. 78

⁸² *Ibid.*

It is a hardcore restriction under Article 4(1)(a) if competitors provide for reciprocal running royalties in circumstances where the licence is a sham, in that its purpose is not to allow an integration of complementary technologies or to achieve another pro-competitive aim.

Hence, it is stated in para 186 that Article 101 TFEU can be applied to cross licensing between competitors that exceed the threshold of the safe harbour, when running royalties result in fixing prices that significantly affect competition in the market. Therefore, it can be concluded that running royalties schemes are generally kept under review by the Commission, according to the effects on the final prices and ultimately on competition in the market. Thus, it does not give rise to concerns the possibility that firms, which have gained blocking positions by patent thicket behaviours, could force rivals to cross-licensing agreements applying running royalties schemes. Indeed, these clauses will be always caught by Article 101 (1) TFEU, when their ill effects are not balancing by pro competitive effects, i.e. technology integration or implementation.

b. “All product sales” royalties

As pointed out by the European Court of Justice,⁸³ costs of final product incorporating a licensed technology can increase more than expected when licensors are forced into agreements that fixed royalties on the basis of quantity of product sold, irrespective of whether the licensed technology is used. Taking the example of the margin-brokerage management system, this would be happen when royalties are fixed considering the number of customers accessing the system irrespective if they use the specific service related to the patented technology. This type of licensing are identified as “all product sales royalty” agreements because firms agree to pay royalties for all products or services sold, irrespective of the fact that their own competing

⁸³ Case 193/83 *Windsurfing International v Commission* [1986] ECR 611, para 67

technology or a third party technology are implemented in the product or service sold. Clearly, when these type of clauses are included in a licensing agreement firms' costs are considerable affected. As a consequence, firms can decide to stop manufacturing a product or employing a method or, even not to enter a specific market, considering the significant amount of royalties that it can imply. Reducing in competition, therefore, has been highlighted as a possible result when licensees are asked to pay royalties not only on products or services implementing the licensed technology, but also extended to products or services implementing their own competing technology or with a third party technology.⁸⁴

The Court's concern has been endorsed by the Commission. In the TT Guidelines it is taken into account the possibility that parties adopt an "all product sale" royalty scheme. According to para 101, these schemes can be caught by both Article 4 (1) (a) and 4 (1) (d), when apply to cross licensing between competitors because

In general such agreements restrict competition since the agreement raises the cost of using the licensee's own competing technology rights and restricts competition that existed in the absence of the agreement

However, according to the following para 102 TT Guidelines, parties can prove that this type of royalty plan is indispensable to generate pro-competitive effects, though objective evidences need to be provided.⁸⁵ This may be the case when it is proved that otherwise it would be impossible or unduly difficult to calculate and monitor the royalty payable by the licensee, for instance because the licensor's technology leaves no visible trace on the final product and practicable alternative monitoring methods are unavailable. Equally, it seems

⁸⁴ A Ezrachi, *EU competition law: an analytical guide to the leading cases* (Bloomsbury Publishing 2014) 348

⁸⁵ See also TT Guidelines (9) para 188

that the Article 101 (3) requirements can be met also regarding no-competitor cross licensing falling outside TTBER when ‘there is no other practical way of calculating and monitoring royalty payments’.⁸⁶ Hence, a favorable balance towards pro – competitive effects is deemed possible even when cross licensing among no competitors exceed the TTBER thresholds, insofar as the coordinate use of patents allowed by an “all product sales” royalty scheme does not result in an appreciable foreclosure of the market.⁸⁷ According to the EU competition law, therefore, an accurate assessment ex Article 101 (3) needs to be made when firms agree on “all product sales” royalty schemes. Thus conceived, the possible antitrust risks pointed out refereeing to “all product sales” royalties, i.e. reducing in competition due cost to cost raising, can be controlled even when this practice is engaged by cross licensing in patent thickets.

c. Disproportionate royalties

In patent thicket areas, firms tend to settle patent litigation accepting to pay royalties that are greater than could be justified by the market value of patents.⁸⁸ This hold-up effect is typical, for example, when a firm with a relevant position in the market is under the threat of a potential entrant, which claims the ownership or the validity of a key patent for a specific technology. In such a case, parties could reach an agreement that provide on the payment of royalties higher than patent values. In particular, incumbents tend to settle those types of cases out of the court by agreeing on settlement terms that are more profitable for competitors than to enter the market itself. However, these settlement agreements eventually result in inefficiency in the market. The monopolistic level of output and the monopolistic price

⁸⁶ TT Guidelines (9) para 188

⁸⁷ TT Guidelines (9) para 188 referring to criteria in para 229 to assess the ease of third party entry “depends not only on the availability of licensees but also the extent to which they have access to distribution”

⁸⁸ MA Lemley, C Shapiro, ‘Probabilistic Patents’ (2005) 19 J. Econ. Persp. 75, 91-92

are, indeed, maintained.⁸⁹ Ultimately, consumers will suffer for high prices and cuts in the product choice.⁹⁰ Nevertheless, hold-up effects can occur also in competitive market. For example, firms can agree on excessive royalties persuaded by the threat to be sued for infringement even when more firms are already active in the same market. In point of fact, uncertainty on patent validity as well as on litigation costs make more profitable to pay substantial royalties, instead of bearing costs for switching toward a different product.⁹¹ Therefore, disproportionate royalties are agreed in this scenario as a lesser evil.

Both the scenarios described above are considered in the TT Guidelines. In particular, disproportioned royalties are deemed to fall under the hardcore restrictions when applied to a cross licensing agreement between competitors, unless the parties do not reach the TTBER threshold.⁹² Additionally, settlement agreements can be caught by Article 101 (1) TFEU when royalties are so high that firms are impede to fully exploit their inventions⁹³ or product final costs are significantly impacted.⁹⁴ However, para 186 TT Guidelines clarifies that

In assessing whether the royalties are disproportionate it is necessary to examine the royalties paid by other licensees on the product market for the same or substitute technologies. In such cases it is unlikely that the conditions of Article 101(3) are satisfied.

Therefore, hold-up practices that result in disproportionate royalties are effectively tackled by the EU competition law. As such, hold-up effects can be controlled even when patent thickets are put in place.

⁸⁹ Lemley, Shapiro (88) 92

⁹⁰ TT Guidelines (9) para 186

⁹¹ J Farrell, C Shapiro, 'How strong are weak patents?' (2008) 98 *The American Economic Review* (2008) 1347, 1361

⁹² TT Guidelines (9) para 186

⁹³ *Ibid.* para 240

⁹⁴ *Ibid.* para 241

Nevertheless, doubts have been casted on the extent of the assessment that can be conducted by the Commission ex Article 101 (1) TFEU. Ultimately, disproportionate royalties are among those clauses included in the safe harbor, when cross licensing is reached by competitors with a joint market share less than 20%.⁹⁵ Nevertheless, such scenarios, i.e. agreements between firms that represent less than 20% of the market, are not those where patent thickets tend to occur.

4.2 Clauses resulting in tacit collusion

Competition should increase in the market, when more than one firm hold patents related to an innovative process and the new technology can be implemented by several firms at the same time.⁹⁶ In such cases, prices tend to be low, with beneficial effects for consumers. However, patent holders might decide to conclude cross-licensing agreements to pursue some market strategies. In particular, scholars have suggested that cross-licensing agreements can be used to tactically organize firms' activities, i.e. to impede that product prices decrease or output quantities increase. Thus, mutual-licensing agreements can be ultimately reached to prevent the outbreak of a price war which is likely when large quantities of similar products are placed simultaneous on the market and rivals can decided to reduce prices to gain market share. Such a scenario is possible when patent thickets take place especially with regard to digital technologies. In digital areas, as usual in other cumulative technologies, more firms are often involved in the same technology or in similar technologies, given the ease in copying or developing similar inventions. This implies that firms usually work on products and services that are

⁹⁵ DS Jeon, Y Lefouili, *Cross-Licensing and Competition* (CEPR Discussion Paper No. DP10941, 2015) 23

⁹⁶ Federal Trade Commission of United States, *Competition Policy in the New High-Tech Global Marketplace. Vol. I* (FTC Staff Report 1996)
<https://www.ftc.gov/system/files/documents/reports/anticipating-21st-century-competition-policy-new-high-tech-global-marketplace/gc_v1.pdf >accessed 7th August 2017, 6; Guidelines (9) para 163

similar and firms tend to serve the same market or subsidiary market, when digital technologies are involved.⁹⁷ In this kind of scenario, firms can be facilitated in knowing each other strategy. Consequently, it is possible that “similar views on the terms of coordination” can be shared among competitors, when patent thicket practises are developed in digital technologies.⁹⁸ Indeed, parties can tacitly agree to keep prices high or quantities low in order to avoid hurting each other. As a result of mutual patent agreements, therefore, competition can be tactically reduced when patent thicket behaviours are developed in digital technologies. The TBER and the TT Guidelines try to deal with some of the ill effects created by these collusive behaviours, especially between competitors.

a. Price fixing

Price fixing can result when parties agree on the exact price to sell the final product that implements the licensed technology.⁹⁹ Price fixing can also occur when parties decided for a certain royalty rate that is arranged consistently with margins or maximum level of discounts; thus, prices are indirectly controlled.¹⁰⁰ Moreover, collusive behaviors can emerge when parties agree on measures to identify price cutting, i.e. establishing a price monitoring system or imposing obligations on licensees to report price deviations, because of the control ultimately achieved on the price trend.¹⁰¹ Nevertheless, fixing price terms are caught by art 101 TFEU, irrespective of the fact that the control of final prices is gained directly and indirectly. Indeed, Article 4 TBER includes fixing price clauses into the hard-core restrictions to the competition. However, a different legal framework is provided according to the relationship between the parties. For instance, a contractual term, which fixes a minimum amount of royalties to be

⁹⁷ MA Lemley, C Shapiro, ‘Patent holdup and royalty stacking’ (2006) 85 Tex. L. Rev. 1991, 2025

⁹⁸ TT Guidelines (9) para 171

⁹⁹ TT Guidelines (9) para 99

¹⁰⁰ TT Guidelines (9) para 118

¹⁰¹ Ibid.

paid, does not always “in itself amount to price fixing”, when provided in a cross-licensing agreement between competitors.¹⁰² Similarly, a more detailed analysis is required to verify if “the agreement is devoid of any pro-competitive purpose”,¹⁰³ when competitors fix a low fringe in the royalty amount.

Case by case antitrust assessment is also conducted on non-competitor cross-licensing agreements, when parties agree, for example on a list of recommended prices or on a list of maximum prices.¹⁰⁴ Indeed, the TT Guidelines suggest that these scenarios are completely different from those where parties agree on clauses that result in fixing or minimum prices.¹⁰⁵ Indeed, a recommended maximum price list can be crucial to encourage newcomers to enter the market when it is particularly costly or risky to implement a new technology.¹⁰⁶ Thus, restrictions on competition that result from clauses applying recommended sale prices are ultimately allowed, whereby balanced with pro competitive effects, such as increasing in consumer choices or starting up of new markets.

Nevertheless, doubts continue to be raised on maximum price clauses. Recently, the Commission’s New Guidelines on Vertical Restraints have clarified that clauses providing a list of recommended maximum prices could ultimately affect competition. In particular, a fixed maximum price can become a focal point for the resellers and the suppliers that can find difficult to deviate from a price proposed by important supplier or seller on the market. Therefore, under such circumstances the practice of imposing a maximum resale price or

¹⁰² TT Guidelines (9) para 99

¹⁰³ Ibid. para 100

¹⁰⁴ Ibid. para 118

¹⁰⁵ Ibid.

¹⁰⁶ MA Lemley, ‘Ten things to do about patent holdup of standards (and one not to)’ (2007) 48 BCL Rev. 149,159 .

recommending a resale price may infringe Article 101 TFEU, if it leads to a uniform price level.¹⁰⁷

All this considered, it can be concluded that fixing price clauses are generally considered among those affecting competition when provided in licensing agreements. Indeed, there is not TTBER safe harbor for this type of clauses, unless parties provide evidences of pro-competitive effects. Additionally, fixing price is also clearly castigated, when included in mutual licensing agreements that fall outside the TTBER. Especially, it is the case of technology pools “composed solely or predominantly of substitute technologies”, whereby clauses result in establishing a fixing price cartel among the parties of the patent pool.¹⁰⁸ In conclusion, there are no doubts that the EU competition law provides an adequate legal framework capable of dealing with price fixing practices. Thus, unless pro competitive effects are proved, fixing price is always castigated and this would be true even when these clauses are provided in mutual licensing agreements reached between firms involved in patent thickets.

b. Market-sharing agreements

b.1 Exclusive clauses

Exclusive clauses are usually provided in licensing agreements in order to allow licenses to be the only to exploit the licensed technology in a particular territory or for a particular use.¹⁰⁹ These clauses are perfectly legal; however, problems arise from exclusive clauses included in cross-licensing agreements between competitors.¹¹⁰ Firms, for example, can agree on reciprocate exclusive clauses when they have relevant positions in market of substitutive goods or services. It

¹⁰⁷ Commission Notice on the Guidelines on vertical restraints [2010] OJ C 130, para 227- 228

¹⁰⁸ TT Guidelines (9) para 246

¹⁰⁹ TT Guidelines (9) para 190

¹¹⁰ Ibid.

can be the case when two or more banks offer similar financial derivatives. In such a case, banks can reach an agreement based on exclusive clauses related to types of consumers (for example, firms and individuals) or territories, thereby easily resulting in market sharing. As such, exclusive clauses can facilitate collusion on outputs to be put in the market regarding each of the substitutable products, ultimately impede rivals to enter.¹¹¹ Further, reciprocal exclusive clauses can lead parties to arrange to ‘where they may sell products incorporating the licensed technology’, whereby their positions will be strengthened and rivals will be ultimately discouraged to enter the market.¹¹² Similarly, tacit collusions on the market allocation can result when competitors agree on a reciprocal sole licensing clauses, i.e. clauses that provide only limitation on licensing to third parties to produce within a given territory. All this considered, licensing agreements between competitors including exclusive or reciprocal sole licensing clauses are caught by art 101 TFEU. Nevertheless, the Commission recognizes the importance of a case-by-case analysis according to the economic approach, finally embraced by the recent formulations of the TTBER (the 2004 and the 2014 version).¹¹³

According to the TT Guidelines, the assessment ex Article 101(3) TFUE of those agreements providing exclusive clauses has to taken account of several features such as the nature of the agreement, the market position of parties and competitors, the existence of entry barriers and the maturity of the market.¹¹⁴ As such, the TT Guidelines mainly recall the four cumulative conditions defined in the Guidelines on the application of Article 101 (3) of the Treaty on horizontal agreements. According to those Guidelines firms are asked to prove that the are fulfilled so that contracts 1) provide pro-competitive efficiencies (cost efficiencies or qualitative efficiencies) 2) grant consumers a fair share of the resulting benefits in the form of a

¹¹¹ Ibid. para192

¹¹² Ibid. para 191

¹¹³ Ibid. para192

¹¹⁴ Ibid. para 159

wider variety of products based on the same technology or of cheaper products, 3) parties can prove that they continue to be a competitive force with regard to their own technology, thus that the contract do not allow market allocation 4) the contract is indispensable since without the exclusivity clause the parties may refrain from licensing if the other party is able to grant licenses to other market participants.¹¹⁵ Only when all these conditions are completely fulfilled, exclusive clauses can be legally included in cross-licensing between competitors that falls under the TTBER.

A particular attention is paid when non-reciprocal exclusive licensing clauses are included in cross licensing agreements between competitors.¹¹⁶ In such cases, the licensor should abstain from producing goods and services in the territory in question or worse licensor should leaves the market, if the exclusive licensing is worldwide. Hence, exclusive clauses can have detrimentally affect licensor positions in the market.¹¹⁷ According to the TT Guidelines, Article 101 TFEU can be applied to these agreements, unless exclusive clauses regard small territories or no significant portion of the market. In particular, non-reciprocal exclusive licensing are considered in the in safe harbour of the TTBER, when evidences are given that reductions on competition do not occur and exclusiveness is essential to incentive the technology implementation.¹¹⁸ For example, exclusive clauses are allowed when a large investment is needed to develop the licensed technology. In such a case, exclusive clauses can ensure licensees to recoup the investment. This is specifically true when exclusive clauses are agreed between non-competitors.¹¹⁹ Therefore, exclusive clauses will encouraged licensees not only to efficiently exploit the invention, but also to implement the licensed technology when a large

¹¹⁵ Guidelines on horizontal agreements (35) para 49

¹¹⁶ TT Guidelines (9) para 98 (“A non-reciprocal agreement is an agreement where only one of the parties is licensing its technology rights to the other party or where, in the case of cross licensing, the licensed technologies rights are not competing technologies and the rights licensed cannot be used for the production of competing products”)

¹¹⁷ Ibid. 193

¹¹⁸ Ibid.

¹¹⁹ Ibid. para 194

investment is necessary. As such, beneficial effects on technology dissemination, innovation and ultimately on competition can result when exclusive clauses are agreed.¹²⁰

To sum up, exclusive clauses are thought to produce beneficial effects in the following cases: a) an exclusive patent licensing agreement may produce pro-competitive efficiencies where the licensee combines the licensor's technology with its own knowledge and assets, leading to improved products that are advantageous for consumers, b) exclusivity can be indispensable when a license would not occur in its absence because the licensee is unwilling or unable to make significant investments in the production process due to fears of competition from a very strong licensor or other licensees, thus exclusivity creates pro-competitive efficiencies as it leads to a dissemination of valuable technologies; d) the exclusive license may also be indispensable in cases where the licensee is not willing to undertake significant investments to adapt his production facilities to produce under the license due to fear of competition from the strong licensor, who can use the same technology without royalty burdens; e) an exclusive license serves as a necessary inducement for the licensee to invest in the licensed technology and to bring the products to market in a timely manner.¹²¹

b.2 Sale restriction clauses

In cross licensing agreements, parties can include clauses that provide restriction on the sales of products incorporating the licensed technology with regard to a given territory (territorial sales restrictions) or to a given customer group (customer restrictions).¹²²

¹²⁰ Ibid.

¹²¹ S Fina, AM Baumgartner, *A Comparative Antitrust Analysis of Exclusivity Clauses in Patent Licenses Under Article 101 TFEU and Section 1 Sherman Act*, (TTLF Working Paper No. 11, 2012) <http://www.law.stanford.edu/program/centers/ttlf/papers/fina&baumgartner_wp11.pdf> accessed 7th August 2017, 20.

¹²² TT Guidelines (9) para 189

When business method patents are involved, for example, a restriction on sale can result in restriction on service supplying with regard a certain territory or customer group. However, restrictions on sales can result in market sharing, specifically when applied to a non-reciprocal cross licensing agreement between competitors.¹²³ These types of clauses are, indeed, listed in the Article 4 TTBER among the hardcore restrictions; thus, cross licensing agreements that include sale restrictions fall out of the safer harbour provided by the TTBER. Nevertheless, the TT Guidelines highlights the possibility that sale restrictions can facilitate the increase of consumer welfare; especially, it could happen when restrictions on sale according to a specific territory or a specific group of costumers can secure the implementation of valuable technologies, which are costly to be started up.¹²⁴ In such cases, pre-competitive effects can overcome the ill effect of sale restrictions. For example, it can occur when the licensor has a relatively weak position in the territory and the risk of facing competition would discourage him to disseminate the technology. Similarly, restrictions on active sales do not fall under the umbrella of hard-core restrictions when the licensee has a relatively weak market position in the territory that is allocated to it and huge investments are needed in order to efficiently exploit the licensed technology.¹²⁵

Additionally, sale restrictions are not caught by Article 101 (1) TFEU, when they are applied in cross licensing between non-competitors.¹²⁶ Nevertheless, restrictions on active and passive sales that applies to one or both parties in cross licensing agreements can result in asymmetric positions in the market; thus, the dissemination of valuable technologies is ultimately deterred, thereby impeding the development of new or better products.¹²⁷ According to the TT Guidelines, therefore, the Commission will assess also non-competitor

¹²³ Ibid. para 105

¹²⁴ Ibid. para 198

¹²⁵ Ibid. para 199

¹²⁶ Ibid. para 200

¹²⁷ Ibid. para 201

cross licensing agreements including sale restriction, that in theory meets all requirements of the TTBER safe-harbour. Equally, particular attention is paid to sale restrictions when they are included in mutual agreements that fall outside of the TTBER. Hence, effects of sale restriction clauses are assessed whether applied in cross licensing that fall under the TTBER or outside the block exemption regulation. However, an economic – based approach is suggested in the TT Guidelines; thus, a certain flexibility is provided to verify the extent of the pre -competitive effects produced by a sale restriction clause included in a mutual licensing agreement. Both the position in the market and possible barriers to entry need to be taken into consideration.

Ultimately, requirements of Article 101 (3) are considered to be met when evidences are given that the licensing agreements would not have taken place without including sales restriction terms. For examples, sale restrictions are considered crucial to encourage licensees to invest in the production, marketing, and sale of the products incorporating the licensed technology. Especially, licensee’s incentive to invest could be significantly reduced whether licensee has to face direct competition from the licensor. Indeed, licensors have clear advantages in the market due to the fact that costs are not burdened with royalty payments.¹²⁸ Additionally, for examples, sale restriction clauses can be used to prevent free riding and to motivate the licensee to undertake the investment necessary for the efficient exploitation of the licensed technology inside its territory and to promote sales of the licensed product.¹²⁹ Therefore, according to the EU competition law, mutual licensing including sale restriction clauses can be exempted from antitrust assessment when these clauses are considered of great importance in reaching the agreement and evidences are provided about their beneficial effects in improving competition and consumer welfare.

¹²⁸ Ibid. para 202

¹²⁹ Ibid para 203

All this considered, hence, there are not doubts that EU competition law can efficiently intercept cases in which mutual licensing agreements can produce market sharing effects. Indeed, the risk of tacit collusion is deemed greatest when patent thicket behaviours are developed. The proximity between big players in the market is high probable as well as the opportunity to coordinate their actions; thus, either exclusive clauses or sale restrictions can be agreed with the strategic purpose of avoiding reciprocal market interferences and strengthening market positions, thereby raising barrier to impede rivals to enter the market. Nevertheless, the opportunity to conduct an assessment ex art 101(1) TFEU is widely provided by the EU competition law, when these types of clauses are included not only in cross licensing agreements, but also in patent pools. Hence, any concerns about reductions on competition can be dismissed with regard to the possibility that firms could take advantages of proximity generate by patent thickets to achieve market sharing, including either exclusive or sale reduction clauses in mutual licensing agreements.

5. Some conclusions

One of the major concerns about granting patent protection to business method patents is related, as discussed in Chapter V, to the possibility that these patents could be used strategically. Empirical studies have demonstrated that firms interested in business methods tend to file a significant number of patent applications. As such, patent thickets are likely to occur, as it usually happens when inventions are cumulative. The quantitative analysis performed in this thesis has confirmed, to some extent, that firms active in the category G06Q at the EPO show a certain strategic attitude toward patents. In particular, a significantly high number of patent applications, as well as strong relationships between firms in the network of citations, have been found in the category G06Q. Hence, it cannot be

excluded that business method patents could be used to create inefficiencies, ultimately affecting competition in the European market.

Hold-up effects, tacit collusion and increasing in rivals' costs are often indicated to be the common results of patent thickets. As such, these effects can probably appear when business method patents are used strategically to reduce competition. However, the EU Competition law, namely the TTBER and the TT Guidelines, seems to be already familiar with these issues. An informed approach towards the possible strategic use of patents has been developed. In particular, attention is paid to licensing agreements, specifically the mutual ones, which are the usual means to achieve foreclosing of the market to rivals. As demonstrated in the first section of this chapter, mutual licensing agreements can be strategically used. On this purpose some contractual terms, such as exclusive clauses and fixing prices or running royalties clauses, could be included in order to generate increasing in rivals' cost or market sharing.

Nevertheless, as discussed in the last section of the Chapter, the EU Competition law provides means to address the issue (the reduction of competition due to the strategic use of patents), without affecting the positive impact of patents and patent licensing on the economic growth and on the spur of innovation. In particular, some of licensing agreements are exempted from the application of Article 101 TFEU. Others must undergo an assessment. However, the EU framework presents a flexible and economic approach, along with the possibility of a case-by-case verification. Especially, in balancing pro competitive effects of mutual licensing agreement with reduction in competition, the European legislation seems to achieve what suggested by Shapiro¹³⁰ in his seminal works, namely a positive attitude towards cross licensing and patent pools as a way to get efficiently around patent thickets.

¹³⁰ Shapiro (75)

This conclusion can be applied also to business method patents and patent applications at the EPO. Referring to possible strategic uses of patents and patent applications in the category G06Q, concerns arise because of the existence of relationships among large companies involved in this area. Thus, patent thicketing is considered likely to happen as well as the possible use of patent thickets to force rivals out of the market, i.e. reaching agreements resulting in raising rivals' costs or excluding rivals from exploiting patents in some territory or field of use. Nevertheless, the EU competition law provides effective means to deal with these types of agreements. As already discussed, an assessment ex art 101 (1) TFEU is likely to be conducted when agreements produce such kind of detrimental effects. Thus, also mutual licensing agreements exploiting blocking position put in place in business method patent at the EPO are likely be caught by Article 101 TFEU. In particular, the analysis of the TTBER and the TT Guidelines has corroborated this finding. Not only most of the contract clauses potentially producing ill- effects fall out of the TTBER umbrella, but also mutual licensing agreements between large firms tend to be assessed ex article 101 (1) by the European Commission, as revealed by the TT Guidelines. Hence, there is non-significant risk of a strategic use of patents resulting in reducing competition in the European business method patent area. As such, the objections posed in Europe to patenting business methods cannot be justified by the need to avoid patent thicket phenomena, because the current legislation offers a proper set of rule capable of tackling the problem.

Conclusions

Both the empirical and the theoretical analysis presented in the thesis have supported the evidence that business method patents and patent applications are a remarkable phenomenon in Europe, with more than 34,000 patent applications filed over the last 20 years. Furthermore, the quantitative analysis conducted in this research, namely in Chapter IV and in Chapter VI, has demonstrated that most of the well-known firms in the IT and financial industry are involved in the phenomenon of business method patents. Besides, the investigation of the network of citations among firms has suggested that strategic purposes could explain to some extent the popularity of business method inventions at the EPO.

When computer implemented, business methods are based on algorithms and pieces of processes that are already well known. Hence, innovation in this technological area is usually the result of small pieces of inventions, often already patented, that are combined to build a non-obvious method. As such, business methods are usually presented as a classical example of cumulative inventions. However, a patent crowd overlapping all around a specific technology is the key point not only of cumulative inventions but also of patents thickets. Thus, concerns on the possible growth of patent thicketing are commonly associated with business method patents.

Referring to the findings of the empirical research provided in the thesis, a tendency to patent overlap has been revealed in category G06Q at the EPO. As results of the analysis suggested, therefore, it cannot be excluded that patent thickets could be strategically built in the context of European business method patents. In such a case, uncertainty on the real extent of patent protection could be used to create inefficiencies in the market. In particular, hold-up effects, as well as “raising costs” effects, could result when business-method patent holders decide to not

cooperate in the exploitation and implementation of their cumulative inventions.

As demonstrated in the well-known example of “zinc and brass” proposed by Cournot,¹³¹ cooperative behaviours could be the most effective solution to this kind of inefficiencies. As such, mutual licensing not only secures an efficient exploitation of the resources, but also assures higher revenues for firms. Hence, hold-ups and other detrimental effects can be cleared by mutual licensing agreements, especially by cross-licensing agreements, so far as patent holders decide to share their knowledge and to fully exploit their own patents, without risks of infringements.

However, cooperative behaviors can result in collusive practices. Thus, mutual-licensing agreements could be used to emphasize inefficiencies, instead of neutralizing them. Ultimately, mutual licensing, especially cross-licensing, could result in magnifying the detrimental effects of patent thickening, including elimination or reduction of competition in the market. Suggestions have been provided that reducing or even eliminating competition could be the firms’ reason to seek patent protection for business methods in Europe. Admittedly, concerns on possible strategic uses, together with the lack of a specific piece of legislation, have generated increasing hostility toward business method patents.

Nevertheless, this thesis demonstrated that both the EPC and the European competition law have all the means necessary to define the boundaries of business method patentability and to efficiently contrast possible detrimental effects on competition, if business method patents and patent applications were to be used to create patent thickets. All this, therefore, seems to confirm that an adequate legal framework already exists in Europe with regard to business method patents.

On the one hand, as described in the first three chapters of this thesis, the EPO Boards of Appeal’s case law has finally made clear that busi-

¹³¹ Text to n.102 Chapter VIII

ness methods are not patentable in Europe, unless the method is computer-implemented and the inventive step results in a technical feature. In particular, both Article 52 and Article 56 EPC have been applied accordingly to the principle of the “technical consideration”, which permeates the European Patent Conventions. Therefore, consistent indication has been ultimately provided by the EPO Enlarged Board of Appeal on the extent of patent protection to be granted to business methods in Europe.

On the other hand, the European competition law provides a specific set of rules regarding the interface of Article 101 TFEU and IP rights, thereby reducing the risk that patents and patent applications were used strategically to prevent or lessen competition. As discussed in the last three chapters of the thesis, licensing agreements, specifically mutual licensing agreements relative to business method patents and patent applications, are castigated when the terms on using the patents included in the agreement went beyond the mere protection of IP into controlling the market and impeding rivals to enter. However, not only most of the contract clauses potentially producing ill effects fall out of the TTBER umbrella, but also mutual licensing agreements between large firms tend to be assessed ex article 101 (1) by the European Commission, as revealed by the TT Guidelines.

Hence, there is a non-significant risk that a strategic use of patents can result in reducing competition in the European business method patent area. As such, the difficulties posed in Europe to patenting business methods cannot be justified by the need to avoid patent thickets, because the current legislation offers a proper set of rules capable of tackling the problem.

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