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Patent Aggregation Redefinition and Taxonomy of Its Activities Useful for Competition Law

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Patent Aggregation Redefinition and Taxonomy of Its Activities Useful for Competition Law

Niccolò Galli*

Abstract

Patent aggregation, or the monetisation of patents without selling patent-implementing products, is a rising practice in the electrical engineering industry. However, the complexity and distance of this phenomenon from traditional patent exercises prevent a clear assessment of its impact on innovation. On the one hand, patent aggregation may spur innovation by determining efficiencies in licensing or litigation and by conveying liquidity to inventors. On the other hand, patent aggregation might also unduly tax technological developments by enforcing otherwise dormant patents. Since the relationship between patent aggregation and innovation is uncertain, it is unsettled whether EU competition law can remedy anti-innovative patent aggregation instances. Building on existing economics and legal scholarship, this paper contributes to the competition law understanding of patent aggregation providing both a definition and a taxonomy of its identifiable activities. Accordingly, patent aggregation is redefined as any activity where electrical engineering patents, patent applications, or their commercialisations rights, aggregated under common ownership or control through direct prosecution or transfer, are then used for non-manufacturing purposes. As such, patent aggregation activities are divided into two prongs. The first one refers to the means of aggregating patents, whereas the second one comprises the non-manufacturing exploitations of aggregated patents. The crossing of the two prongs of activities determines the taxonomy of patent aggregation. The redefinition and taxonomy aid future research to evaluate the effects of patent aggregation on innovation, and, therefore, its treatment under competition law.

Abbreviations

EPO	European Patent Office
IP	Intellectual Property
JRC	Joint Research Centre
NPE	Non-Practising Entity
PAE	Patent Assertion Entity
PE	Practising Entity
R&D	Research and Development
SEP	Standard-Essential Patent
TTO	Technology Transfer Office

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1. Introduction

Patent aggregation is a multifaceted phenomenon, which is recently spurring in the electrical engineering sector.[1] Generally, it comprises any business that monetises patents without selling patent-implementing products. Some of these businesses have already been studied in isolation, for example, patent pools, patent assertion entities (PAEs), and technology-transfer offices (TTOs).[2] However, the complexity and distance of patent aggregation from conventional patent exercises prevent its relationship with innovation from being clearly assessed. On the one hand, it may help resource-constrained inventors to bridge the so-called valley of death, namely the gap between the invention and its successful commercialisation.[3] Indeed, insofar as patent aggregation brings efficiencies in licensing and litigation, conveys liquidity to inventors, eases technology transfer or

[1] The electrical engineering sector, according to the WIPO Technology Classification for Country Comparisons, comprises electrical machinery, audio-visual technology, telecommunication, digital communication, computer technology, information technology methods for management, and semiconductors. Sometimes, information communication technology (ICT) is used as synonymous with electrical engineering, yet the latter contains the first in a genus-species relation. See Ulrich Schmoch, *Concept of a Technology Classification for Country Comparisons* (WIPO Report, 2008), 5. Albeit this research limits its scope to the electrical engineering industry, patent aggregation may become relevant in the near future in other patent-intensive sectors, such as the life-science, biotechnology or mechanical engineering ones.

[2] Patent pools are agreements between patentees to license certain patents to each other and/or third parties through some medium, such a joint venture or an independent party, which administers the pool and retains a fee. See, in general, Josh Lerner and Jean Tirole, ´Efficient Patent Pools´ (2004) 94 The American Economic Review 691; Monica Armillotta, *Technology Pooling Licensing Agreements: Promoting Patent Access Through Collaborative IP Mechanisms* (MIPLC Studies No. 10, NOMOS, 2010), 21. PAE is a term coined by Chien to refer to firms that use patents primarily to get licensing fees rather than to transfer technology. See, *inter alia*, Colleen Chien, `From Arms Race to Marketplace: The Complex Patent Ecosystem and Its Implications for the Patent System` (2010) 62 Hastings Law Journal 297; Federal Trade Commission, *Patent Assertion Entity Activity: An FTC Study* (US FTC, 2016). TTOs are those organisations assisting universities and other public research organisations to prosecute, manage, and commercialise their IP rights See, among the others, Patrick Van Eecke and others, *Monitoring and Analysis of Technology Transfer and Intellectual Property Regimes and Their Use* (EC DG Research Study, 2009).

[3] In the economics scholarship on innovation and technology transfer, the valley of death represents the gap between an invention and its successful commercial exploitation. It is also referred to as the Darwinian Sea or the challenge between proof of concept and start of mass production. See, Philip Auerswald and Lewis Branscomp, ´Valleys of Death and Darwinian Seas: Financing the Invention to Innovation Transition in the United States`(2003) 28 Journal of Technology Transfer 227.

internalises sunk research and development (R&D) costs, it may spur technological progress alleviating patent hold-out and royalty stacking issues.[4] On the other hand, patent aggregation might also unduly tax innovation by enforcing substitutes or otherwise dormant patents, facilitating patent hold-up or foreclosing access to commercially significant technologies.[5] The last negative scenario would be especially problematic in the electrical engineering standardisation milieu, where industry participants jointly set key enabling or general-purpose technologies within standard-setting organisations (SSOs).[6]

Since patent aggregation activities do not directly result in new products being marketed, their effects on innovation are unclear. As a result, it is also uncertain if EU competition law can address those patent aggregation instances that harm innovation. In theory, several patent aggregation activities touch upon all competition law provisions. For example, acquisitions of patent portfolios could be questioned either ex-ante in light of the Merger Regulation if the portfolios constitute a business per se with its own turnover over specific thresholds, or scrutinised ex post as anticompetitive abuses by already dominant undertakings under Article 102 TFEU. In addition, aggregating patents by directly filing applications to patent offices could potentially be an abuse of

[4] Patent hold-out consists of patent implementers free-riding and not seeking licenses for the patents they practice. A variation of patent hold-out is the so-called reverse patent hold-up whereby instead of straight free-riding, patent implementers offer patentees to abide by excessively low licensing conditions. See, among others, Sannu Shrestha, `Trolls or Market-Makers? An Empirical Analysis of Non-Practising Entities` (2010) 110 Columbia Law Review 114. Instead, royalty stacking is an issue typical of patent-intense industries where manufacturers must conclude many licenses with multiple patentees in order to commercialise their products. The stack of royalties refers to the several mark-ups patent implementers incur because of double-marginalisation and Cournot-complements problems. In this sense, see, Mark Lemley and Carl Shapiro, `Patent Hold-Up and Royalty Stacking`(2007) 85 Texas Law Review 1991.

[5] Patent hold-up refers to situations where patentees exploit their market power over patent users that cannot design around or substitute the proprietary technology. This lock-in situation occurs because users either have incurred sunk costs, or would incur switching costs, or are subject to technological path dependence. When multiple patentees engage in patent hold-up, the problem escalates to royalty stacking. The literature on patent hold-up, hold-out, and royalty stacking is copious especially in the field of standardisation and standard-essential patents (SEPs). Among all, see, Justin Orr, `Patent Aggregation: Models, Harms, and the Limited Role of Antitrust`(2013) 28 Berkeley Technology Law Journal 525; Colleen Chien, `"Holding Up" and "Holding Out"`(2014) 21 Michigan Telecommunication and Technology Law Review 1.

[6] SSOs enable coordination on, and certification of, technical standards in interoperability-driven industries; see Andrei Hagiu and David Yoffie, `The New Patent Intermediaries: Platforms, Defensive Aggregators, and Super-Aggregators´ (2013) 27 Journal of Economic Perspectives 45, 50.

dominance too, if the direct filing or strategic amendment of patent applications harm competition. Patent enforcement could also fall foul of either Article 101 TFEU in case of anticompetitive licenses falling outside the reach of the TTBER, or Article 102 TFEU for exclusionary and exploitative monopolistic behaviours.[7] Additionally, State subsidies for the creation of patent aggregation entities, as the French government sponsorship of France Brevets, could violate Article 107 TFEU if they exceed the R&D projects requirements of the State Aid GBER.[8] Finally, the same public interventions could represent indirect violations of Articles 101 and 102 TFEU by the Member States where the publicly financed patent aggregation activities distort competition.[9]

Beyond theory, certain competition law cases on the licensing or enforcement of electrical engineering patents reveal the growing significance of patent aggregation in the European Single Market. Between 2008 and 2009, the EC investigated three electrical engineering patentees, namely IPCom, Rambus, and Qualcomm for alleged abuses of a dominant position in the markets for licensing their respective patent portfolios.[10] In 2012, Google´s acquisition of Motorola Mobility for

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[7] See Commission, 'Guidelines on the application of Article 101 TFEU to technology transfer agreements' (Communication) OJ 2014/C 89/3 (TTBER Guidelines).

[8] See Commission Regulation (EU) No. 651/2014 of 17 June 2014 declaring certain categories of aid compatible with the internal market in application of Articles 107 and 108 of the Treaty (2014) OJ L187/1 (State Aid GBER).

[9] On competition law violations by states, see Eleanor Fox and Deborah Healey, 'When the State Harms Competition – The Role for Competition Law' (2014) 79(3) Antitrust Law Journal 769; Eleanor Fox and Deborah Healey, *Competition Law and the State: Competition Laws' Prohibitions of Anti-Competitive State Acts and Measures* (UNCTAD Report, Vol. 1 Summary of answers to questionnaire, 2015).

[10] The IPCom case related to a change of ownership of certain SEPs, which the new owner sought to license at excessive conditions, avoiding the FRAND licensing commitment given by Bosch, the former owner, to the relevant SSO. The case was closed without the EC sending any statement of objection when the new patent-holder publicly announced its readiness to concede FRAND licenses. See Commission Press Release 10 December 2009 MEMO/09/549, Case COMP/39615 *IPCom*. The EC also investigated Rambus under Article 102 TFEU for having deceptively concealed the existence of certain patents deemed essential for the DRAM standard. This way, Rambus evaded the FRAND commitment, mandatory for all SEPs, and tried to obtain excessive licensing terms. The case was closed by a commitment decision providing for a five-year cap on the royalty asked by Rambus. See Commission Decision of 9 December 2009, Case COMP/38636 *Rambus* Summary in OJ 2010 C30/17. Last, the EC for four years investigated the claims of several mobile devices original equipment manufacturers (OEMs), including Nokia and SonyEricsson, accusing Qualcomm of charging excessive royalty rates for its SEPs reading on the W-CDMA telecommunication standard in breach of its FRAND commitment. The complaints were finally withdrawn and the case was closed without a decision. See Commission Press Release 24 November 2009 MEMO/09/516, Case COMP/39247 *Qualcomm*. For a commentary, see Mario Mariniello, ´Fair, Reasonable and Non-Discriminatory (FRAND) Terms: A Challenge for Competition

US$12,5 billion, which involved the transfer of about 17,000 patents, passed the EC´s merger control only after Google publicly committed to engaging in good faith licensing negotiation for the transferred patents.[11] More recently, the Samsung and Motorola cases both involved the abuse of a dominant position by such undertakings for seeking preliminary injunctions against Apple, which was considered willing to sign appropriate licenses for the infringed standard-essential patents (SEPs).[12] Finally, the Court of Justice of the EU (CJEU) in its Huawei/ZTE preliminary ruling expressed its view on how licensing negotiations should be conducted and court remedies pursued in the context of SEPs for which a Fair, Reasonable, and Non-Discriminatory (FRAND) commitment was given to the appropriate SSO.[13] Despite the number of cases, their outcomes do not suggest a straightforward impact of patent aggregation on innovation. Rather, these cases show the delicate balance of interests between granting access to patented technologies to interested firms and rewarding patentees for such access.

The first step to clarify the relations between patent aggregation activities and innovation, and therefore to assess correctly such activities under competition law, is to define what patent aggregation is and what activities it encompasses. Patent aggregation, beyond the intrinsic meaning of aggregating patents, is not a self-explanatory concept that can be easily researched. Overly abstract definitions prevent instances of actual patent aggregation from being observed. In contrast, too practical definitions would identify the phenomenon with the abovementioned TTOs, PAEs or patent pools. This paper thus redefines patent aggregation with the aim of applying competition law to it.[14] It does so by engaging closely with economics and empirical legal scholarship to pinpoint the conducts underlying patent aggregation into a new taxonomy. This new foundation serves to

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Authorities`(2011) 7(3) Journal of Competition Law and Economics 523, 524-525.

[11] See Commission Decision of 13 February 2012, Case COMP/M.6381 *Google/Motorola Mobility* OJ 2012 C75/1.

[12] Patents read on by a standard become essential (i.e. SEP) insofar as no one can implement the standard without infringing them. Because of the essentiality, the patentee is able either totally to exclude others from accessing the standard technology, or constructively to refuse access asking excessive licensing terms for the use of its patents. See Commission Decision of 29 April 2014, Case AT.39985 *Motorola* Summary in OJ 2014 C344/6; Commission Decision of 29 April 2014, Case AT.39939 *Samsung* Summary in OJ 2014 C350/8. For a discussion of the cases, see Niccolò Galli, ´The FRAND Defense up to Huawei/ZTE`(2016) 7 Bocconi Legal Papers 155.

[13] See Case Case-170/13 *Huawei v ZTE* EU:C:2015:477. For a commentary, see Peter Picht, `The ECJ Rules on Standard-Essential Patents: Thoughts and Issues Post-Huawei` (2016) 37 European Competition Law Review 365.

[14] On definitional efforts directing further empirical research, see Robert Lawless, Jennifer Robbennolt and Thomas Ulen, *Empirical Methods in Law* (Wolters Kluwer, 2016), 35-37.

subsequently identify evidence of patent aggregation activities in Europe, assess their different effects on innovation, and then determine the potential for competition law to intervene when patent aggregation stifles technological development.

In this context, the exposition is organised as follows. The second section recalls the economic rationales of the patent system that led to the division of innovative labour behind patent aggregation and the characteristics of the electrical engineering industry where the phenomenon is most prominent. Section 3. builds on existing scholarship to propose a redefinition of patent aggregation purposeful for further competition law analysis. The fourth section maps the existing types of patent-related businesses that fit the proposed patent aggregation definition, which are then synthesised in Section 5. into a new patent aggregation taxonomy. The conclusion paves the way for subsequent research, both empirical and competition law-related.[15]

2. Patent Aggregation in Context

Patent aggregation, or the monetisation of patents without selling patent-implementing products, represents a further advancement in the division of innovative labour experienced by several patent-intensive industries.[16] Because patents are as transferable as any other property, patentees can monetise their inventions by selling or licensing them. Patentees can so specialise in inventing without undertaking the risks of making the invention into a final product and commercialise it.[17]

The alienability of patents, besides allowing for economic specialisation, also allows knowledge transfer. Information about inventions, without patent protection, would have all characteristics of pure public goods. Indeed, once an inventor reveals an unpatented invention, it is inherently hard to prevent others from using it (i.e. non-excludability), also because a single use does not prevent

[15] Notwithstanding that tax and corporate reasons might also influence patent aggregation activities, this research limits its scope to patent and competition law considerations. On patent boxes, see e.g. Fabian Gässler, Bronwyn Hall and Dietmar Harhoff ´Should There Be Lower Taxes on Patent Income?`(2018) MPI for Innovation and Competition Research Paper No. 18-18.

[16] Arora and others describe how the chemicals, software, life science, and electrical engineering sectors have each experienced an extensive division of innovative labour. The division of innovative labour sees specialised firms, respectively specialized engineering firms, software houses, dedicated biotechnology firms, and fabless/chipless firms, supply technological inputs to downstream manufacturers. See Ashish Arora, Andrea Fosfuri and Alfonso Gambardella, *Markets for Technology* (MIT 2001), 45-89.

[17] In this sense, see Patent Informatics Team, *Patent Thickets: An Overview* (UKIPO Report, 2011), 17-18.

or diminish subsequent ones (i.e. non-rivalry and joint consumaiblity). Given the difficulty of appropriating rents descending from inventions, the proponents of the patent system posit that in its absence society would experience less innovation.[18] Without patents, no inventor would undertake the required R&D expenditure if there were no prospects of being able to recoup it.[19] In contrast, the right to exclude anyone from practising one´s own invention, enforceable in courts through property and liability remedies, enables patent owners to charge implementers supra-competitive prices and to inhibit free riding.[20] Hence, during the years of patent protection, patentees can recover their R&D costs and devote their rents to new inventions.[21]

Patent exclusivity and alienability are the incentives to innovate that patents grant.[22] In consideration of these incentives, society benefits from the disclosure of novel, inventive, and industrially applicable inventions.[23] Consecutively, these creations lead to newer and better

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[18] The inventors´ problem of preventing free riding of their inventions is the so-called appropriability problem. On the topic, see, above all, Kenneth Arrow, `Economic Welfare and the Allocation of Resources for Invention` in NBER, *The Rate and Direction of Inventive Activity: Economic and Social Factor* (NBER, 1962), 609. More recently, Andrés Lopez, ´Innovation and Appropriability: Empirical Evidence and Research Agenda´ in WIPO, *The Economics of Intellectual Property. Suggestions for Further Research in Developing Countries and Countries with Economies in Transition* (WIPO, 2009), 1-40.

[19] Patent antagonists argue that there are other ways of incentivising innovation, such as public subsidies, open source movements, trade secrets, first-mover advantages, and prizes. See, in general, Kenneth Dam, ´The Economic Underpinnings of Patent Law´ (1994) 23 Journal of Legal Studies 247.

[20] In patent law, the main property remedy is injunctions banning infringing products from markets, while the main liability remedy is damage awards compensating the patentee for the infringement. On the appropriateness of liability and property rules to remedy patent infringement, see Carl Shapiro, ´Property Rules vs Liability Rules for Patent Infringement´ (2017) University of California Berkeley Working Paper.

[21] For European patents granted by the European Patent Office (EPO), the twenty-year term of protection starts from the day of first filing of an application according to Article 63 of the European Patent Convention (EPC).

[22] Patentees, in all European legal systems except Spain, can leave their patents unused subject to mandatory licensing provisions. Generally, grounds to obtain a mandatory license for unused patents are the lapse of a certain time from the patent grant, insufficient exploitation of the patent to satisfy domestic market demands, and proof of having tried to conclude a license with the patentee on reasonable commercial terms. See Jon Broughton, ´Compulsory License Provisions Across Europe´(2007) 28 Patent Law Update <https://www.aplf.org/compulsory_licence_provisions_across_europe/index.html> accessed 15 May 2019.

[23] Articles 52, 54, 56 and 57 of the EPC state the patentability requirements of novelty, inventive step, and industrial application. Moreover, certain exceptions exclude the patentability of specific inventions, such as those against public order or morality.

products, available to consumers at a premium price during the patent-term, and at a competitive price once they enter the public domain.

Notwithstanding the division of innovative labour brought by the patent system in several industries, patent aggregation has its most radical effects in the electrical engineering sector.[24] This is because the electrical engineering innovation ecosystem is more incremental, technologically convergent, standards-driven, and fast-paced than other patent-intense fields.[25] First, electrical engineering products are ever more complex, relying on several complementary patented technologies cumulatively built one upon the other. Smartphones embedding telecommunications, audio-video, and semiconductor technologies are a ubiquitous example. In contrast, medicines cover a few patents each, usually held by the same entity.[26] Second, electrical engineering innovation is also convergent since different products use the same technology. In this sense, with the advent of the so-called Internet of Things (IoT), every product embeds data-processing and telecommunication capabilities, once upon a time exclusively implemented in computers and mobile phones, respectively. Third, the need for interoperability drives electrical engineering innovation by means of industry standards cooperatively set by all industry participants within SSOs. Lastly, electrical engineering technological development is increasingly fast-paced to foster consumer demand, yet to the detriment of products life cycles. For example, cellular network standards and the products implementing them have been released at tighter intervals.[27]

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[24] Actually, also the life science sector already experiences to a limited extent patent aggregation in the form of non-profit patent pools with the humanitarian goal of fostering access to medicines. See infra Section 2.4.4.

[25] For an analysis of the semiconductor industry, as a specific type of electrical engineering sector, see Rosemarie Ziedonis, ´Don´t Fence Me In: Fragmented Markets for Technology and the Patent Acquisition Strategies of Firms´(2004) 50 Management Science 6 804, 819.

[26] For example, in 2011, RPX Corp., a defensive patent fund, estimated that smartphones cover more than 250,000 patents; see RPX Corp., ´Registration Statement SEC Form S1´ (2011), 55. On the small number of patents embedded in medicines, see Lisa Larrimore Ouellette, ´How Many Patents Does it Take to Make a Drug? Follow-On Pharmaceutical Patents and University Licensing´(2010) 17 Michigan Telecommunication and Technology Law Review 299; Wesley Cohen, Richard Nelson and John Walsh, ´Protecting Their Intellectual Assets: Appropriability Conditions and Why US Manufacturing Firms Patent (or Not)´(2000) NBER Working Paper Series No. 7552, 19-24.

[27] The first generation cellular analogue communications started in the late ´70s, the second-generation digital standards (2G) arose in the early ´90s, third-generation (3G) in the early ´00s, the fourth-generation (4G) before 2010, while the fifth-generation (5G) trials started in 2017. For an overview of the evolution of cellular standards up to 3G, see Theo Dunnewijk and Staffan Hulte, ´A Brief History of Mobile Communication in Europe´(2007) 24 Telematics and

In this incremental, convergent, standards-driven, and fast-paced innovation ecosystem patents have gained strategic importance.[28] By the late 1980s, electrical engineering firms had started exploiting patents not only internally for manufacturing improved products or preventing imitation (so-called closed innovation paradigm), but also externally (so-called open innovation paradigm). On the one hand, companies began to allow third parties to access their proprietary technology in consideration of either or both a price and mutual proprietary technology through cross-licenses.[29] On the other hand, undertakings increasingly blocked competitors, patenting around the rivals´ products and then gate-keeping access to their proprietary technologies.[30]

This shift from closed to open innovation, where patents are strategic assets in competitive struggle, brought a surge in electrical engineering patenting whereby most patent applications and grants are concentrated in the hands of a few large firms.[31] More patents over the same technologies held

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Informatics 164. On 4G, see Ericsson, *World First 4G/LTE Network Goes Live Today in Stockholm* (Press release, 14 December 2009) <https://www.ericsson.com/en/press-releases/2009/12/worlds-first-4glte-network-goes-live-today-in-stockholm> accessed 15 May 2019. Regarding 5G, Ericsson and Huawei, two of the major electrical engineering patentees, have both reported successful trials during 2017. See Ericsson, *AT&T Expands Fixed Wireless 5G Trials to Additional Markets* (Press release, 30 August 2017) <https://www.ericsson.com/en/news/2017/8/att-expands-fixed-wireless-5g-trials> accessed 15 May 2019; Huawei, *Huawei and NTT Docomo Mark Milestone in 5G Joint Trials With Succesful High Speed and Long Distance mmWave Field Trial at Tokyo Skytree* (Press release, 7 December 2017) <https://www.huawei.com/en/press-events/news/2017/12/NTT-DOCOMO-5G-mmWave-Field-Trial-Tokyo> accessed 15 May 2019.

[28] Rivette and Kline compared, in 2000, the new strategic importance of patents to the discovery of a forgotten masterpiece in an attic; see Kevin Rivette and David Kline, *Rembrandts in the Attic* (Harvard Business Review Press, 2000). See, also, Suzanne Harrison and Patrick Sullivan, *Edison in the Boardroom Revisited: How Leading Companies Realise Value from Their Intellectual Property* (Wiley, 2011).

[29] Cross-licenses involve the negotiation and agreement between two firms to license their respective IP rights. See, e.g. Joel Klein, *Cross-Licensing and Antitrust Law* (Speech to AIPLA, 2 May 1997), 3 <https://www.justice.gov/atr/speech/cross-licensing-and-antitrust-law> accessed 15 May 2019.

[30] For the theoretical foundations of external patent exploitations and open innovation, see Henry Chesbrough, *Open Innovation: The New Imperative for Creating and Profiting from Technology* (Harvard Business Review Press, 2006); WIPO, *2011 World Intellectual Property Report: The Changing Face of Innovation* (WIPO Economics & Statistics Series, 2011), 47-51.

[31] See, inter alia, Dietmar Harhoff and others, *The Strategic Use of Patents and Its Implications for Enterprise and Competition Policies* (EC Report, 2007), 65; Dominique Guellec, Thierry Madiès, and Jean-Claude Prager, *Les Marchés des Brevets Dans l´Économie de la Connaissance* (Conseil d´Analyse Économique, 2010), 11 ; Elise Mellon, *Patents, Competition Law and Open Innovation : A Study of « Global Patent Warming »* (College of Europe, 2012), 3-5 ; Annette

by different owners have led to what Shapiro in 2001 called the patent thicket, namely *a dense web of overlapping intellectual property rights that a company must hack its way through in order to actually commercialise new technology.*[32] Such a patent thicket presents a high risk of blocking situations. Products inadvertently infringing on proprietary technologies are either altogether banned from the market by means of injunctions or offered at higher prices reflecting the mark-ups of all the licenses necessarily concluded. Market players, in a private ordering way, have tackled this risk with portfolio licenses, cross-licenses, SSOs, patent infringement settlements, and, as a last resort, patent litigation. Patent aggregation intersects with each of these issues insofar as it strengthens the bargaining position in licensing negotiations, augments the weight in standardisation procedures, allows fighting against infringement claims, and shields business operations from patent-invalidity findings. Furthermore, it is also a response in itself to patent thickets when it allows pooling complementary electrical engineering patents into one-stop shop licensors, thus solving royalty stacking problems.

Having introduced the economic rationales of the patent system and the specificities of the electrical engineering industry to which patent aggregation mostly pertains, section 3. redefines patent aggregation. In particular, it considers the advantages and limits of previous definitions and sets a new one significant for further competition law analysis.

3. Defining Patent Aggregation in Light of Competition Law

Existing scholarship on patent aggregation spans economics and law fields. Because of the novelty of external patent exploitations, few studies covered patent aggregation in its entirety. However, EU competition law has already addressed specific activities that fit the concept of patent aggregation, such as patent licensing and litigation.[33]

The economics literature on innovation management is the pioneer in the research of patent aggregation as an entire phenomenon. In the context of external patent exploitation strategies, Bader and others systematise patent aggregation within patent intermediation practices, among

Kur and Thomas Dreier, *European Intellectual Property Law : Text, Cases & Materials* (Edward Elgar, 2013), 95.

[32] Carl Shapiro, ´Navigating the Patent Thicket: Cross Licenses, Patent Pools and Standard Setting´ in Adam Jaffe, Scott Stern and Josh Lerner (eds.), *Innovation Policy and the Economy* (MIT Press, 2001), 121.

[33] See above footnotes 10 to 13.

pure patent brokering and patent financing.[34] Nevertheless, they do not clearly define patent aggregation besides equating it to the aggregation of patent portfolios.[35] It is Rüther, who characterise the entities that engage in patent aggregation, that, in 2012, indirectly provides the first definition. Focusing on the benefits that vertically integrated patentees (so-called practising entities, PEs), can derive from exploiting patent aggregators´ services, she defines patent aggregating companies as those undertakings that *focus on amassing patents, see R&D not as a core competency, and do not produce or manufacture own physical goods… .*[36]

A second definition emerges at the 2014 EPO workshop titled ´Patent Aggregation and Its Impact on Competition and Innovation Policy´. At that event, participants from industry, academia, legal practice, along with public officials conclude that 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.* They further specify that patent ownership or control *means the right to decide which party gets access to the patents and under what terms.*[37] As a result, patent aggregation, beyond patent purchases, is also achieved by means of exclusive licenses with sublicensing rights. Finally, the participants deem irrelevant for definitory purposes any teleological concern behind patent aggregation. Consequently, the ends to which patent aggregation activities aim, such as gaining freedom to operate or improving the patentee´s bargaining position, do not

[34] Patent brokering facilitates the matching of patent demand and supply, while patent financing provides capital to patentees using their patents or the descending royalty revenues as collateral or security. See Martin Bader and others, *Handbook: External Patent Exploitation* (St.Gallen University, 2013), 13; Peter Picht, *Vom Materiellen Wert des Immateriellen: Immaterialgüterrechte als Kreditsicherungsmittel im National und Internationalem Rechtsverkehr* (Mohr Siebeck Tübingen, 2018).

[35] Patent portfolios, according to Parchomovsky and Polk Wagner, are strategic collections of distinct-but-related patents that combined offer competitive advantages to their holders; see Gideon Parchomovsky and Ralph Polk Wagner, ´Patent Portfolios´(2005) 154 University of Pennsylvania Law Review 1, 27.

[36] Depending on the actual business model pursued, Rüther concluded that PEs can exploit patent aggregators to obtain either short-term financial rewards, such as additional cash flows from patent sales or out-licenses, or long-term financial and non-monetary rewards, such as patent maintenance cost-savings, immediate realisation of R&D investments, entry in new markets, standard-setting, and learning effects. See Frauke Rüther, *Patent Aggregating Companies: Their Strategies, Activities, and Options for Producing Companies* (Springer, 2012), 13.

[37] See EPO Economic and Scientific Advisory Board, *Patent Aggregation and Its Impact on Competition and Innovation Policy* (EPO Workshop Report, 2014), 7.

qualify what conducts meet the definition or not. Later, in 2015, the EC Expert Group on Patent Aggregation echo the outcomes of the EPO workshop.[38]

Another brief definition of patent aggregation is included in the detailed taxonomy of IP related services from Bartsch and others, according to whom patent aggregation consists of the process of scouting for existing patents, acquiring them, and then pursuing other offensive or defensive purposes.[39]

Finally, the EC Joint Research Centre (JRC) 2016 Science for Policy Report ´Patent Assertion Entities in Europe´, following Rüther, indirectly defines patent aggregation by reference to its actors. Distinguishing PAEs from patent aggregators, the report states that these latter *comprise companies that predominantly do not produce goods… but accumulate large patent portfolios encompassing a significant amount of patents on the rights of which they often assert*.[40] This report also highlights the difficulty in defining and categorising patent aggregators since they employ substantially different strategies.

All the definitions, focusing either on the change in patent ownership or on the accumulation of patents, diverge from Bader and others´ systematisation of patent aggregation among patent intermediation. They exclude patent intermediaries that just facilitate the meeting of patent buyers and sellers without taking patent ownership or control risks.[41] Furthermore, the described studies commonly conceive patent aggregation from the patent grant onwards, finding it as soon as a group of patents, at least ten for Rüther, changes ownership of control. This way, patent prosecution, that is the filing of patent applications, is explicitly outside the definition of the EPO and Bartsch and others, and implicitly from that of Rüther. Indeed, despite the timely first definition opens the terminology to *amassing patents,* it is difficult to see how a firm which sees *R&D not as a core competency* could file patent applications. Moreover, Rüther excludes from her study pure R&D

[38] See Paola Giuri and others, *Report of the Expert Group on Patent Aggregation* (EC Report, 2015), 12. Giuri and others build on a 2012 report of a different EC Expert Group on the feasibility of direct EU policy intervention to enhance patent valorisation through sales and licenses; see Alfonso Gambardella and others, *Options for an EU Instrument for Patent Valorisation* (EC Report, 2012).

[39] See Bartsch and others, *Intellectual Property Services Classification (IPSC)* (Fraunhofer IMW, 2016).

[40] See Europe Economics, *Patent Assertion Entities in Europe – Their Impact on Innovation and Knowledge Transfer in ICT Markets* (JRC Science for Policy Report, 2016), 16.

[41] The distinction between aggregation and intermediation becomes blurred when firms pursue different activities over or at the same time.

companies, such as Tessera Technologies,[42] but includes those firms that buy patents and then pursue proof of concept, proof of performance, and prototyping activities only for commercialisation purposes.[43] At a maximum, patent prosecution fits all definitions insofar as it enlarges the geographical and technological families of acquired patents.[44] In contrast, only the JRC conceives patent aggregation as including the development of patent portfolios by internal R&D.

Each definition leaves patent aggregation open-ended, without specifying the purpose for aggregating patents. Bartsch and others circumscribe this openness by vaguely limiting patent aggregation to defensive and offensive purposes, whereas the JRC Report states that patent aggregators often assert the accumulated patents. Lacking clear boundaries, this flexibility is desirable to catch unforeseen patent aggregation conducts in emerging electrical engineering technology markets.[45]

Overall, the major distinction between the existing studies is the possibility for PEs to engage in patent aggregation activities. On the one hand, Rüther, almost followed by the JRC Report, excluding PEs from her definition, equals patent aggregators to non-practising entities (NPEs), namely those patentees operating only upstream on the technology input side. NPEs monetise their patents without practising the technologies themselves. On the other hand, the other definitions leave the scope open for patent aggregation by PEs without limitations.

Acknowledging that no definition is inherently wrong, given the aim of facilitating further completion law analysis, it does not seem appropriate either *tout court* excluding or including PEs from the patent aggregation phenomenon.[46] Indeed, PEs engage in the aggregation of patents as

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[42] See <https://www.tessera.com/> accessed 15 May 2019.

[43] See Frauke Rüther, *Patent Aggregating Companies: Their Strategies, Activities, and Options for Producing Companies* (Springer, 2012), 14.

[44] A patent family is a group of patents that are all linked by a common source or priority. Usually, a patent family consists of a number of patents filed in more than one country for a single invention. See Patent Informatics Team, *Patent Thickets: An Overview* (UKIPO Report, 2011), 61. Transfers of patent applications, according to Article 71 EPC could also be considered *lato sensu* part of patent prosecution, therefore fitting the definitions centered on patent ownership changes.

[45] Notably, for the purpose of competition law analysis, technology markets comprise both the upstream market where patents are traded as technological input and the downstream market for patent implementing products. Depending on the relevant product, patent aggregation might affect both or either the upstream and downstream markets; in this sense, see the EC TTBER Guidelines, para. 20 and 116.

[46] In particular, Rüther´s definition is perfectly sound from the point of view of her research on the benefits that PEs can

much as NPEs, since any type of firm can aggregate patents and then out-license, sale or litigate them.[47] Actually, PEs rather than NPEs have long aggregated patents for manufacturing purposes, protecting their products from copying and asserting their huge portfolios against competing infringers. Thus, it is important that the redefinition goes beyond the traditional form of aggregation by PEs, and emphasises its new manifestations typical of open innovation, where PEs externally exploit their patents. Inasmuch as PEs aggregate patents beyond manufacturing, they share commonalities with NPEs that are worth studying under the patent aggregation category. In addition, excluding PEs from the definition misses a substantial part of European patent aggregation activities, since these are the undertakings allegedly most active in both electrical engineering patent prosecution and litigation.[48]

Accounting for the division of innovative labour inherent to the patent system, this research does not follow existing definitions. It approaches the JRC understanding as it equally treats acquired and internally prosecuted patents, as well as PEs and NPEs. Yet, it departs from that solution as it only considers patent aggregation beyond manufacturing goals. Therefore, patent aggregation is redefined as any activity where electrical engineering patents, patent applications, or their commercialisations rights, aggregated under common ownership or control through direct prosecution or transfer, are then used for non-manufacturing purposes.

Further economic reasons are outside the definition, recognizing that patent aggregation pursues divergent goals, both defensive, such as clearing one´s own downstream market position or preventing copying, and offensive, such as raising rivals´ costs or heightening market-entry barriers.[49] Hence, the definition does not discriminate according to the patent origin or patentee

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derive from interacting with patent aggregating companies.

[47] Actually, the biggest and most famous electrical engineering patent acquisitions have been conducted by PEs; see Justin Orr, `Patent Aggregation: Models, Harms, and the Limited Role of Antitrust`(2013) 28 Berkeley Technology Law Journal 525, 567. Furthermore, cross-licensing, an established strategic patent use, is only pursued by PEs. Whatever the purpose, patent portfolios aggregated for licensing or assertion exploit the same features of the patent system as portfolios aggregated for defence and cross-licensing, and thus provide similar advantages; see Gideon Parchomovsky and Ralph Polk Wagner, ´Patent Portfolios´(2005) 154 University of Pennsylvania Law Review 1, 20-27.

[48] For patent prosecution data, see below Chapter 3. Regarding patent litigation, Love and others found that PEs account for about 80% of patent suits filed in Germany between 2000 and 2008 and the United Kingdom between 2000 and 2013; see Brian Love and others, `Patent Assertion Entities in Europe`, in Daniel Sokol (ed.), *Patent Assertion Entities and Competition Policy* (Cambridge University Press, 2017), 106-109.

[49] See Paola Giuri and others, *Report of the Expert Group on Patent Aggregation* (European Commission, 2015), 37.

type and focuses on novel patent aggregation conducts, whose impact on innovation is ambiguous. Moreover, the definition is also size-neutral. In other words, the definition applies to any business that aggregates and uses at least two patents beyond manufacturing, recognizing that even a small portfolio of SEPs or commercially important patents can constitute a relevant product market for competition law analysis.

Having defined the phenomenon of interest, the next section delves into the details of the available taxonomies of patent-related businesses in order to find which commercial activities and actors meet the redefinition of patent aggregation and what characterises them.

4. Existing Classifications of Patent-Related Businesses

Studies into individual types and taxonomies of patent-related businesses are fragmented and span economics and law literature on IP, technology markets, patent intermediaries, and patent litigation. This section reviews the existing classifications to identify those commercial activities that fall within the proposed patent aggregation definition.[50]

Methodologically, the retrieved classifications have six features. First, their research scopes range from broad, such as participants in patent markets, to narrow, such as PAEs. Consequently, the detail level is granular for those taxonomies with a narrow scope, whereas aggregated for the broad ones. Second, the geographical focus is either American, European or holistic. The older classifications focus on US situations, while only the most recent ones on the European context. However, since many of the classified businesses operate on both sides of the Atlantic, and to a lesser extent in prominent Asian markets, most taxonomies are holistic.[51] Third, because of the authors´ backgrounds, the studies adopt different perspectives such as industry, academic, and public policy-oriented. Fourth, the methodologies vary from traditional black-letter research,

[50] Natural limitations of the deployed research techniques, i.e. desktop-based research and footnote surfing, make it impossible to locate all existing studies on the subject. Particularly, footnote surfing or snowballing, namely the process of retrieving unknown publications from references in known ones, might conduct to research bubbles that ignore not-cited publications. On this matter, see Caroline Morris and Cian Murphy, *Getting a PhD in Law* (Hart, 2011), 44; Burke Johnson and Larry Christensen, *Educational Research: Quantitative, Qualitative, and Mixed Approaches* (SAGE, 2010), 231-232.

[51] This notwithstanding, the age and geographical focus of the classifications suggest a relative more mature patent market in the US than in Europe. Patent markets comprise the trade of patent themselves, the license of patent exploitation rights, and financial patent derivative products.

qualitative empirical methods, and some even quantitative methods. Different research perspectives and methodologies balance and triangulate the analysis of a verisimilar representation of the actual patent market.[52] Fifth, a few taxonomies specifies further species for certain or all of the classified genres, while the majority has only one level of specification. Lastly, different variables determine each classification. Some variables shared across more classifications are the business characteristics, the patent monetisation strategy employed, the value added to patents or the commitment put into patent transactions by the classified entities.

For the sake of brevity and coherence with the redefinition of patent aggregation, this analysis omits those businesses that do not acquire or control patents and that instead aggregate patents solely for manufacturing purposes. The over 150 examples of real firms provided by all references are collected in a separate table available upon request.[53]

The exposition groups the classifications into four subsections, reflecting commonalities in the research scope dimension. From the broadest research scope to the narrowest one, these are 4.1. Patent Market Intermediaries, 4.2. Patent Monetisation Strategies, 4.3. Patent Enforcement, and 4.4. Patent Aggregators.

4.1. Patent Market Intermediaries

This subsection comprises both the broadest research scopes, ranging from patent market players to patent intermediaries and services, and the oldest study encountered, namely that of Laurie and Millien from 2007.[54] In general, only a few patent intermediaries meet the redefinition of patent aggregation, being directly involved in the acquisition or prosecution of patent themselves. Many

[52] The verisimilitude of a sample, also called ecological validity, differs from its external validity, the only characteristic that combined with internal validity allows generalisations from the sample to the entire population of interest. On the validity of research results in empirical research, see Burke Johnson and Larry Christensen, *Educational Research: Quantitative, Qualitative, and Mixed Approaches* (SAGE, 2010), 256-277.

[53] Considering the difficulties of classifying patent-related businesses that might undertake distinct activities over or at the same time, it is interesting to see how different publications have classified the same companies and if classified firms have received multiple labels.

[54] See Ron Laurie and Raymond Millien, ´Meet the Middlemen´(2008) 28 Intellectual Asset Management 53; and See Ron Laurie and Raymond Millien, `A Summary of Established and Emerging IP Business Models´ (2008) 9 The Sedona Conference Journal 77.

patent intermediaries simply facilitate the meeting of patent buyers and sellers without taking patent ownership or control risks.[55]

Generally, the broad classifications that focus on patent market intermediaries draw a primary distinction of patent-related businesses: PEs and NPEs. PEs are the traditional patentees while NPEs represent a new genre of patent intermediaries, as Hagiu and Yoffie explain.[56] In fact, PEs, including IP subsidiaries of manufacturing companies, represent vertically integrated patent-holders that implement certain of their proprietary technologies into some product. The second genre, NPEs, runs exclusively in the upper part of the supply chain and provides the patented technologies used as inputs by manufacturers. To conduct further competition law analysis of the relevant markets and market power, it is helpful to consider in detail the different types of NPEs, so to understand which are their customers, suppliers, and competitors. Empirical research has found that NPEs differ from PEs but they are also heterogeneous in themselves.[57]

Albeit with different labels, the taxonomies further point to six main types of NPEs considering the entrepreneurial practices pursued. These are TTOs, R&D firms, patent pools, patent funds, PAEs, and defensive patent funds. First, according to Laurie and Millien, TTOs manage the patent portfolios of universities and public research organisations, providing prosecution and commercialisation services for their inventions.[58] Second, R&D firms internally develop technologies, file patent applications, and then monetise in the market the patented technologies.[59] Third, patent pools, a traditional patent institution for Hagiu and Yoffie, administer the licensing programs of patents bundled form different owners.[60] Fourth, patent funds raise money from PEs

[55] In this sense, for example, Kelley distinguishes patent market facilitators between brokers, auction houses, and online platforms. See Anne Kelley, ´Practicing in the Patent Marketplace´ (2011) 78 University of Chicago Law Review 115, 121-123. For the same reason, also Hagiu and Yoffie exclude patent-related services such as patent valuation, rating or screening from their classification; see Andrei Hagiu and David Yoffie, `The New Patent Intermediaries: Platforms, Defensive Aggregators, and Super-Aggregators´ (2013) 27 Journal of Economic Perspectives 45, 46.

[56] See Andrei Hagiu and David Yoffie, `The New Patent Intermediaries: Platforms, Defensive Aggregators, and Super-Aggregators´ (2013) 27 Journal of Economic Perspectives 45, 51-60.

[57] See Aija Leiponen and Henry Delcamp, ´The Anatomy of a Troll? Patent Licensing Business Models in the Light of Patent Reassignment Data´ (2019) 48 Research Policy 298, 308.

[58] See Ron Laurie and Raymond Millien, ´Meet the Middlemen´(2008) 28 Intellectual Asset Management 53, 57.

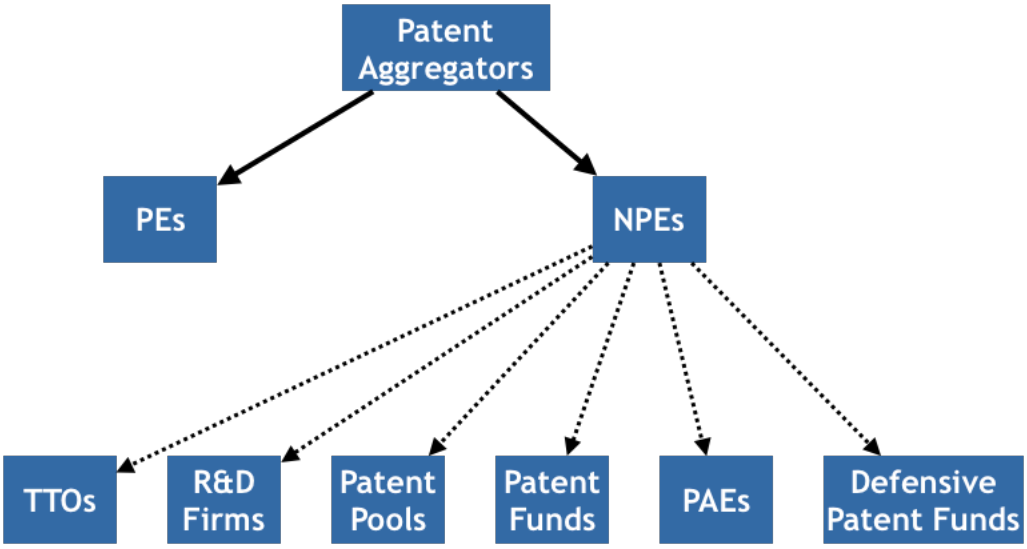
[59] Ibid, 54.

[60] See Andrei Hagiu and David Yoffie, `The New Patent Intermediaries: Platforms, Defensive Aggregators, and Super-Aggregators´ (2013) 27 Journal of Economic Perspectives 45, 50.

or from capital markets, acquire patents that fit coherent patent portfolios, and then exploit them to achieve a return on investment.[61] Fifth, PAEs, pejoratively known as patent trolls, acquire patents to obtain licensing fees or damage awards in courts rather than transfer technology.[62] Last, defensive patent funds, which emerged as a market response to PAEs, buy patents, either with own capital or upon members´ solicitation and finance, to provide freedom to operate as a service to their members or subscribers.[63]

To sum up, the taxonomies of patent market intermediaries confirm that both PEs and NPEs meet the advocated patent aggregation redefinition and that NPEs comprise a range of different types, as visualised by Figure 1. below. Because competition law scrutinises conduct rather than ways of doing business, the next subsection specifically centres on what patentees do, besides implementing them into products, to profit from their proprietary technologies.

Figure 1. The Domain of Patent Aggregators



Edited by the author.

[61] See Ron Laurie and Raymond Millien, ´Meet the Middlemen´(2008) 28 Intellectual Asset Management 53, 54.

[62] See Ron Laurie and Raymond Millien, `A Summary of Established and Emerging IP Business Models´ (2008) 9 The Sedona Conference Journal 77, 79; Mario Benassi and Alberto Di Minin, ´Playing in Between: Patent Brokers in Markets for Technology´ (2009) 39 R&D Management 68, 80. For Hagiu and Yoffie, PAEs degenerate in patent trolls when they engage in nuisance value litigation or patent hold-up; see Andrei Hagiu and David Yoffie, `The New Patent Intermediaries: Platforms, Defensive Aggregators, and Super-Aggregators´ (2013) 27 Journal of Economic Perspectives 45, 52-53.

[63] See Bartsch and others, *Intellectual Property Services Classification (IPSC)* (Fraunhofer IMW, 2016); Anne Kelley, ´Practicing in the Patent Marketplace´ (2011) 78 University of Chicago Law Review 115, 119-120.

4.2. Patent Monetisation Strategies

The second group of taxonomies is characterised more by its results rather than by its research scope. Despite variably concentrating on IP related businesses, IP intermediaries, and NPEs the studies here considered homogeneously produce classification based on the external patent monetisation strategy pursued. Essentially, all these classifications conceive four monetisation options: out-licensing, sales, defensively holding, and enforcement.[64]

Out-licensing is the most natural patent exploitation strategy apart from vertically integrating the implementation of patented technology into products. As Yanagisawa and Guellec point out, TTOs, R&D firms, and patent pools specifically build their patent portfolios with the goal of reaching profitable licensing contracts with manufacturers in support of the latter´ commercialisation activities.[65]

Patent sales, instead, pertain more to the operations of patent funds. These entities usually acquire undervalued patents, bundle them into coherent technological portfolios, and then sell them to profit from arbitrage.[66] Nevertheless, PEs too can divest their patent portfolios, either to make revenue, to cut patent maintenance costs, or to exit non-core business sectors, as demonstrated by Google´s recent sale of lithium battery patents to Amperex Technology.[67]

The defensive holding of patents is at the same time a traditional strategy for PEs, typical of the closed innovation paradigm, and an emerging one for NPEs. Indeed, PEs have always aggregated patents and held them directly to disrupt the competitors´ operations, gatekeeping the availability of their proprietary technologies. By contrast, within the NPEs genre, only defensive patent funds can sustain a holding strategy. Defensive patent funds acquire and hold patents to ensure freedom to operate, lower search costs, and safety from litigation of their members or subscribers. Wang specifies that defensive patent funds acquire patents either directly with their own finance raised from capital markets and subscription fees, or indirectly with subscribers´ pooled resources.[68] In

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[64] See Jennifer Clark, *Working Regions: Reconnecting Innovation and Production in the Knowledge Economy* (Routledge, 2014), 68.

[65] See Tomaya Yanagisawa and Dominique Guellec, *The Emerging Patent Marketplace* (OECD, 2009), 21-25.

[66] See Jennifer Clark, *Working Regions: Reconnecting Innovation and Production in the Knowledge Economy* (Routledge, 2014), 68.

[67] See Malathi Nayak, ´Google Makes First Sale in US Brokered Patent Market´ (Bloomberg BNA, 28 August 2018) <https://www.bna.com/google-makes-first-n73014482079/> accessed 15 May 2019.

[68] See Allen Wang, ´Rise of the Patent Intermediaries´ (2010) 25 Berkeley Technology Law Journal 159, 171-177.

both cases, the financial backers of the defensive patent funds remain anonymous, so that they can benefit from information asymmetries in technology markets. Usually, defensive patent funds commit to the holding strategy and do not enforce their patents unless counter-attacking those who are suing their members. However, as Papsts discusses, holding may be followed by other monetisation strategies both to recoup some of the patent acquisition costs and to prevent free-riding from non-members, which otherwise would benefit from the commitment not to sue. Thus, defensive patent funds also out-licensing the acquired patents to third parties and offer subscriptions to new firms (so-called catch and hold strategy), or license the bought patents to members and then resell them (so-called catch and release strategy).[69]

Unlike the defensive holding patent monetisation strategy, the enforcement strategy sees patentees that generate rents through patent infringement damage awards in court and patent settlements out of court. The next subsection is entirely dedicated to patent enforcement given the multitude of strategies behind it.

4.3. Patent Enforcement

The classifications focused on patent enforcement consider features such as patent origin, patent use or litigation strategy. Overall, they show that all types of patentees assert their patents for non-manufacturing purposes, therefore engaging in patent aggregation as redefined.

First, patent enforcers differ regarding the origin of the asserted patents. For example, Optiz and Pohlmann classify those that prosecute patents through internal R&D as innovative patent enforcers, whereas they consider those that strategically acquire them as non-innovative patent enforcers.[70] Highlighting the relevance of litigated patents, enforcement is criticised when the underlying patents are of minor technological quality, blatantly invalid, vaguely scoped, or even non-infringed.[71]

Then, the use made of the patents in suit characterises their enforcers. For example, Allison and others, reporting US patent litigation data between 2000 and 2007, categorise twelve classes of patent infringement plaintiffs.[72] Among them, only one represents PEs, namely product company,

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[69] See Daniel Papst, ´NPEs and Patent Aggregators – New, Complementary Business Models for Modern IP Markets´ (2013) 48 les Nouvelles 94, 97.

[70] See Marieke Optiz and Tim Pohlmann, ´Typology of the Patent Troll Business´ (2013) 43 R&D Management 103, 113.

[71] Ibid, 113.

[72] See John Allison, Mark Lemley and Joshua Walker, ´Extreme Value or Trolls on Top? The Characteristics of the Most

while the other classes are specific types of NPEs, such as universities or start-ups in the pre-product phase. This categorisation is in line with Optiz and Pohlmann who distinguish patent enforcers depending on whether their patents are directly implemented or non-practised ones.[73]

Last, litigation strategies characterise patent enforcers. According to the JRC Report ´Patent Assertion Entities in Europe´, patent pools, R&D firms and TTOs are patentees that usually assert their patents only after licensing negotiations have failed. Defensive patent funds go to court as soon as the freedom to operate of their members is jeopardised.[74] Furthermore, the enforcement strategies of PAEs can correspond either to the prominent litigation of key enabling patents against big manufacturing companies or to serial litigation campaigns against multiple defendants, suing both manufacturing firms and their customers.[75] The report also notes that PEs, to block the freedom to operate of competitors without incurring reputational or other operational risks, recur to *ad hoc* PAEs, sometimes known as privateers. Privateers assert the patents on the PEs´ behalf maintaining secrecy over their sponsors.[76]

Again, the analysis of patent enforcement confirms that both PEs and NPEs meet the redefinition of patent aggregation. Of course, PEs might assert their patents against competitors only to secure the

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Litigated Patents´(2009) 158 University of Pennsylvania Law Review 1, 10-11. Their twelve classes are: 1) acquired patents; 2) university heritage or tie; 3) failed start-up; 4) corporate heritage; 5) individual inventor-started company; 6) university/government/NGO; 7) start-up in the pre-product phase; 8) product company; 9) individual; 10) undetermined; 11) industry consortium; 12) IP subsidiary of a product company. The Stanford NPE Litigation Database adopts the same classification only adding one category for corporate-inventor-started company; see Shawn Miller, ´Who´s Suing Us? Decoding Patent Plaintiffs since 2000 with the Stanford NPE Litigation Dataset´(2018) 21 Stanford Technology Law Review 235, 244-245.

[73] See Marieke Optiz and Tim Pohlmann, ´Typology of the Patent Troll Business´ (2013) 43 R&D Management 103, 113

[74] See Europe Economics, *Patent Assertion Entities in Europe – Their Impact on Innovation and Knowledge Transfer in ICT Markets* (JRC Science for Policy Report, 2016), 45.

[75] See Europe Economics, *Patent Assertion Entities in Europe – Their Impact on Innovation and Knowledge Transfer in ICT Markets* (JRC Science for Policy Report, 2016), 130-134. Lemley and Melamed refer to lottery-ticket trolls for those NPEs that hold few yet valuable patents, which they use to achieve exemplary damages in court. Instead, bottom-feeder trolls are those NPEs that send myriads of licensing demand letters to alleged infringers of their vast patent portfolios; see Mark Lemley and Douglas Melamed, ´Missing the Forest for the Trolls´ (2013) 113 Columbia Law Review 2117, 2126.

[76] See Europe Economics, *Patent Assertion Entities in Europe – Their Impact on Innovation and Knowledge Transfer in ICT Markets* (JRC Science for Policy Report, 2016), 31-32. For an extensive discussion of patent privateering, see Thomas Ewing, 'Indirect Exploitation of Intellectual Property Rights by Corporations and Investors: IP Privateering and Modern Letters of Marque and Reprisal", 4 Hastings Science & Technology Law Journal 1 (2011).

patent implementing product market for themselves without so engaging in patent aggregation. However, this likelihood is remote in the electrical engineering sector where products rarely embed only one firm own patents.

4.4. Patent Aggregators

The fourth and last subsection consists of those taxonomies centred on the characteristics of patent aggregators. Three elements distinguish patent aggregators, namely the value they add to the patents they monetise, their public or private structure, and the rewards they pass on to inventors when they buy their patents.

Mostly, these taxonomies emphasise the intermediate activities undertaken to add value to patents before their monetisation.[77] They refer to two types of value-adding activities, mostly labelled as patent incubation and patent enrichment, eventually conducted to make patents more attractive for the market.[78] On the one hand, patent incubation comprises all R&D efforts that add significant value to patents, such as proving the concept or performance of an invention or prototyping, and that are necessary to bridge successfully the so-called valley of death.[79] On the other hand, patent enrichment adds limited value to patents and involves the geographical enlargement of patent families or the bundling of many patents into technologically coherent portfolios. Because of enrichment, patent portfolios are worth more than the sum of the individual values of the underlying single patents they comprise.[80]

Another distinction of patent aggregators is their public or private origin and related ownership structure.[81] Gassmann and others refer to government-sponsored patent funds that aggregate patents from national universities and SMEs to foster the domestic economy through protectionist

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[77] See Frauke Rüther, *Patent Aggregating Companies: Their Strategies, Activities, and Options for Producing Companies'* (University of St.Gallen, 2012), 59-60.

[78] See Alfonso Gambardella and others, *Options for an EU Instrument for Patent Valorisation* (EC Expert Group Report, 2012), 41-42.

[79] See Ruslan Galiakhmetou, Paola Giuri and Federico Munari, ´How to Enhance Patent Commercialisation? An Analysis of Patent Aggregators in Europe´ (2018) 22 International Journal of Innovation Management 4 – 1850040, 6.

[80] Ibid, 8. Patent portfolios are often more valued than the sum of each individual patents they contain; see Gideon Parchomovsky and Ralph Polk Wagner, ´Patent Portfolios´(2005) 154 University of Pennsylvania Law Review 1, 52.

[81] See EPO Economic and Scientific Advisory Board, *Patent Aggregation and Its Impact on Competition and Innovation Policy* (EPO Workshop Report, 2014), 8.

strategies.[82] Then, there are not-for-profit public patent funds that provide finance to patentees only to pursue macroeconomic social benefits and seldom expecting returns to be paid back.[83] However, because these public patent funds do not acquire patent ownership, they do not engage in patent aggregation as redefined.

Finally, patent aggregators are classified based on the type of reward they can provide to original inventors from whom they buy patents.[84] Consideration for the sale of patents is the simplest monetary reward that inventors can receive, either immediate lump sum payment upon sale, or continued participation to the proceeds of the subsequent commercialisation of the sold patents. Additionally, patent aggregators with technical and entrepreneurial competencies can also provide long-term non-monetary rewards to original patentees, such as transfer of operational risks, protection from infringement litigation, and R&D collaboration.[85]

To sum up, patent-related businesses, in general, and patent aggregators, in particular, have been classified along several dimensions. Nevertheless, none of the analysed taxonomies matches the redefinition of patent aggregation. Since competition law does not scrutinise business models by rather real market behaviours, the next section synthesises a new two-dimensional taxonomy of patent-related conducts fitting the redefinition of patent aggregation.

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[82] See Oliver Gassmann, Carol Krech and Frauke Rüther, ´Proifiting from Invention: Business Models of Patent Aggregating Companies´(2015) 19 International Journal of Innovation Management 3 – 1540005, 11.

[83] See Georg Buchtela and others, *SEE.IP Fund Feasibility Study* (aws Austria Report, 2010), 28-37. Not-for-profit patent aggregators also exist in the private sector, such as those non-commercial patent funds and patent pools described by Rüther that amass patents to neutralise licensing issues in social or humanitarian areas or to make patents freely accessible. Nevertheless, also these non-commercial entities are outside the redefinition of patent aggregation since they are prevalently active in the agricultural, health, and environmental sectors. See Frauke Rüther, *Patent Aggregating Companies: Their Strategies, Activities, and Options for Producing Companies'* (University of St.Gallen, 2012), 95-96; Meir Pugatch, ´Patent Pools and Collaborative Initiatives: Assessing the Efficacy of Alternatives to IP in the Development of New Pharmaceutical Drugs, Especially for Neglected Diseases – An Empirical Analysis´ (2011) 2(4) European Journal of Risk Regulation 566.

[84] See Oliver Gassmann, Carol Krech and Frauke Rüther, ´Proifiting from Invention: Business Models of Patent Aggregating Companies´(2015) 19 International Journal of Innovation Management 3 – 1540005, 5.

[85] See Frauke Rüther, *Patent Aggregating Companies: Their Strategies, Activities, and Options for Producing Companies'* (University of St.Gallen, 2012), 95-96.

5. New Taxonomy of Patent Aggregation Activities

Because market players engage in many economic activities over or at the same time, the new taxonomy focuses on patent aggregation activities rather than business models.[86] This direction is in line with the redefinition of patent aggregation, which does not discriminate between patentee types, and which equally admits PEs and NPEs to engage in patent aggregation. This is also supported by empirical evidence that, after controlling for patent characteristics, many of the differences between NPEs and PEs patent enforcement are insignificant.[87] Moreover, conducts and not entities have economic effects and are so subject to competition law scrutiny.

The departure point of the new taxonomy is the redefinition of patent aggregation, whose openness and uniqueness are a strength and weakness at the same time. On the one hand, the flexible definition catches unforeseen patent aggregation cases emerging from the market. Yet, it does not clarify what actual patent monetisation activities it includes. On the other hand, its singularity means it targets only the new patent aggregation practices typical of the open innovation paradigm. Yet, it impedes to rely completely on any of the reviewed classifications, which might have unduly excluded or included activities in or out of the redefinition. Consequently, a new taxonomy is needed to understand what conducts fall within the phenomenon of interest, and which in turn allows their empirical and competition law appraisals.

Methodologically, the new taxonomy includes all patent aggregation activities by any type of entity, balances each mutually exclusive category, adopts a self-explanatory nomenclature, and is manageable in its granularity.[88] Practically, the structure of the taxonomy is bi-dimensional, corresponding to the two meaningful propositions identifiable within the redefinition. Indeed, the redefinition can be divided into a first prong, referring to the aggregation of electrical engineering patents under common ownership or control by prosecution or transfer, and a second prong, limiting the interest only to non-manufacturing patent uses.

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[86] Fischer and Henkel list some NPEs specifying whether they were born as NPEs or they became so later in time; see Timo Fischer and Joachim Henkel, ´Patent Trolls on Markets for Technology – An Empirical Analysis of NPEs´s Patent Acquisitions´(2012) 41 Research Policy 1519, 1523.

[87] See Aija Leiponen and Henry Delcamp, ´The Anatomy of a Troll? Patent Licensing Business Models in the Light of Patent Reassignment Data´ (2019) 48 Research Policy 298, 308.

[88] These principles mirror to a certain extent those used by Schmoch in its classification of technological sectors; see Ulrich Schmoch, *Concept of a Technology Classification for Country Comparisons* (WIPO Report, 2008).

Preliminary, the reference to aggregation under common ownership or control excludes all patent market intermediary activities.[89] Furthermore, the first prong specifies that direct prosecution or patent transfer can lead to patent aggregation. While prosecution univocally identifies the filing of patent applications, a transfer is manifold. Indeed, the ownership or control of patents can be transferred either directly through patent purchases and exclusive long-lasting licenses, or indirectly by merging with or acquiring patent owners.[90] Finally, the second prong of the redefinition limits patent aggregation to non-manufacturing purposes, omitting the internal use of patents exclusively for production goals. This limitation, albeit including PEs inasmuch as they use their patents beyond manufacturing, is not self-explanatory. Nevertheless, it is reasonable to conclude that intermediary activities such as patent incubation or enrichment, occurring between the aggregation of patents and their exploitations, are irrelevant to qualify the use of a patent as non-manufacturing.[91] Against this opaqueness, the reviewed studies on patent monetisation strategies highlight four non-manufacturing options that any patentee faces: out-licensing, selling, enforcing, and defensively holding. Since the position in the supply chain of a patentee materially affects the viability of these options, it is worth to explore them in greater depth to provide a clearer taxonomy.

In principle, the out-licensing scenario is more circumscribed for NPEs than it is for PEs, as these latter ones operate on both the upstream technology market and the downstream product market. In fact, NPEs, not implementing patents themselves, rationally maximise licensing income, either at a penetration price to any interested implementer or at a premium price exclusively to certain implementers. By contrast, PEs, besides maximising licensing income as NPEs with patent

[89] See Martin Bader and others, *Handbook: External Patent Exploitation* (St.Gallen University, 2013), 13.

[90] See EPO Economic and Scientific Advisory Board, *Patent Aggregation and Its Impact on Competition and Innovation Policy* (EPO Workshop Report, 2014), 7.

[91] The exclusion of intermediate activities from the taxonomy does not mean that they do not matter for innovation purposes. As shown by the studies on patent aggregators, patent incubation and enrichment might well be decisive in determining the effect of patent aggregation on technological development and therefore on its competition law treatment. Organisation features, such as technological capabilities, portfolio size, and business relationship have been found to characterise patent aggregation conducts. Access to technical expertise allows aggregators to directly assess the merits of inventions and evaluate patents beyond their visible market signals of quality. Large patent portfolios enable building complementarities among the acquired patents, making the portfolio more valuable than the sum of its individual components. Business relations influence litigation behaviour because large partners, clients or suppliers may introduce contractual or strategic constraints. In this sense, see Aija Leiponen and Henry Delcamp, ´The Anatomy of a Troll? Patent Licensing Business Models in the Light of Patent Reassignment Data´ (2019) 48 Research Policy 298, 308.

implementers, are also interested in concluding cross licensing with other PEs. Such contracts give mutual access to the respective patent portfolios, enabling cost-savings or even profits if one portfolio is more valuable than the other and so requires consideration on top of the reciprocal license. Accordingly, PEs might well discriminate the price to access their proprietary technologies, depending on whether or not the prospective licensees can offer valuable patents in return.[92] In theory, without NPEs and if cross-licenses were an industry custom, market entry could be foreclosed to new entities without valuable patents to offer in mutual licenses.

Conversely, the sale option appears more advantageous to NPEs than to PEs. Through patent sales, NPEs seek to maximise proceeds, selling to the highest bidder regardless of it being a vertically integrated patentee or a competing NPE. Instead, PEs might opt not to sell their proprietary technologies to rival downstream manufacturers. In addition, patent sales from a PE to an NPE can have reputational effects for the seller, either positive if the acquiring NPE pursues defensive monetisation strategies or negative is the NPE is known for being prone to sue in court. Because of the incremental and convergent features of the electrical engineering sector, firms need to cooperate repeatedly with each other, granting reciprocal access to their technologies or jointly undertaking standardisation endeavours.[93] Negative reputation changes might deter other market players from cooperating, ultimately leading to the alienation of aggressive firms.

In addition, the enforcement option seems a monetisation strategy more suitable for NPEs than PEs.[94] First, NPEs asserting their patents in courts against alleged infringers do not bear any risk of infringement countersuit since they lack manufacturing activities. Reversely, PEs, fearing retaliation risks, are deterred from intensively asserting their patents against other PEs, conscious that one patent infringement lawsuit might trigger other lawsuits in a mutually-assured-destruction setting.[95]

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[92] Hypothetically, also NPEs could conclude cross-licenses with PEs. Such a contract could take a variety of forms. For example, it could first consist of a settlement agreement where the parties agree not to enforce or invalidate each other´s patents. Or, it could be a defensive alliance agreement, the NPE safeguarding freedom to operate on its portfolio to any PE in exchange for the reciprocal freedom to operate being provided by the PE to each of the NPE´s licensees.

[93] See Peter Grindley and David Teece, ´Managing Intellectual Capital: Licensing and Cross-Licensing in Semiconductors and Electronics´ (1997) 39 California Management Review 8, 8-10.

[94] In this sense, see Fiona Scott-Morton and Carl Shapiro, ´Strategic Patent Acquisitions´ (2014) 79(2) Antitrust Law Journal 463, 488-493.

[95] The smartphone patent wars are exemplary of how patent infringement lawsuits can escalate. Indeed, smartphone manufacturers sought injunctions in courts around the world for the infringement of their numerous patents. Because mobile phones, like any electrical engineering product, include dozens of standards, which read on thousands of patents

Second, NPEs focused on patent enforcement benefit of a reputation for being proficient patent infringement plaintiffs, which could incentivise potential infringers to settle quickly given the costs, length, and uncertainty of patent litigation. To the contrary, PEs generally do not wish to be perceived as avid patent asserters by competing manufacturers both because that reputation might jeopardise business relations or even attract allegation of abuse of a dominant position.[96]

Finally, the holding scenario turns out to be more profitable for PEs than NPEs, since these latter ones can hold their patents without monetising them exclusively if they benefit from some other income. In practice, NPEs defensively holding patents are just defensive patent funds that offer freedom to operate as a service in exchange for membership or subscription fees. PEs instead have long held patents without asserting them, while still making profits in product markets. Actually, the holding option for PEs grew in its strategic function with the shift from the closed innovation paradigm to the open one. Indeed, in the old paradigm, PEs aggregated and internally held patents only to prevent the imitation of their proprietary manufacturing advantages. In open innovation settings, PEs have begun to leverage externally their patents strategically blocking competitors, raising rivals´ costs or deterring market entry.[97] However, the non-manufacturing holding option implies for any patentee risks of patent hold-out, since implementers know they will not be pursued for infringement. Defensive patent funds, committed to never enforce their patents, tackle patent

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owned by many patentees, the likeliness of involuntary patent infringement is at least probable. For an overlook of the smartphone patent wars, see Charles Duhigg and Steve Lohr, ´The Patent, Used as a Sword´ (The New York Times, 7 October 2012); Jeffrey Lewis and Ryan Mott, ´The Sky is not Falling: Navigating the Smartphone Patent Thicket´ (2013= 1 WIPO Magazine. The EC discussed the situation of mutual dependency of two contracting parties in its merger control decision *Enso/Stora*; see Commission Decision of 25 November 1998, Case COMP/M.1225 *Enso/Stora* OJ 199 L 254/9, para. 84-97.

[96] In this sense, ITT Promedia and Protégé International GC judgments. On raising rival´s costs strategy, see Daniel Rubinfield and Robert Maness, ´The Strategic Use of Patents: Implications for Antitrust´ in Francois Léveque and Howard Shelanski (eds.), *Antitrust, Patents, and Copyright: EU and US Perspectives* (Edward Elgar, 2005).

[97] Parchomovsky and Wagner list several benefits of holding large patent portfolios: 1) it eases subsequent innovation by broadening the scope of effective patent protection; 2) it attracts related external innovations through the power to exclude others from the marketplace; 3) it confers market power that avoids costly litigation; 4) it improves the bargaining position; 5) it enhances the defensive aspects of patent protection through counter-infringement threats; 6) it increases the patentee´s voice in the patent system politics; 7) it allows to attract and retain capital investments. See Gideon Parchomovsky and Ralph Polk Wagner, ´Patent Portfolios´(2005) 154 University of Pennsylvania Law Review 1, 33-37.

hold-out with catch and release strategies, whereas PEs might develop confidential profit-sharing mechanisms with privateers without impacting their reputation.[98]

Completed the analysis of the non-manufacturing patent exploitation options, it is now possible to recap all activities of the two-dimensional patent aggregation taxonomy. Following the two prongs of the redefinition, the first group of activities comprises the means by which patents can be aggregated, namely exclusive licenses, mergers and acquisitions (M&As) of patentees, patent prosecution, and patent purchase. The second group consists of the non-manufacturing uses of aggregated patents, namely enforcement, defensively holding, out-licenses, and sales. The crossing of the two groups gives fifteen possible patent aggregation combinations listed in Table 1. below together with examples of corresponding patent-related business types.[99]

Table 1. Patent Aggregation Taxonomy

		Non-Manufacturing Uses of Aggregated Patents			
		Enforcement	Defensive Holding	Out-Licenses	Sales
Means to Aggregate Patents	Exclusive Licenses	PEs and PAEs	PEs and Defensive Patent Funds	Patent Pools, TTOs and PAEs	N.A.
	M&As of Patentees	PEs and PAEs	PEs and Defensive Patent Funds	PEs	Patent Funds
	Prosecution	PEs and R&D Firms	PEs	PEs, TTOs and R&D Firm	TTOs and R&D Firms
	Purchases	PEs and PAEs	PEs and Defensive Patent Funds	PEs, Patent Funds and PAEs	Patent Funds

Table edited by the author.

Any patentee type can pursue most patent aggregation categories with three exceptions. Indeed, M&A-sell and purchase-sale correspond to arbitrage activities typical of patent funds, far from the

[98] See Allen Wang, ´Rise of the Patent Intermediaries´ (2010) 25 Berkeley Technology Law Journal 159, 171-177

[99].One less than the mathematical combinations since it is not legally possible for an aggregator to conclude patent exclusive licenses and then selling the patents since exclusive licensees do not acquire patent ownership.

core business of PEs. Instead, prosecution-defensive holding is the traditional strategy of PEs precluded to any NPEs, which could not recoup R&D investments just holding patents.

Considering the individual types of NPEs, PAEs can pursue all enforcement combinations except for prosecution-enforcement, which only pertains R&D firms, the only NPE engaging in patent prosecution. Furthermore, defensive patent funds uniquely occupy the defensive holding scenario, with the abovementioned prosecution-defensive holding exception. In contrast, out-licenses options are varied, being the normal practice of most NPEs, yet the unique outcome of patent pools, which in-license patent commercialisation rights from many patentees, and then sub-license the bundled rights to contributing patentees or third parties. Then, M&A-sale and purchase-sale are the usual enterprises of patent funds, while prosecution-sale of R&D firms. Lastly, TTOs deploy several commercialisation strategies, like in-license-out-license, prosecution-out-license, and prosecution-sale, sometimes in the form of spin-offs of patent-based start-ups.[100]

6. Conclusion

This paper is only the first step in the broader attempt to understand the complexities of patent aggregation activities, their impact on innovation, and competition law treatment. Nonetheless, the proposed redefinition reduces patent aggregation conducts to a consistent and classified phenomenon.

Notably, because patentees may engage in several economic behaviours over or at the same time, the taxonomy should not be statically used. Indeed, any PEs or NPEs might qualify for one or more patent aggregation combinations depending on the case. For example, a PE could stop its manufacturing operations and focus exclusively on enforcing its patents.[101] Likewise, an NPE can diversify its business, licensing as a patent pool certain patents while asserting others.[102]

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[100] On spin-offs mechanisms for TTOs, see Morten Steffensen, Everett Rogers and Kristen Speakman, ´Spin-Offs from Research Centers at a Research University´ (1999) 15 Journal of Business Venturing 93; Pinaki Pattnaik and Satyendra Pandey, ´University Spinoffs: What, Why, and How?´ (2014) 4 Technology Innovation Management Review 44.

[101] This was the case of Paspt Motoren, a former manufacturer of computer fans and cooling systems, which since 1992 turned to the PAE business; Daniel Papst, ´NPEs and Patent Aggregators – New, Complementary Business Models for Modern IP Markets´ (2013) 48 les Nouvelles 94, 97.

[102] For example, see the experience of Sisvel <http://www.sisvel.com/> accessed 15 May 2019. In the US, Form Holdings, a PAE, diversified its business and started to operate SPA shops at airports under the name of XpressSpa, see <https://seekingalpha.com/article/4058865-form-holdings-patent-troll-undervalued-health-wellness-company>

Alternatively, defensive patent funds committed not to litigate their patents could also pursue patent infringement litigation, thanks to the anonymity provided by shell companies. Given this flexibility, any effort to explain the relationship between patent aggregation activities, innovation, and competition law should be carried on a case-by-case basis, taking into account the peculiarities of the patent aggregation instance at hand.

To conclude, further exploratory research could build upon the redefinition and taxonomy of patent aggregation in order to identify its empirical evidence in Europe. These data, as a means to an end, would ground the research in the real world clarifying to what extent and under what forms patent aggregation occurs. Indeed, if patent aggregation happens only to a negligible extent in Europe, competition law has a limited role in ensuring its consistency with innovation. If that were the case, a more comparative research angle might investigate what differences in the US and EU legal systems lead to the diffusion of patent aggregation, since the American scholarship already established empirical evidence of patent aggregation. Then, the impact of patent aggregation on innovation should be determined, admitting divergent results depending on the specific patent aggregation combinations considered. Last, future research might formulate policy actions to ensure the positive relationship between patent aggregation activities and innovation. These measures would serve both if competition law could not remedy eventual anti-innovative patent aggregation practices and if Europe was short of the pro-innovative ones. In this sense, the EC already shows a balanced approach. In fact, it endorses patent aggregation activities generally known for spurring technological development, such as patent pools, whereas it closely scrutinises controversial patent aggregation, such as dominant patentees´ licensing and enforcement practices.[103]

accessed 15 May 2019.

[103] The European Commission´s favour towards patent pools has been restated at the end of 2017; see Commission Communication, ´Setting Out the EU Approach to Standard Essential Patents´ COM (2017) 712 final, 8.

Patent Aggregation in Patent and Competition Law

Niccolò Galli
Project: ESR3

Research Question

Does patent aggregation harm innovation and does, therefore, competition law provide a remedy to respond to the problem?

Methodology

To disentangle the complexity of patent aggregation the enquiry follows a mixed methodology. It employs traditional black-letter analysis together with quantitative and qualitative empirical legal methods.

Societal impact

The implementation of patents into end-products is but one way of profiting from patents. Indeed, many electronics firms, besides selling end-products, raise revenue by licensing or selling their patents (so-called Practicing Entities). Other firms with little or no research and development activities, disregard manufacturing activities completely and, instead, specialize in monetizing patents (so-called Non-Practising Entities). These patents-only transactions are enabled by the transferability of patent rights and correspond to some of the patent aggregation practices recently spurring in electrical engineering industries. Since patent aggregation does not directly result in new products being brought to markets, its effects on innovation are ambiguous and depend on the specific activity considered. Posing as a hypothesis that certain patent aggregation activities might stifle innovation, for example exacerbating patent hold-up scenarios, the study assesses the compatibility of the phenomenon of interest with European competition law. As a result, the research provides, first, recommendations for policy-makers to ensure that patent aggregation and innovation are positively related. Second, legal certainty and lower transaction costs for market-players, clarifying how their patent aggregation practices are regulated under EU competition law. Indirectly, society experiences more innovation, since lower transaction costs and pro-active recommendations enable more investment in research and development.

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