JUNE 2020
BxWP2020-10

BORDEAUX ECONOMICS WORKING PAPERS
CAHIERS D'ECONOMIE DE BORDEAUX

Non-practicing entities and transparency in patent ownership in Europe

Valerio Sterzi

GREThA, CNRS, UMR 5113, University of Bordeaux

valerio.sterzi@u-bordeaux.fr

Jean-Paul Rameshkoumar

VIA Inno, GREThA, CNRS, UMR 5113, University of Bordeaux

jean-paul.rameshkoumar@u-bordeaux.fr

Johannes Van Der Pol

VIA Inno, GREThA, CNRS, UMR 5113, University of Bordeaux

johannes.van-der-pol@u-bordeaux.fr

GREThA UMR CNRS 5113
Université de Bordeaux
Avenue Léon Duguit
33608 Pessac – France
Tel : +33 (0)5.56.84.25.75
http://gretha.u-bordeaux.fr/

LAREFI
Université de Bordeaux
Avenue Léon Duguit
33608 Pessac – France
Tel : +33 (0)5.56.84.25.37
http://larefi.u-bordeaux.fr/

Abstract

Non-practicing entities (NPEs) file or buy patents from a variety of sources and employ them primarily to obtain license fees by asserting them against accused infringers, without any intention of using the invention they protect.

This report gives unique insight into how NPEs game Europe's patent system for profit. The report also provides further evidence that the problem of NPEs is migrating to Europe from the US, and it proposes policy responses to increase patent ownership transparency.

The report is largely based on forensic original research into two cases. These cases point to a serious lack of transparency in patent and corporate ownership. They demonstrate how shell or dormant companies, often of unknown ownership and commonly established in the UK, are used to acquire European patents, and how these companies exploit those patents in courts in the European Union – especially Germany.

The report also shows that due to the lack of transparency of patent ownership, the problem of NPEs gaming the system is almost certainly far worse than the report states.

Keywords: Non-practicing entities, Patent trolls, Patent litigation, Patent ownership transparency

JEL: O31, O34, D23

ACKNOWLEDGEMENTS: *We are grateful for funding from the French National Research Agency (ANR, Project NPEIE - https://npeie.org - ANR-17-CE26-0014-01_ACT). The present report has been also produced with partial funding from VIA Inno, the technology intelligence platform of the University of Bordeaux specialised in developing methodologies for innovation landscapes characterization, and IP2Innovate, a coalition of large and small companies that creates innovative products and services in Europe.*

We have received excellent insights and comments from Stefania Fusco, Massimiliano Granieri, Francesco Lissoni, Catalina Martinez, and Gianluca Orsatti.

All opinions, and errors, remain our own.

To cite this paper: **STERZI Valerio, RAMESHKOUMAR Jean-Paul, VAN DER POL Johannes** (2020), Non-practicing entities and transparency in patent ownership in Europe, Bordeaux Economics Working Papers, BxWP2020-10.

https://ideas.repec.org/p/grt/bdxewp/2020-10.html

Table of Contents

0. Executive Summary

Overview

Non-practicing entities (NPEs)[1] file or buy patents from a variety of sources and employ them primarily to obtain license fees by asserting them against accused infringers, without any intention of using the invention they protect.

This report gives unique insight into how NPEs game Europe's patent system for profit. The report also provides further evidence that the problem of NPEs is migrating to Europe from the US, and it proposes policy responses to increase patent ownership transparency.

The report is largely based on forensic original research into two cases. These cases point to a serious lack of transparency in patent and corporate ownership. They demonstrate how shell or dormant companies, often of unknown ownership and commonly established in the UK, are used to acquire European patents, and how these companies exploit those patents in courts in the European Union – especially Germany.

The report also shows that due to the lack of transparency of patent ownership, the problem of NPEs gaming the system is almost certainly far worse than the report states.

A Growing problem

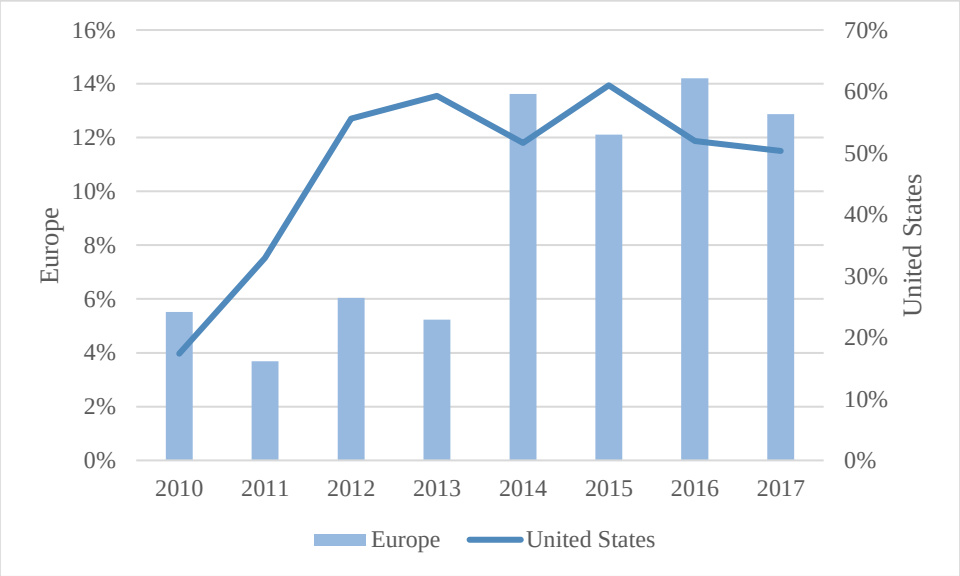
The report builds on existing and recent academic studies by providing further evidence that the problem in Europe grew when in the US, court rulings and legislative changes weakened some of the leverage that NPEs could use when trying to monetize their patents. The report cites legislative changes – such as the 2011 Leahy–Smith America Invents Act – and three cases that helped weaken NPEs leverage in the US: *eBay Inc. v. MercExchange, L.L.C.* (2006), *Octane Fitness v Icon Health & Fitness* (2014), *TC Heartland LLC v. Kraft Foods Group Brands LLC* (2017).

The growing number of patents being acquired and litigated by NPEs in Europe can be seen, therefore, as an initial response to the changing environment faced by NPEs in the US. It also demonstrates the growth of IT-related innovation in Europe, albeit from a far lower base than in the US. The prospect of a Unitary Patent (UP) and Unified Patent Court (UPC) in Europe may be distant still, but the creation of one single, giant patent jurisdiction will make Europe even more attractive to NPEs.

This should merit the serious attention of EU policy makers. While US courts and lawmakers clamp down on patent trolling little is being done this side of the Atlantic.

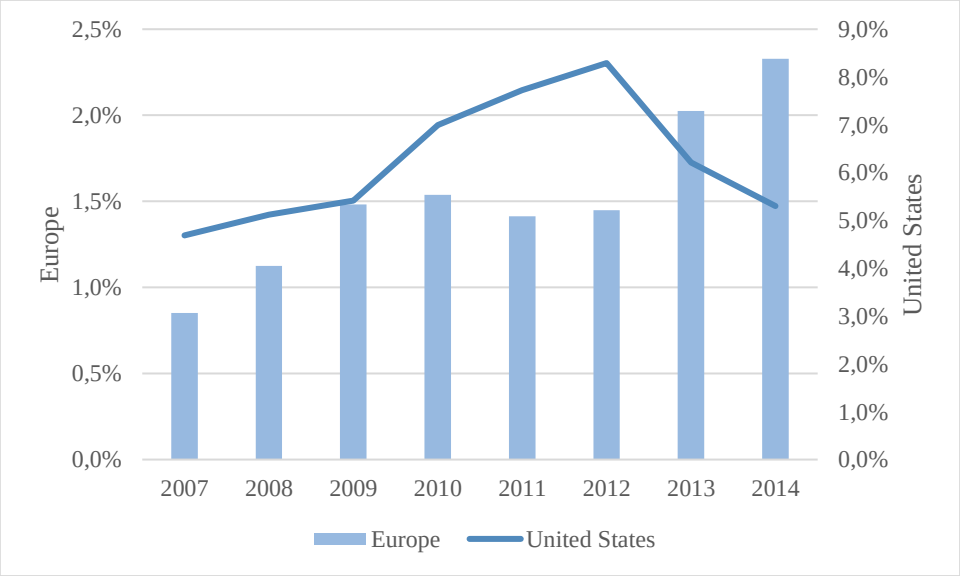
[1] For the purpose of this study IP subsidiaries of product companies, universities, public research institutions and sole inventors/individuals are not considered as NPEs.

Figure I. Share of NPE patent litigations in Europe and United States (Infringement Actions, 2010-2017)



Note: Infringement actions brought by NPEs in European (left scale axis) and US (right scale axis) Courts. Source: Authors' elaboration based on data from Darts-IP.

Figure II. Share of transferred patents acquired by NPEs in Europe and United States (2007-2014)



The figure shows the share of transferred patents to NPE, both at the USPTO (US) and EPO (Europe). Shares indicated the ratio between the number of patents acquired by NPEs and the total number of transferred patents, by year of transfer (3-year average). Transfers that occur after the grant date are not registered at the EP Register. Source: Authors' elaboration based on data from the EP Register (2015), US Patent Assignment Database (2017). Data on year 2014 can be incomplete.

Lack of ownership transparency

Many of the largest NPEs hide behind dozens of dormant or shell companies with obscure ownerships. Meanwhile national patents offices including those in Germany and France do not impose a strict time period for recording the change of ownership of a patent, allowing the holder to gain an advantage by controlling the timing of its ownership disclosure.

Problems with obscure patent ownership arise in general in the shadow of litigation. As a consequence of the lack of patent ownership transparency, the IP ecosystem today faces four main problems:

Discouraging preclearance – a licensee can't identify problematic patents during a prior art search

Incomplete licenses – making royalty demands without disclosing necessary info about the portfolio to be licensed

Distorting market transactions – withholding the holder's identity to tilt licence negotiations to their advantage over the licensee

Litigation abuse – suing a firm with large cash holdings; or just prior to an IPO

Notice failure creates room for NPEs to enter the patent market and negotiate licensing agreements after specific technologies have been adopted by third parties (ex-post licensing). Property rule mechanisms, such as injunctive reliefs, can even provide the patent owner with much greater bargaining leverage, in cases when the presumed infringer has already sunk substantial resources into developing a product.

Depending on the country, a patent holder can sue alleging infringement of a particular patent without providing many more details. Companies that receive patent demands from shell companies find it extremely challenging to dispute the validity of the underlying patents and to evaluate the appropriateness of the demand against them. The fact that defendants cannot easily identify who is asserting the patents against them creates significant bargaining asymmetries.

The report concludes that owing to these un-transparent black spots in Europe's patent system, patent holders are in the enviable position of being able to exert an influence on the market that is disproportionate to their patent's contribution to it.

At the very least a potential licensee of a patented invention should easily be able to identify those holding the necessary rights. But they can't for two reasons: First, firms are not required to give prompt notification of a change in patent ownership to patent offices. Second, patent owners (NPEs in particular) set up shell companies and dormant companies to hide patent ownership. Often ownership is only disclosed immediately before the NPE attacks a practicing company, putting the target at a tactical disadvantage.

The UK - the home of choice of the of NPE shell companies

Dormant companies neither produce nor sell anything, generate no revenues and pay no taxes. The report finds 224 active dormant IP companies – with no links with any non-dormant

company - registered in the UK, holding more than 14,000 patent documents. Over three quarters of these patents are from non-UK patent jurisdictions.

UK-based NPE dormant companies hold patents of relatively low technological quality but that have a high risk of litigation.

One of the report's case studies looks into an NPE called Dragon Green Development Balboa SA (DGDB), which has a substantial litigation record against various companies in Germany. Based in the Republic of Panama, DGDB makes extensive use of dormant companies in the UK to acquire, hold and litigate patents. These companies are directed by proxy directors, maintaining in anonymity the real individuals behind the company and shielding them from legal actions.

Policy recommendations

The report points out that there are strong reasons for advocating greater transparency in the European patent market. Patent offices should be endowed with substantive rule-making authority and called on to make patent ownership information more readily available, to help tracking formal changes of property, and to implement legislative initiatives to facilitate patent clearance and limit ex-post licensing and litigation. Legislative initiative should aim at enhancing intellectual production by widely employing liability rules and remedies to deal with unwitting trespass and to circumvent holdout problems.

1. Introduction

The sharp increase in patent applications worldwide over the last 20 years is indicative of many economies becoming increasingly dependent on intellectual property (IP). As for Europe and the US, IP is today a pervasive presence in society, while intangible assets (primarily, patents and trade secrets) represent the most important components of firms' market value. Intangible assets in 2015 represented 84% of US stock market capitalization (S&P 500), rising from 68% in 1995 and from just 32% in 1985. Similarly, in Europe, intangible assets today represent more than 70% of the stock market capitalization value (Elsten and Hill, 2017).

Traditionally, patents are conceived as innovation incentive mechanisms, based on an exchange between society and the inventor (Feldman, 2012): society grants the inventor the right to exclude others from making, using or selling the invention as an incentive for providing society with something new. However, in today's knowledge economy, the use of patents has long deviated from this original purpose, as patents figure prominently among firms' strategic tools. This is especially true in the ICT industry, where the IP rights related to its constituent technologies are highly fragmented. There is ample evidence showing that firms are no longer using patents to primarily appropriate returns on innovations, for which they find other means to be more effective (chiefly, complementary assets, including sales and service provision; see e.g. Levin et al., 1987; Cohen et al., 2000; Blind et al. 2006).[2] Similarly, while key inventions are often kept secret, patents on lesser ones may be used to deter and block competitors in the innovation race.

In today's modern society, patent holders have the choice between (1) exploiting their IP rights by commercially developing the invention they protect or (2) by suing or threatening to suit any presumed or potential infringer. Martin and Partnoy (2011) claim that the present patent system inopportunely favours exercising the litigation option as opposed to the development option, with patent power being a *power to exclude* rather than a *power to create*. If actual creation requires considerable investment to find marketable applications of the invention, exclusion is indeed a far simpler process. Such behaviour is also facilitated by the attributes of a system that allow IP holders to bargain for compensation far beyond the value of the rights they hold (Feldman, 2012; Scott Morton and Shapiro, 2016).

[2] The Carnegie Mellon survey (Cohen et al., 2010) was administered to R&D labs in the US manufacturing sector in 1994. Based on 1,478 responses, the survey shows that patents were reported to be the least important of the major appropriability mechanisms.

Thus, in recent years, a new line of business has emerged, which consists in exploiting and monetizing patents. Various IP markets have undergone this shift to monetization, where patents that would ordinarily not have provided any return are now being reconstituted and monetized (Feldman, 2012). Firms that do not produce (or which have moved away from production) have started to see patents as a major intangible asset[3]. Pénin (2012) describes this phenomenon as a "radical hijacking of the primary role of patents", and finds this shift in patent usage to be paradoxical as "patents were designed to prevent infringements" whereas now they are being used "precisely in order to be infringed".

Among the entities that profit most from the monetization of patent assets, non-practicing entities (NPEs) have emerged as key players. NPEs are actors that acquire patents from a variety of sources and use them primarily to obtain license fees and revenue by asserting them against alleged infringers.[4] Known sometimes also as "patent assertion entities" (PAEs) or with the derogatory term of "patent trolls", NPEs do not manufacture, distribute or sell products, nor do they act as intermediaries that facilitate technology transfer between the inventor and the manufacturer before the product is developed and marketed (*ex-ante* patent transactions). Rather, by acquiring and then asserting patents, NPEs often target manufacturers that allegedly use the patented technology (*ex-post* patent transactions). The *power to exclude* is, in fact, particularly lucrative when it is exercised against those that are already engaged in the market (and who have much to lose if they are unable to continue operating).

As patent enforcers, NPEs seek to benefit from the lack of transparency of the patent ecosystem. By accumulating patents through shell companies, NPEs make it difficult to conclude who actually owns a particular patent and whether it is a patent for which target firms already have a license (Feldman, 2013; Scott Morton and Shapiro, 2013; TFC, 2016). Moreover, NPEs also take advantage of the fact that the registration of transfers of patent ownership is often not

[3] Several product-producing companies have recently re-focused their business strategy and moved one-step closer to the IP monetization business, which is becoming an important source of revenues (Osenga, 2014). For example, Technicolor, a company based in France that provides services and products for the communication, media and entertainment industries, initiated several patent infringement suits in Germany and France in 2017 against Samsung Electronics and, more recently, has sold its patent licensing business to InterDigital, a US wireless technology firm specialized in generating revenues by licensing and asserting patents. Among others, Blackberry, Ericsson, Nokia are examples of early market leaders that have recently embraced monetization as their core business and become supporters of privateer-style PAEs. These companies often operate through satellites (for example, Avanci, Unwired Planet, PanOptis in the case of Ericsson; Core Wireless and Vringo/FORM Holding in that of Nokia) and engage in patent stacking.

[4] The term "NPE" does not include those non-practicing entities that are not (primarily) involved in the patent assertion business, including individuals, universities, technology development companies and defensive aggregators.

mandatory (Ciaramella et al., 2017) and the legitimacy of the transaction is not directly conditional on the registration of the change of ownership (Gorbatyuk and Kovacs, 2019).

Problems with hidden patent ownership arise largely in the shadow of litigation (Anderson, 2015). Once a patent has been acquired, NPEs may hide the patent away until its use by the alleged infringer becomes widespread. Such a situation is most likely when the parties lack the necessary patent ownership information to evaluate effectively the litigation risk (Menell and Meurer, 2013), thereby enabling NPEs to generate rewards often unrelated to any contribution made.

In the patent ecosystem, large NPEs may own and monetize hundreds, even thousands, of patents, backed by massive private equity funds with billions in capital raised by investors.[5] Also small NPEs may, occasionally, win substantial damages as a result of asserting patents through courts.[6] Lawsuits initiated by NPEs have come to be seen as an "unwanted tax" by companies involved in litigation, an extra cost that scares off further investments, especially in innovation activities (Cohen et al., 2019). An influential study (Bessen and Meurer, 2014) estimated the "direct costs" of NPE litigation in the US in 2011 at $29 billion.[7] Indeed, firms embroiled in litigation cases with NPEs are likely to be forced to divert operative resources towards legal actions (Feldman, 2013). Moreover, given the threat of losing the suit, the decision might be taken to settle at costs that are well above those of the actual damage arising from the infringement (Feldman and Frondorf, 2015).

The activities of NPEs have attracted the attention of the US Congress and the public, above all since 2006 when a successful NPE litigation case threatened the closure of the BlackBerry wireless service (Magliocca, 2006; Menell and Meurer, 2013).[8] Since then, the *New York Times*

[5] According to our data, Intellectual Venture has acquired and filed more than 27 thousand US patents (with filing dates between 2000 and 2015) using a large number of subsidiaries.

[6] In February 2015 a jury verdict (first instance) required Apple to pay $533 million to Smartflash LLC, a small licensing company with no employees, after the latter accused Apple's iTunes software of infringing on its data storage patents. A year later, the US Patent and Trademark Office invalidated the patents in question on the grounds that they were too abstract.

[7] Bessen and Meurer (2014) estimated the direct costs to defendants arising from NPE patent assertions from a survey of defendants and a database of litigation. This study has been criticized by two other US scholars (Schwartz and Kesan, 2014), who questioned the representativeness of the data and claimed that Bessen and Meurer's $29 billion calculation of the direct costs of NPE patent assertions should be viewed as the highest possible limit.

[8] RIM (BlackBerry) settled the case for $612.5 million in March 2006 (Krazit and Broache, 2006), corresponding to about 50% of the total revenue generated by RIM in fiscal year 2005. http://www.annualreports.com/HostedData/AnnualReportArchive/B/TSX_BB_2005.pdf

and the *Wall Street Journal* have dedicated cover stories to NPEs;[9] the Federal Trade Commission has issued reports proposing action be taken against them;[10] and US President Barack Obama condemned them in a public address, when still in office.[11]

In contrast, NPEs have not attracted the same degree of attention in Europe. Analyses of NPEs in Europe have remained on the sidelines and their activity has only recently come under investigation (see, for example, Fusco, 2013; Orsatti and Sterzi, 2019a; Thumm and Gabison, 2016; Thumm, 2018). However, recent evidence shows that NPEs are undoubtedly emerging as important players in the European patent ecosystem. Our analysis shows that NPEs have initiated a significant number of litigation cases for patent infringement in Europe (about 13% of the total between 2014 and 2017) and that they hold a significant number of patents filed at the EPO (more than 14,000 patent applications filed between 1997 and 2012 and transferred up to 2014).

Our evidence further suggests that some NPEs originating from the US have begun to shift their business to Europe (Thumm, 2018). Recent patent reforms, and in particular the 2011 Leahy–Smith America Invents Act (AIA), have reduced NPE opportunities for asset monetization in the US. Likewise, several major decisions by the Supreme Court have established legal precedents that limit the likelihood of obtaining an injunction, make it harder to acquire and assert software-related patents and lower the bar for when *fee-shifting* can occur and significantly reduce the ability of patent holders to engage in *forum shopping*.

Conversely, the long-lasting lack of transparent patent ownership in Europe, together with the fact that several courts still issue automatic injunctions upon a finding of a patent infringement and that the Unitary Patent (UP) and the Unified Patent Court (UPC) are soon to be launched, make the European patent monetization landscape potentially more attractive for NPEs.

In Chapter 2, we provide new evidence of the increasing presence of NPEs in Europe based on large-scale patent litigation and patent acquisition data. In Chapter 3, we explore the principal causes of notice failure in the patent system, something that has contributed significantly to the emergence of NPEs, and we pay particular attention to the problems associated with the

[9] For example, Charles Duhigg & Steve Lohr, The Patent, Used as a Sword, N.Y. Times (Oct. 7, 2012); Ashby Jones, Patent 'Troll' Tactics Spread, Wall St. J. (July 8, 2012, 8:46 PM).
[10] FTC, The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition (2011).
[11] Obama Says Patent Reform Needs to Go Farther, Reuters (Feb. 14, 2013, 8:52 PM), http://www.reuters.com/article/2013/02/15/us-obama-patent-idUSBRE91E03320130215

transparency of patent ownership. In Chapter 4, we describe the NPE business model(s) and review the main evidence regarding the consequences that NPEs have on the patent ecosystem. Chapter 5 draws upon the ideas discussed in Chapters 2-4 to provide recommendations for possible legislative reforms that would create meaningful disclosure requirements. In Chapter 6 we present two case studies showing how NPEs can exploit the lack of patent ownership transparency in Europe. We focus on a specific type of company registered in the UK – the *dormant company* – an entity that engages in no activity, has no accounting transactions, does not trade and does not receive any form of income. In the first case study ("NPEs and the use of dormant companies for IP monetization: the case of UK"), we examine the degree to which UK *dormant* companies buy patents for monetization purposes, we describe their business, and we study the characteristics of their patent portfolios. In the second case study ("An example of a dormant NPE in the UK: Dragon Green Development Balboa SA"), we conduct an in-depth analysis of Dragon Green Development Balboa SA (DGDB), an NPE that, by making extensive use of dormant companies in the UK, exploits the Panamanian, British and German legal systems to create a structure suitable for patent litigation. Chapter 7 lists all references made to the literature and, finally, Chapter 8 contains the appendixes that include additional figures and tables.

2. The increasing presence of NPEs in Europe

To date, the NPE business has been widely debated in the US, but it has not attracted the same kind of coverage in Europe. Whereas scholars have documented closely the growing role played by NPEs in the US patent market, only a few recent papers have examined the NPEs operating in Europe (Fusco, 2013; Love et al., 2016; Orsatti and Sterzi, 2019a; Thumm and Gabison, 2016; Thumm, 2018). However, in light of recent developments, this is difficult to justify. While it is true that patent monetization is less often pursued in Europe compared to the US, NPEs are nonetheless becoming increasingly active in the European patent market. They are: (i) initiating a growing number (and share) of litigation cases against European companies, both in Europe and outside it; and (ii) acquiring an increasing number of European inventions.

2.1. Litigation[12]

Europe is characterized by a complex, decentralized enforcement system, in which each national jurisdiction is empowered to rule on patent litigation cases that impact its territory.[13] This generates major managerial complexity (Mejer and van Pottelsberghe de la Potterie, 2012), especially for US-based NPE patent holders, and may explain, at least in part, the lower presence of NPEs in European courts with respect to their US counterparts (Thumm, 2018).[14] However, although the number of cases of NPE patent litigation in Europe is still relatively low, they have undoubtedly risen, both in absolute and relative terms, and account for a substantial, and largely unrecognized, share of patent litigations.

Using data provided by Darts-IP[15], our analysis covers the period 2010-2017 (note that NPE litigation in Europe is virtually non-existent prior to 2010). The data show that the number of

[12] For the purpose of this study we consider NPEs as legal entities which hold patent rights but do not sell or manufacture goods or services associated with them (i.e., non-operating companies) and which an active offensive assertion role as plaintiffs towards the enforcement of their patent rights (Darts-IP, 2018). Universities, academic institutions and sole inventors/individuals are excluded. To individuate active NPEs, we rely on the list provided by Darts-IP. Together with the information on the name of the single NPE, Darts-IP also gathers information on NPE group-tree structures.

[13] The legal fragmentation of patent protection – with national patents operating under the European Patent Convention – acts as a disincentive to NPEs from carrying out assertion activity on a pan-European scale (Thumm, 2018).

[14] Other reasons include the relative small damages awarded (Mayergoyz, 2009) and different rules governing the payment of the attorney's fees (Love et al., 2016).

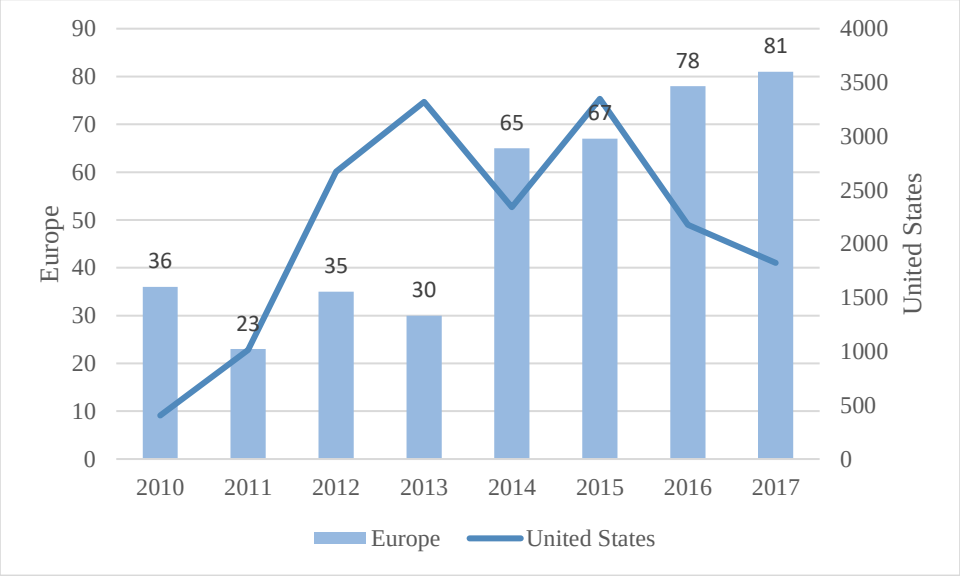
[15] Darts-ip is data provider of intellectual property cases worldwide and it is used on a daily basis by leading law firms, corporate counsel, and courts alike. With over 3 million cases gathered from more than 3,000 courts worldwide, Darts-ip is the largest known database of its kind in the world.

NPE litigation cases has risen over the years: in the period 2014-2017 there were twice as many cases as there were in the first four years covered by our analysis (Figure 1). Moreover, the share of actions (for infringements) started by NPEs over the total number of actions has also increased significantly (Figure 2), from around 5% in the period 2010-2013 to around 13% in the period 2014-2017. Germany, with one in every five actions being brought by an NPE in the period 2014-2017, is by far the country most affected by this trend in Europe, with its nearest 'rival' trailing with less than 6% of cases initiated by NPEs. These differences are attributable to the fact that NPEs (like any other patent holder) can engage in forum shopping[16]: i.e. they can select the jurisdiction in which they believe they will obtain the most favourable judgment in keeping with the strategy they adopt (for example, by requesting an injunction), and where they can reach the easiest settlement (Perkins and Mills, 1996; Gabison, 2015).

The small number of patent litigation cases heard in the UK is due, at least in part, to its notoriously high litigation costs (See Table A1 in Appendix). In contrast, the attraction of the German courts can be explained by the fact that: (1) procedure times are shorter; (2) they appear to be more favourable to NPEs, recording the highest win rates (Darts IP, 2018; Love et al., 2016); (3) their bifurcated system makes it more challenging for the defendant to invalidate the asserted patent(s) before an injunction has been granted; (4) the threat of an injunction being granted appears to be greater than in other European courts (JRC, 2016); and, finally, (5) the relevant industries (ICT) are much more active in Germany (Fusco, 2013). In a recent (14 January 2020) discussion paper published by the German Federal Ministry of Justice[17], the government publicly acknowledged that there are problems with its bifurcated system and with, what is apparently, its system of automatic injunctions and it proposed a number of possible legislative changes in order to provide patent judges with greater discretion when granting injunctions.

[16] Forum shopping occurs "when a party attempts to have his action tried in a particular court or jurisdiction where he feels he will receive the most favorable judgment or verdict". BLACK's Law Dictionary 655 (6th ed. 1990).
[17] https://www.bmjv.de/SharedDocs/Gesetzgebungsverfahren/Dokumente/DiskE_2_PatMoG.pdf?__blob=publicationFile&v=1

Figure 1. Number of NPE patent litigations in Europe and United States (Infringement Actions, 2010-2017)



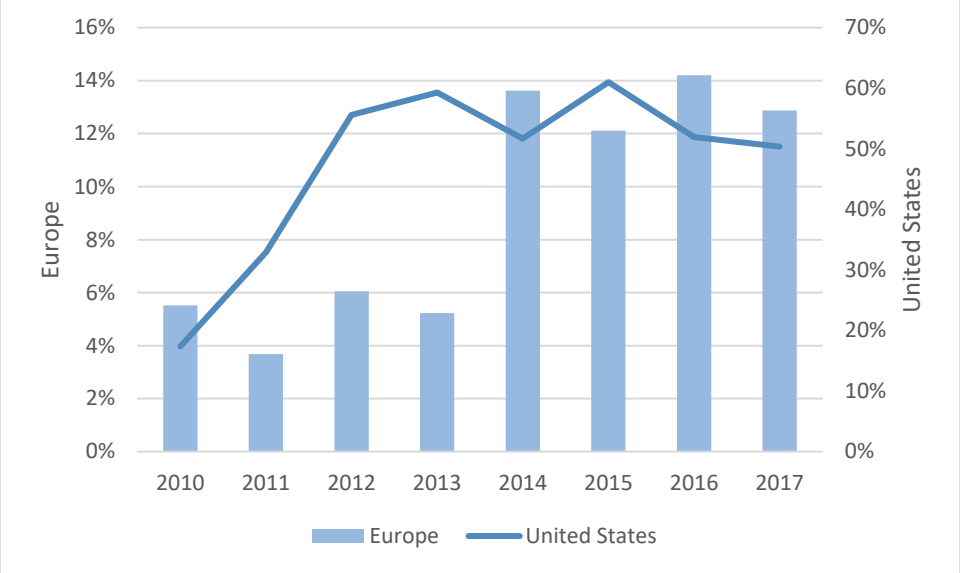
Note: Infringement actions brought by NPEs in European (left scale axis) and US (right scale axis) Courts. Source: Own elaboration based on data from Darts-IP.

Europe's national courts continue to apply different procedural rules and to employ different methods in patent infringement actions (Perkins and Mills, 1996), despite the move towards the harmonization of IP laws throughout the EU. Unified European Patents may change this, and activity in this area needs to be monitored to see if the simplification of European patent litigation actually opens the gates to more litigation.

The relatively low number of NPE patent litigation cases in Europe does not mean that European operating companies are not under threat. Large European manufacturers, when producing on a global scale, are in fact often sued in courts outside Europe. It is a well-known fact that, at least until a few years ago, "United States forums offer(ed) a plaintiff both lower costs and higher recovery" (Weintraub, 1994).[18]

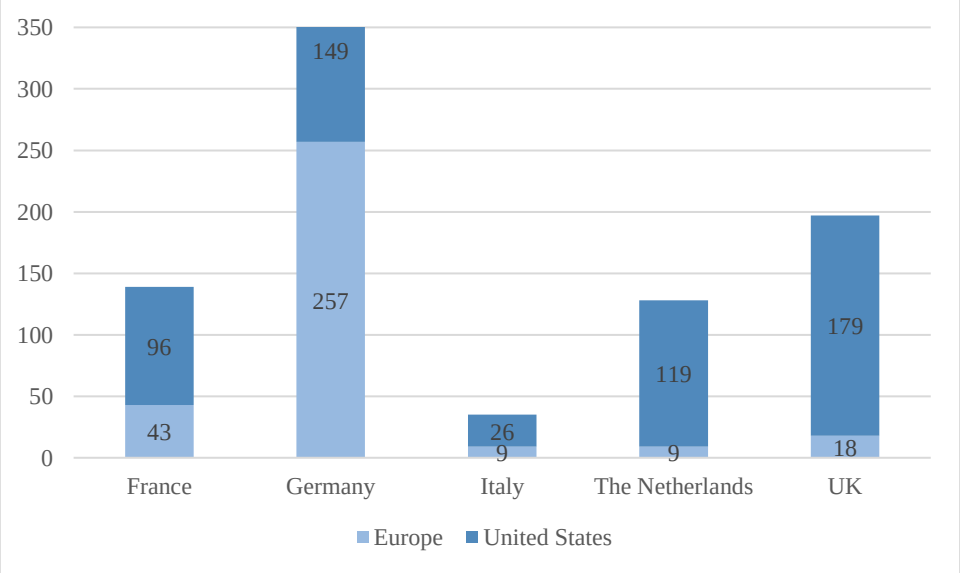
[18] As reported in Stengel and Trautmann (2016, p.2) "Attractive features of the United States legal system include: (1) procedural constructs, including class actions, jury trials, and punitive damages; (2) economic advantages, such as contingent fees and the relative absence of "loser pays" fee-shifting risks; and (3) substantive law, driven by a bias toward domestic law, often viewed as more plaintiff-friendly (in that either claims are recognized by the United States and not in other jurisdictions, like strict liability, or are perceived to require lower levels of proof).

Figure 2. Share of NPE patent litigations in Europe and United States (Infringement Actions, 2010-2017)



Note: Percentage of actions (infringements) brought by NPEs over the total number of actions by jurisdiction (Europe: left scale axis; US: right scale axis). Source: Own elaboration based on data from Darts-IP.

Figure 3. Number of NPE patent litigations involving European companies in Europe and US (Infringement Actions, years 2010-2017)



The figure shows the number of patent litigation cases (for infringement actions) initiated by NPEs against European companies in Europe (light blue bar) and in the United States (dark blue bar). The country (France, Germany, Italy, the Netherlands, and the United Kingdom) identifies the nationality of the alleged infringer. Source: Own elaboration based on data from Darts-IP data.

Figure 3 shows the number of patent litigation cases (infringement actions only) initiated by NPEs against European companies in the years 2010-2017, both in Europe and in the US. It highlights that, with the exception of German companies, European companies have been sued more frequently in the United States than they have in Europe. French companies, for example, have been sued in courts by NPEs on 43 occasions in Europe and 96 in the US; Italian companies have been sued 9 times in Europe and 26 times in the US; Dutch and British companies are nearly always sued in the US. These figures should serve as a wake-up call. Because of the recent reforms and court decisions weakening the NPE business in the US, over the next few years we can expect the NPEs that typically sued European companies in the US to be more likely to sue them in Europe.

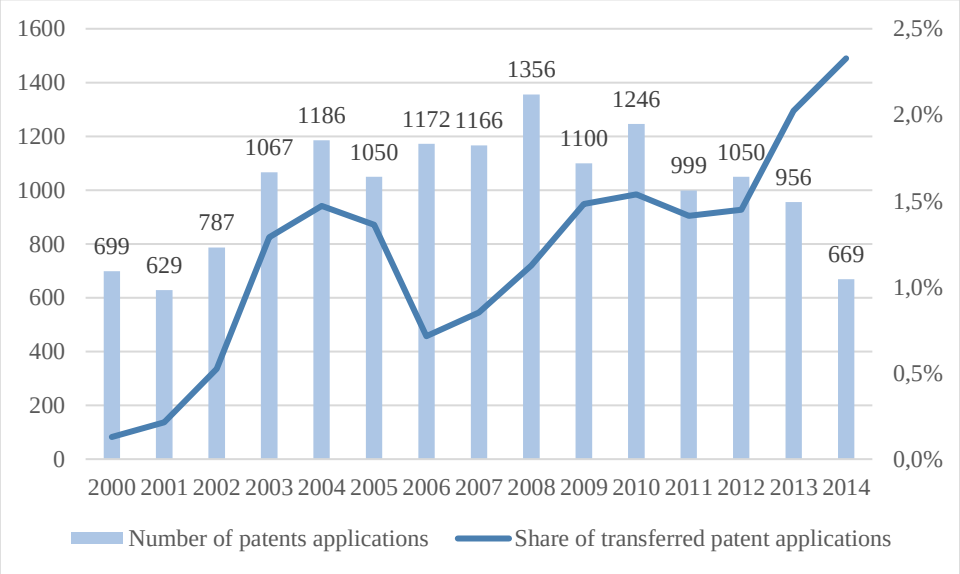
2.2. Patent portfolios[19]

Figures based exclusively on patent litigation underestimate the NPE business: patent litigations are "just the tip of the iceberg" (Scott Morton and Shapiro, 2013, p. 469). Rather than resorting to patent assertion, NPEs are more likely to opt to set royalty demands strategically below litigation costs in order to make the business decision to settle an obvious one (Leslie, 2008). The fact that NPEs bring a smaller number of litigation cases in Europe, with respect to the US, does not mean that NPEs are not active in Europe. The level of investment by NPEs in European assets has increased significantly in recent years, suggesting there will be an upsurge in litigation activity over the next few years. Although, historically, NPEs have held substantially fewer European assets than US ones, things may be changing. For example, in 2015 *WiLAN*, an NPE with its headquarters in Ottawa (Canada), acquired thousands of semiconductor patents from *Qimonda*, a German spin-off of Infineon Technologies. The deal has been described as "*its* most important patent acquisition to date" by *WilAN's* President and CEO, Jim Skippen.[20] More recently, in 2018, another US-based NPE operating in the wireless technology (*Interdigital*) has acquired more than twenty thousand global patent applications from *Technicolor*, a French media and entertainment company. The value of the deal has been

[19] This section is based on data on NPE patent acquisition at the EPO (EP Register, 2015) from Orsatti and Sterzi (2019a). Appendix A2 (Chapter 2) reports the methodology used to identify NPE patents at the EPO.
[20] http://www.wilan.com/news/news-releases/news-release-details/2015/WiLAN-Acquires-Qimonda-Patent-Portfolio-from-Infineon/default.aspx

estimated at $475 million (including an upfront payment of $150 million and 42.5% of the future royalties from *Interdigital*'s licensing activities in the Consumer Electronics field).[21]

Figure 4. Number and percentage of EP patents held by NPEs (year of filing 1997-2012)



The figure shows the number of EPO patents that are held by NPEs by year of transfer. When the application was directly filed by an NPE, the year corresponds to the filing year. The share of transferred patents is defined as the ratio between the number of patents acquired by NPEs and the total number of transferred patents, by year of transfer (3-year average). Transfers that occur after the grant date are not registered at the EP Register. The analysis is restricted to patents filed during the period 1997-2012: data for years 2013 and 2014 do not include patent filings and are not thus comparable to previous years. Source: Own elaboration based on data from the EP Register (2015) and Orsatti and Sterzi (2019a). See Appendix A2 (Chapter 2) for a description of the methodology used to identify NPE patents at the EPO. Data on year 2014 can be incomplete.

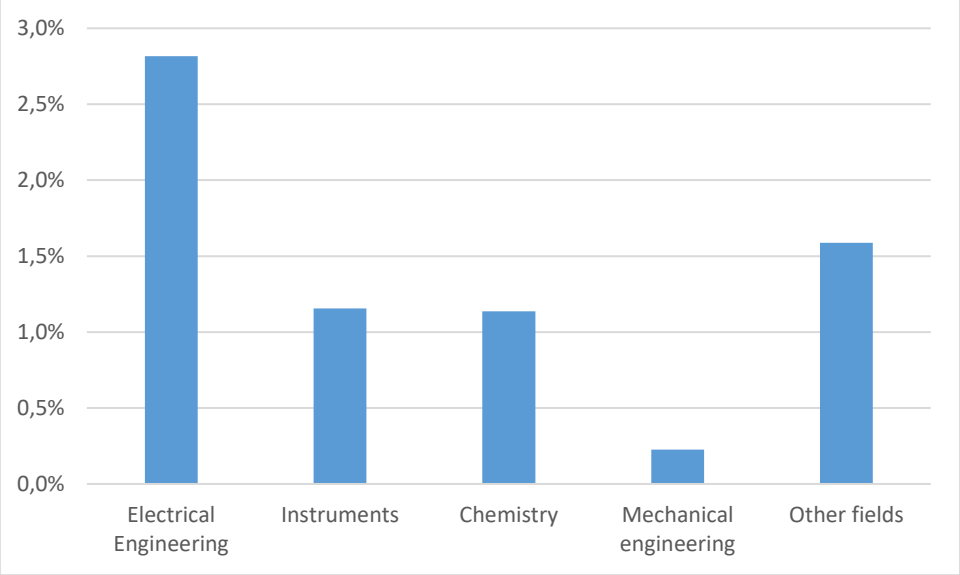
The size of European assets in NPEs' patent portfolio would be a better indicator of their interest into Europe, than the mere counting of the court actions. Unfortunately, identifying with any precision the patents held by NPEs, both at national patent offices and at the European Patent Office (EPO), is practically impossible, as we show in the next chapter. First, each national patent office operates a different policy with regards to the obligation to register changes in patent ownership (and the categorization of these patents). Second, the EPO does not make patent reassignments public after the grant.[22] Bearing in mind this limitation, Orsatti and Sterzi

[21] See https://www.reuters.com/article/us-technicolor-sa-interdigital-us-acquis/technicolor-sells-its-patent-licensing-business-to-interdigital-idUSKCN1GD61O and https://www.technicolor.com/news/technicolor-has-received-binding-offer-its-research-innovation-activity-interdigital

[22] As is discussed below in Section 3, "Up to grant of the European patent, transfers, licenses and other rights in respect of European patent applications are registered centrally in the European Patent Register in accordance with

(2019a) find that NPEs appear as patent holders of more than 14,000 patent applications filed at the EPO from 1997 and 2012, and transferred up until 2014. Figure 4 shows the number of patents acquired or filed by NPEs per year and the share of patent applications acquired by NPEs over the total number of transferred patents by year of transfer. The number of patents acquired or filed by NPEs rises from an average of about 870 per year in the first five years covered by the analysis (2000-2004) to about 1,400 in the last five years (2008-2012)[23], corresponding to an increase of about 60%.

Figure 5. Share of NPE-acquired patents at the EPO in different technological fields



The figure shows the share of transferred patents acquired by NPEs for different technological fields. Only patent acquisitions registered in the years 2009-2013 are considered. See Appendix A3 (Chapter 2) for details about the IPC-Technology Concordance Table. Transfers that occur after the grant date are not registered at the EP Register. Source: own elaboration based on data from the EP Register (2015), Orsatti and Sterzi (2019a), and OECD Patent Quality Database (ver. 2017).

The contribution of NPEs as patent buyers to patent transfers increased sharply from the early 2000s onwards (see Figure 4), rising from about an average of 0.5% to about 2% after 2012. The most targeted technology is Electrical Engineering, with 2.8% of transferred patents (See

Rules 22 to 24 EPC. After grant of the European patent, a transfer is registered in the European Patent Register only during the opposition period or during opposition proceedings, in accordance with Rule 85 in conjunction with Rule 22 EPC" https://www.epo.org/law-practice/legal-texts/html/natlaw/en/ix/index.htm.

[23] Figures for years 2013 and 2014 do not include patents filed by NPEs and are thus not comparable to previous years.

Figure 5). In the Appendix (A3, Chapter 3), we show the evolution of the shares of transferred patents to NPEs for different technological fields.

2.3. Are the United States and Europe converging?

There is no doubt that the US patent system has traditionally been more conducive for NPE activities than the European system. The prevailing belief is that Europe is a less profitable hunting ground for NPEs because of the combination of higher barriers to patenting software and business methods, lower litigation costs for defendants (Helmers et al., 2014), smaller damages awards and, in particular, more frequent attorney-fee awards (Love et al., 2016). Until a few years ago, most companies (NPEs included) seeking to assert a patent family would have said the US was the obvious location in which to pursue enforcement activities.

However, the situation has been changing significantly. The recent combination of court decisions and legislative changes in the US has weakened some of the leverage that NPEs can use when monetizing their patents in the US, and accounts for the increasing presence of NPEs in Europe.

First, in *eBay Inc. v. MercExchange, L.L.C.* (2006) the Supreme Court determined that an injunction should have not been automatically issued based on a finding of patent infringement. Commentators[24] consider the eBay case a response by the Court to the NTP settlement and that the court was influenced by MercExchange's business model (Clugston and Kim, 2017). The court held in fact that "the public does not benefit from a patentee who obtains a patent [and] yet declines to allow the public to benefit from the inventions contained therein".[25] Second, in *Octane Fitness v Icon Health & Fitness* (2014), the Supreme Court handed district courts more discretion in awarding attorneys' fees, a step that was widely seen as lowering the bar for when fee-shifting[26] might occur. Unlike in the EU, where fee-shifting has formed part of the legal system for centuries (*English Rule*), in the US each party is, in general, responsible for paying its own legal fees (*American Rule*). Fee-shifting can be adopted only in exceptional cases. The Supreme Court's decision in *Octane Fitness v Icon Health & Fitness* made it easier for courts

[24] See Dolak and Bettinger (2008) and Holte (2014).
[25] The Supreme Court's decision in *eBay Inc. v. MercExchange, LLC* has subsequently been cited in two district court cases denying an NPE permanent injunctive relief because of the "economic nature of the patent holder" (Jones, 2006).
[26] The fee-shifting system (sometimes known as the 'English rule') establishes that the losing party pays the successful party's legal costs (including lawyers' fees).

to make the loser pay for all attorney costs (especially when the lawsuit is regarded as frivolous).[27] Since fee-shifting has largely been seen as the primary motive for the greater presence of NPEs in the US than in Europe (Love et al., 2016), the Court's decision is expected to have a significant impact on NPE business in the US. Third, in *TC Heartland LLC v. Kraft Foods Group Brands LLC* (2017) the Supreme Court discouraged forum shopping in the US – i.e. the practice of systematically targeting specific courts to maximize the probability of a favorable judgment – by ruling that patent infringement cases must be heard in the district within which the defendant is incorporated or in which the defendant has a regular place of business (Thumm, 2018). In the US, at the time of the Supreme Court's decision, the court most frequently targeted by NPEs was the Eastern District Court of Texas, accounting for more than 40% of NPE-initiated cases between 2007-2017 and presenting the highest NPE success rate (Ansell et al., 2018). Conversely, only 7% of cases initiated by practicing entities were litigated in the Eastern District Court of Texas (Cohen et al., 2019). The choice to initiate a lawsuit in this Court is seen as an opportunistic strategy (Cohen et al., 2019) with many patent holders seeking only to engage in activities in an area that has "a meager population and is home to neither major business nor metropolitan areas" (Taylor, 2006, p. 570).

In addition to these court decisions, several US legislative changes have also been proposed and adopted in order to make patent infringement litigation less attractive. For example, the 2011 AIA included provisions to improve transparency in the patent market: according to the new regime, petitioners before the Patent Trial and Appeal Board ("PTAB") for post grant review ("PGR") or inter partes review ("IPR") must identify all real parties-in-interest in order not to have their petition denied or dismissed. These rules act as an incentive to transparency by limiting a PTAB petitioner's ability to use hidden ownership information to file multiple challenges to a patent at the PTAB (Anderson, 2015).[28] More importantly, the AIA also impacted the "joinder rule", aimed at reducing the NPE economies of scale based on suing simultaneously multiple alleged infringers. Prior to the AIA, joining multiple defendants in a single lawsuit allowed NPEs targeting many small businesses at once (Liu, 2012).[29] More

[27] In *Octane Fitness v Icon Health & Fitness*, the court criticized the Federal Circuit's standard as one that was "unduly rigid and impermissibly encumbers the statutory grant of discretion to district courts". Rather, it held that "an 'exceptional' case is simply one that stands out from others with respect to the substantive strength of a party's litigating position (considering both the governing law and the facts of the case) or the unreasonable manner in which the case was litigated" (IAM, May 2016).

[28] See for example the case of *RPX v. Virnetx* as reported in Anderson (2015).

[29] Feldman et al. (2013) reported that the number of defendants sued by patent monetization entities fell slightly from 2011 to 2012.

recently, the propositions contained in the *Innovation Act* (2013) are seen as a step forward in weakening the NPE business, by requiring a higher standard of specificity in complaints. Plaintiffs of a patent infringement lawsuit are required to be explicit about the identification of patent claim allegations and to provide details about the alleged infringing conduct (Carlon, 2017).

The growing number of patents being acquired by NPEs in Europe can be seen, therefore, as an initial response to the changing environment faced by NPEs in the US. Moreover, the soon to be introduced Unitary Patent (UP) and Unified Patent Court (UPC), as well as the growth of high-tech markets in the European Union (Bartels, 2018), are further expected to modify the incentive structure for NPEs and, consequently, make Europe even more attractive to these entities, changes that should merit the attention of EU policy makers.

3. Lack of ownership transparency

3.1. The *notice* function of the patent system

Patents are key to innovation insofar as they serve a dual role. On the one hand, they grant exclusivity for a specified time period to inventors that can demonstrate they have created something novel. By so doing, they in fact provide a strong monetary incentive to innovate. Patent protection can thus foster innovation by increasing the opportunities an inventor has to bring new products to the market. On the other hand, by encouraging inventors to disclose their inventions to the public, patents benefit innovation and subsequent innovators by disseminating technical information.[30] This *notice* function enables a more efficient investment in innovation by stimulating further innovation, reducing useless duplicate innovative effort and limiting wasteful litigation.

In real estate markets, notices do not pose a serious problem for property development: land boundaries are recorded in publicly accessible and state-administered record offices. Since landowners can usually find out who their neighbours are, potential investors can buy the rights before making an investment and, thus, avoid trespass (Menell and Meurer, 2013). In intangible asset markets, however, notice is very much an issue: the scope of patents is not clear, they are often written in vague language, and technology companies cannot easily find them and understand their claims. Moreover, these *information gaps* are further exacerbated by the inadequate disclosure of the information concerning who ultimately holds the rights to the patent.

However, implicit to the structure of the patent system is the concept that someone willing to license a patent can identify those who hold the necessary rights: indeed, identifying those that have a financial interest in the patent provides a small, but essential, step in guaranteeing the communication of adequate knowledge for the players in the field (Feldman, 2014).

The patent system is predicated on notice and it applies a form of strict liability to those who would trespass (Feldman, 2014). Operating firms that make, use, or sell a product protected by a patent are liable for patent infringement, regardless of whether they independently invented it or whether they had any direct knowledge of the patented invention. Operating firms are, in fact, supposed to undertake broad *patent clearances* and, subsequently, license all the

[30] Without patent protection, inventors might prefer to keep their inventions secret, for fear that their competitors' actions might cause them to lose control over them.

intellectual property rights they need to develop their products or associated inventions. However, because of the vast number of active patents, the unclear patent boundaries and the patent market's lack of transparency, such patent clearances are burdensome (Macdonald, 2004; Menell and Meurer, 2013; Le Bas and Penin, 2014).

> "*[To check a patent] is not an easy task given the millions of issued patents (plots of intangible real estate). Unlike real estate maps, [patent] records are not organized geographically. […] The PTO's classification system was (and remains) outdated and does not deal well with cutting edge technologies for the simple reason that it is difficult to "map" intangible terra incognita. […] Furthermore, the proliferation of digital technology patents creates countless new neighbors, often with fuzzy, multidimensional boundaries*" (Menell and Meurer, 2013, p. 2)

Menell and Meurer (2013) coin the term patent "*notice failure*" to refer to informational problems related to patents that concern both the inherent ambiguities in the scope of property rights and the lack of transparent patent ownership. As regards to the latter, notice failures arise when the private returns to providing notice information are less than the social value. This occurs mainly for two reasons: first, because providing notice is perceived as an extra administrative cost and a waste of financial resources; and, second, because the patent holders might benefit when a third-party infringes their rights.

Notice failure thus creates room for NPEs to enter the patent market and negotiate licensing agreements after specific technologies have been adopted by third parties (*ex-post licensing*). Property rule mechanisms, such as *injunctive reliefs*, can even provide the patent owner with much greater bargaining leverage, in cases when the presumed infringer has already sunk substantial resources into developing a product or process (Reitzig et al., 2007; Lemley and Shapiro, 2006; Magliocca, 2006; Fisher and Henkel, 2012; Ard, 2018).

3.2. Information gaps in the patent market

When the notice function is poorly served, innovators waste both their resources and time searching and navigating the patent system instead of innovating. To be optimal, a patent regime should provide low-cost notice about the existence, scope, and ownership of patent rights (Feldman, 2014). Unfortunately, the current patent system in many countries falls well short of the ideal, even in the provision of information as basic as patent ownership.

Problems with obscure patent ownership arise in general in the shadow of litigation. As a consequence of the lack of patent ownership transparency, the IP ecosystem today faces four main problems (Anderson, 2015; Scott Morton and Shapiro 2013):

1. **Discouraging preclearance**: innovators cannot easily determine the relief features of the patent landscape in which they wish to operate, thus limiting their freedom to operate. In contrast, by providing valuable information about the relevant parties and technologies in a given area, clear patent ownership can accelerate the freedom-to-operate analysis.
2. Higher licensing costs due to **incomplete licenses**: patent holders (NPEs in particular) often demand royalties without disclosing the contents of the portfolio they are offering to license. This creates difficulties for the potential licensee in determining a reasonable royalty for the portfolio (Scott Morton and Shapiro, 2013). In addition, affiliates of NPEs may send several demand letters to the same target using different affiliates (thus asserting similar patents more than once).
3. **Distorting market transactions**: by preventing disclosure of the ultimate purchaser of a patent portfolio, a patent buyer can place the seller at a major disadvantage during negotiations and, thus, distort the market for the value of the negotiating rights. For example, in the case of a seller being a producing company, such agreements could have the undesired result of granting the license to a competitor with whom the seller would rather not have negotiated a license.
4. **Litigation abuse**: by concealing the ownership of the patents acquired in the market, NPEs can study the business of the target and time the lawsuit to cause a disproportionate amount of harm (Scott Morton and Shapiro, 2013). For example, NPEs may behave opportunistically by suing firms with large cash holdings or that have recently accumulated large amounts of cash (Cohen et al., 2016, 2019), sometimes just

prior to the target's IPO or other funding event (Scott Morton and Shapiro, 2013). In contrast, innovators are typically unarmed, lacking patent ownership information and facing problems to assess the litigation risks. Patent holders are thus in the enviable position of being able to exert an influence on the market that is entirely disproportionate to their patent's contribution to it (Lemley and Melamed, 2013; Feldman 2013).

One particular value of the patent notice is that it can facilitate technology transfer. In today's knowledge based-economy the skills needed to develop inventions have become increasingly separated from the skills needed to commercialize them (Arora et al., 2001). The globalization of markets and the increasing complexity of technologies often require more than one firm to successfully introduce an innovation into the market. For this reason, since the beginning of the 20th century, many small- and medium-sized enterprises have made a profitable business as specialist suppliers of technology to larger manufacturing firms. The result of this is that many patents that would not have been used in the past are now being separated out from the underlying products and transferred in the form of tradable rights (Jeruss et al., 2012; Feldman 2013, 2014; Ewing and Feldman, 2012). Against this backdrop, an effective patent notice would require (*at least*) that the potential licensee (or buyer) of the patented invention could easily identify those holding the necessary rights. However, this is often not the case. There are two reasons for this. First, firms are not required to give prompt notification of a change in patent ownership to patent offices. Second, patent owners (NPEs in particular) set up shell companies and dormant companies to hide patent ownership.

Patent offices

Patent offices generally impose rules that require the original applicant to provide accurate patent ownership information when the original application is filed. Non-compliance leads to negative consequences, such as the refusal of a patent. However, after filing, the rights can be transferred to another party: there is no limit to the number of times that the ownership of a patent can change. Depending on the patent office, these changes may not have to be registered or, if they are, their registration may be delayed. This means that information as to who *currently* owns the patent available to the public may be incorrect.

At the USPTO, the recording of an entire or partial patent assignment is not mandatory, there being no express legal requirement for parties to disclose assignments. However, by patent statute, failure to record an assignment at the USPTO renders it null and void against any subsequent purchaser or mortgagee (Marco et al., 2015a).[31] This means that a subsequent transaction would prevail over an earlier transaction and that the former acquirer would lose the rights to the patent. At the same time, the patent statute does not impose a fixed period for registration but it does require filers to register within three months of the execution date, or before the next assignment, to secure protection against subsequent purchasers (Marco et al., 2015a). For this reason, commentators have raised concerns that current requirements for the registration of a change of patent ownership, as imposed by the USPTO, are insufficient. As Gorbatyuk and Kovacs (2019) point out, the USPTO itself has acknowledged the limitations of the current system of rules for recording ownership change when it reports that "[…] the USPTO simply puts the information on the public record and does not verify the validity of the information. Recordation is a ministerial function – the USPTO neither makes a determination of the legality of the transaction nor the right of the submitting party to take the action".[32]

In Europe, since events concerning the life of European patents may be recorded in different registers, tracking reassignments of European patents becomes an added challenge (Ciaramella et al., 2017). At the EPO, changes in patent ownership are only registered at the European Patent Register during the pre-grant stage:[33]

> *Up to grant of the European patent, transfers, licenses and other rights in respect of European patent applications are registered centrally in the European Patent Register in accordance with Rules 22 to 24 EPC.*

[31] "An assignment, grant, or conveyance shall be void as against any subsequent purchaser or mortgagee for a valuable consideration, without notice, unless it is recorded with the Patent and Trademark Office within three months from its date or prior to the date of such subsequent purchase or mortgage." 35 U.S.C. 261 (2015).
[32] See http://assignment.uspto.gov.
[33] In the Appendix we show the frequency of ownership change events (re-assignments), relative to the grant date, at the USPTO and EPO. USPTO keeps track of the ownership change after the grant, whereas this is not the case with EPO as emerges from our data. At EPO, the majority (~80%) of registered re-assignments concern applications that were still in examination procedure around the grant date.

> *After grant of the European patent, a transfer is registered in the European Patent Register only during the opposition period or during opposition proceedings, in accordance with Rule 85 in conjunction with Rule 22 EPC.*[34]

Thus, a third party cannot be certain that the registered owner is the actual owner of the patent registered at the EPO, unless this party searches (when possible) in the national registers. However, each national patent office has different legal requirements, which further complicates matters.

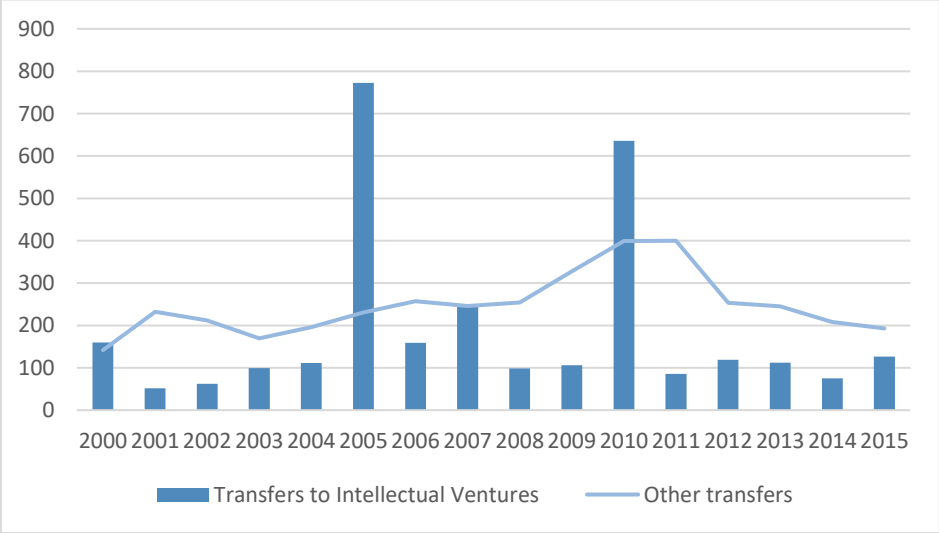
For example, in the UK, as reported by Ciaramella et al. (2017) and Lex Mundi[35] report (2012), patent holders have a strong incentive to register within six months since a party who does not do so "cannot claim costs or expenses in proceedings for an infringement that occurred before registration of it, unless he can satisfy the court that it was not practicable to register it in that period and that the transaction was registered as soon as practicable afterwards (Patents Act 1977, s. 68)". However, in France and in Germany patent holders have the incentive to register the transfer in order to gain legitimacy to interact with the patent office and the courts (Ménière et al., 2012; Gaessler, 2016). "[…] Patent transfer contracts shall only be enforceable against third parties from the time when they are registered. This implies, inter alia, that infringement damages cannot be obtained for the period after the contract but prior to the registration" (Ménière et al., 2012).[36] However, both the INPI (French Patent Office) and DPMA (German Patent Office) do not impose a strict time period for recording, so that the patent holder may potentially signal the property change at any time (for example, immediately prior to initiating a lawsuit).

Despite these differences in the legal requirements for recording patent reassignments, all patent offices are affected by the same drawback: no time pressure is placed on patent buyers to register the transaction, so that recordation may be done only when it is absolutely necessary. For example, Ewing and Feldman (2012) describe a case in which *Intellectual Ventures* the largest NPE in terms of the number of patents acquired in the US,[37] recorded a patent

[34] https://www.epo.org/law-practice/legal-texts/html/natlaw/en/ix/index.htm.
[35] http://www.lexmundi.com/lexmundi/default.asp.
[36] See Gorbatyuk and Kovacs (2019) for a comparative legal analysis of the requirements in six different patent authorities (USPTO, JPO, INPI, DPMA, UK IPO, and EPO) concerning the recordation of patent re-assignments.
[37] Orsatti and Sterzi (2019b) show the top 20 NPEs by number of patents acquired at the USPTO over the period 1990-2014.

assignment at the USPTO 2,506 days after the agreement execution date, meaning that *Intellectual Ventures* could not be recognised as the owner of the acquired patent for a period of almost seven years. This is highly unusual as we would expect NPEs to register the transfer the moment they decided to use the acquired patents for monetization purposes, unlike other types of patent buyer. Our analysis of patent transfers at the USPTO based on US Patent Assignment Database (Marco et al., 2015a; Graham et al., 2018) shows that, conditioning on the transfer being registered, *Intellectual Ventures* always registers patent ownership earlier than the other (patent) buyers at the USPTO, with the exception of two specific years, suggesting that *Intellectual Ventures* has full discretion in deciding when to register the transfer (see Figure 6).

Figure 6. Time lag from executed conveyance to USPTO recording (*Intellectual Ventures* vs other buyers)



Note: Recording lag (expressed as the time from execution date to recordation date, in days) at the USPTO. The first transfer was not included in the analysis since it often refers to a within-firm transfer from inventing employees to their employer assignees (Marco et al., 2015). Transfers to Intellectual Ventures include transfers to their affiliates (identified thanks to data provided by Darts-IP and from information retrieved from various web resources, including PatentFreedom, IP-Checkups and PlainSite). Source: Own elaboration based on US PAD Database (Marco et al., 2015a; Graham et al., 2018).

The use of shell companies

Even when the change of ownership is properly recorded and disclosed to the public, this information may be insufficient to identify who owns the rights to assert the patent and the real

parties in interest. Patent owners do not really have to avoid registering the transfer in order to keep the transaction hidden. They can simply transfer rights sufficient to assert a patent short of formally transferring ownership, as in the case of an exclusive licence (Feldman, 2014). Or, depending on company and fiscal legislation, they can make use of holding companies (shell and dormant companies) to buy patents, thus making it difficult for potential licensees to identify the actual owner of the patents they need (Scott Morton and Shapiro, 2013). A well-documented example of an NPE using a large number of shell companies is provided by *Intellectual Ventures*. Darts-IP identifies almost two hundred entities linked to *Intellectual Ventures* that appear as plaintiffs or defendants (mainly in patent opposition and invalidity cases) in patent litigation cases, while the overall number of shell companies used to acquire and hold patents exceeds 2,000.[38] Secrecy in business transactions is especially valuable for those who hold information to which others do not have access; this is explicitly justified and acknowledged by *Intellectual Ventures*.[39] Not surprisingly, the majority of NPEs do not in fact divulge the precise nature and extent of their patent portfolios.[40]

The use of shell companies for patent acquisition is prone to litigation abuse, and it has been widely criticized to the point that in the press release accompanying the 2013 Executive Action, the White House discusses it openly:[41]

> "*Patent trolls often set up shell companies to hide their activities and enable their abusive litigation and extraction of settlements. This tactic prevents those facing litigation from knowing the full extent of the patents that their*

[38] https://www.plainsite.org/tags/intellectual-ventures-shell-companies/

[39] As reported by Feldman (2014), during the 2012 FTC/DOJ Workshop on patent assertion entities a representative of Intellectual Ventures argued: "We spend a lot of money and a lot of effort figuring out where to invest. And we don't feel like tipping our hands on our investment policies and our investment intentions to our competitors. Warren Buffett doesn't tell people where he's investing until he's forced to when he's practically ready to take over a company. Disney doesn't tell people when it[']s buying swamp land in Florida that, hey, we're planning to put a theme park over there". Fed. Trade Comm'n & U.S. Dep't of Just., Patent Assertion Entity Activities Workshop Transcript 62–63 (Dec. 10, 2012), available at http://www.ftc.gov/sites/default/files/documents/public_events/Patent%20Assertion%20Entity%20Activities%20Workshop%20/pae_transcript.pdf.

[40] One exception is *France Brevets*, a NPE founded by the French government in 2011, that has the exclusive license from Inside Secure (now *Verimatrix*) and *Orange* on NFC (Near Field Communication) patents. In its NFC Licensing Program, France Brevets has made public the list of patents they monetize. https://www.francebrevets.com/en/10-programme-de-licence-nfc

[41] Press Release, The White House Office of the Press Sec'y, Fact Sheet: White House Task Force on High-Tech Patent Issues (June 4, 2013), http://www.whitehouse.gov/the-press-office/2013/06/04/fact-sheet-white-house-taskforce-high-tech-patent-issues.

> *adversaries hold when negotiating settlements, or even knowing connections between multiple trolls*." The White House, Press Release (2013)

In these corporate structures, there is no central entity or individual to be held accountable. Moreover, shell companies not only enable patent holders to keep the patent acquisition unknown until the optimal time to litigate (usually when a company has made irreversible investments), but they also create additional information asymmetries during the negotiations and in court. Depending on the country, a patent holder can sue alleging infringement of a particular patent without providing many more details. Companies who receive patent demands from shell companies find it extremely challenging to dispute the validity of the underlying patents and to evaluate the appropriateness of the demand against them.[42]

The fact that defendants cannot easily identify who is asserting the patents against them creates *bargaining asymmetries*, which constitute the source of the economics of patent assertion (Chien, 2010). Indeed, economic theory suggests that NPEs keep the contents of their portfolios secret because secrecy is more profitable than transparency (Scott Morton and Shapiro, 2013). This is true for three reasons. First, since accused infringers cannot clearly determine all of the parties involved in the patent, nor identify other parties that may have been targeted, their bargaining power is undermined (Scott Morton and Shapiro, 2014). Second, by making competitors unaware of the true extent of their assets, NPEs can easily avoid pre-emptive actions (such as Inter-Partes Review in the US or oppositions at the EPO) by any adversaries. Third, when patent defendants are small players, with low IP management skills, they may settle and make multiple payments to what is essentially the same entity (Scott Morton and Shapiro, 2013; Feldman, 2013, 2014). Feldman refers to this strategy as "unbundling":

> "*With unbundling, an entity takes a group of related patents, separates them out, and transfers different ones to different monetizers. As a result, a product company must face multiple demands from different assertion entities. […]*

[42] The *Xilinx v. Invention Investment Fund I LP* case reported by Feldman (2014, p.292.) is illustrative of this problem. As a reaction to the litigation case brought by Invention Investment Fund, Xilinx filed a declaratory judgment action challenging some of the patents asserted against it. However, some of the parties that Xilinx named were discharged by the judge, for the simple reason that the owners of the patents were not those identified by Xilinx.

> *Unbundling allows the entity that originally divided the group to magnify its return, either by retaining rights to a share of the profits or simply by virtue of the fact that the sale price of each decoupled patent reflects its settlement value*." Feldman (2013, p. 263)

The use of shell companies to obfuscate patent ownership is not peculiar to large NPEs, such as *Intellectual Ventures* and, to a lesser extent, *Acacia Research Group*.[43] Indeed, a large number of NPEs of varying configurations actually use shell companies for patent monetization. As we show in our first case study, thousands of patents are held by registered dormant companies in Europe – that is, companies that do not produce or invent anything, nor generate revenues or pay taxes – with the aim of obfuscating patent ownership and avoiding having to nominate someone to hold accountable. Dormant companies in the UK hold between 1£-100£ in capital, are directed by proxy directors (so as to maintain in anonymity the real individuals behind the company) and often have no website or contact details. Moreover, they make no effort to advertise their products or services. In the second case study, we describe the business model developed by Dragon Green Development Balboa SA (DGDB), as an example of a small NPE built around a large network of dormant companies. Based in an offshore country (the Republic of Panama), DGDB makes extensive use of dormant companies in the UK for acquiring, holding and litigating patents.

[43] *Acacia* "invests in intellectual property and related absolute return assets and engages in the licensing and enforcement of patented technologies" (https://acaciaresearch.com). According to the non-profit organization PLAINSITE (https://www.plainsite.org) *Acacia* has 167 shell companies, while for Darts-IP more than 200.

4. The impact of the NPE business model(s)

4.1. The NPE business model

The usual NPE business model involves filing and, primarily, purchasing patents (sometimes in large numbers) to obtain revenues by licensing and asserting them without any conventional lines of business (Scott Morton and Shapiro, 2013). However, not all NPEs operate in the same way. This definition encompasses firms that act mainly as independent distributors and patent brokers (acquiring patents from inventors and licensing the rights to commercializing entities) as well as firms that assert patents as their primary business model. In both cases, NPEs invest in IP assets that allow them to exploit their comparative efficiency advantage in deploying and enforcing patents (Steensma et al., 2016).

Critics accuse NPEs of wasting resources that could otherwise be used for innovative activities, extorting excessive licensing fees from alleged infringers through the threat of permanent injunction, asserting dubious patents and decreasing competition. This view is one shared by the Obama administration, which accused NPEs "[of focusing] on aggressive litigation, using such tactics as: threatening to sue thousands of companies at once, without specific evidence of infringement against any of them; creating shell companies that make it difficult for defendants to know who is suing them; and asserting that their patents cover inventions not imagined at the time they were granted" (Executive Office of the President, 2013, p.1). Unlike patent intermediaries that generate revenues through licensing fees and which consider patent transparency to be a fundamental pillar of the patent ecosystem, some NPEs mask their identity and assert patents for the sole purpose of extracting settlement fees.

Most NPEs, however, claim to see themselves as the defenders of the small inventor, "fighting an uphill battle to protect [the inventors'] hard-earned intellectual property from being stolen" by corporate titans.[44,45] Supporters of the NPE business model(s) argue that by focusing on the enforcement of patent rights NPEs may be considered useful because they can deter free-riders. This would provide a market in which inventors may profit, improve market liquidity, increase incentives to invest in research and development, help small and medium-sized companies to monetize the value of their patents, and, finally, encourage competition and innovation.

[44] Seidenberg (2006, p. 51), as cited in Jones (2006).
[45] For example *France Brevets*, the French government sponsored NPE, claims on its website that their "mission is to support companies/businesses in the monetization of their innovations by structuring their intellectual property and defending it world wide". Source: https://www.francebrevets.com/en (last visited Jan. 31, 2020).

In general, depending on their particular business model, NPEs can reduce frictions in the patent market or, on the contrary, exploit and exacerbate them (Penin, 2012). On the one hand, when an innovation has several commercial applications or requires access to multiple fragments of knowledge controlled by diverse patent owners (typical of technology sectors), NPEs may efficiently allocate IP rights and increase the use of the technology they acquire (Steensma et al., 2016). In addition, by seeking out free-riders and enforcing valid patent rights, NPEs force free-riders to internalize some of the costs associated with copying, thereby enabling end-inventors to obtain remuneration from which they might otherwise be precluded (McDonough, 2006). Because of their specialization in patent monetization, NPEs may in fact easily reach a minimum efficient scale in patent assertion, a possibility that is usually beyond the reach of small inventors (Steensma et al., 2016).

On the other hand, some infringers actually have no prior knowledge of the infringed patent before the infringement action is initiated, on some occasions because these patents have been deliberately kept hidden by the NPE and on others because the alleged infringers have considered them to be marginal.[46] Moreover, because of the large volume of patents in the ICT industry, many of which are of dubious quality, ICT companies routinely ignore patents and independently develop the requisite technologies themselves (Lemley, 2008). In this sector, as, in general, in all the complex technologies (Orsenigo and Sterzi, 2010), the widespread ownership of potential relevant patents renders patent clearance infeasible as a practical exercise (Lee and Melamed, 2015).

While patent enforcement might benefit the patent system by restoring efficiency through requisite enforcement activities, it is clearly not the case if it is driven by opportunistic behaviour and in case of notice or market failure, such as in case of lack of patent ownership transparency and unclear patent boundaries (Bessen and Meurer, 2005; Lemley and Shapiro, 2006). In addition, NPEs have been accused of bringing nuisance lawsuits when no infringement has occurred, seeking quick, lucrative settlements on frivolous patents, relying on what scholars have defined as "patent nuisance fee economics" (Chien, 2012). As the costs that the alleged infringers have to meet may exceed the cost to assert, it is often cheaper to settle than to pay litigation expenses, even if the case appears to be weak (Schwartz, 2012), with the

[46] For example, even when a manufacturer knows that it might be infringing a given patent, it may initiate production if the patent owner is considered "non-litigious" (for example when the patent owner is a competitor and a cross-licensing agreement has been signed), not knowing that the patent(s) may, at some point, have been transferred to another entity (Reitzig et al., 2007).

result that patent holders often bargain for compensation far beyond the economic value of the right (Feldman, 2013). The nuisance fee model typical of NPEs is further strengthened by the fact that NPEs are not exposed to the threat of injunction, as they do not practice the invention. Conventional market remedies (for example, cross licenses) are thus ineffective in preventing NPEs from pursuing hold-up strategies (Lu, 2012). On the contrary, the prospect of an injunction (or exclusion) can make patent litigation highly unattractive to practicing firms, influencing the negotiated outcome.[47] NPEs thus have a strong incentive to devise large and credible "outsized" threats, which allow them to make even the assertion of weak patents profitable.

4.2. Empirical evidence

Opportunistic behaviour

The empirical evidence on NPEs, taken as a whole, supports the conclusion that enhanced monetization by NPEs discourages downstream innovation; however, it provides mixed results concerning the hypothesis of their "opportunistic" behaviour.

On the one hand, NPEs are accused of exploiting and exacerbating the information frictions that characterize the patent system. First, available evidence indicates that NPEs buy and litigate their patents late in the patent life (Fischer and Henkel, 2012; Orsatti and Sterzi, 2019a, 2019b), suggesting they wait until a lucrative industry has developed before filing suit, rather than facilitating technology transfer to firms better positioned than them in the market. Second, there is evidence that cash is the main correlate of NPE litigation. Feldman and Frondorf (2015), in a survey of in-house legal staff of 50 product companies characterized by initial public offerings (IPOs) between 2007 and 2012, found that 40% of respondents had received patent demands at the time of their IPOs, with these demands coming mainly from NPEs. Similarly, Cohen et al. (2016; 2019) reported that NPEs frequently sue firms with large cash holdings or which had recently accumulated large amounts of cash; in contrast, cash is found not to be a key driver of IP lawsuits by practicing entities. NPEs have also been found to target cash in business

[47] This explains the increasing partnerships between large practicing entities and NPEs. The former have an incentive to assign their patents to NPEs for monetization purposes without risking their reputation or the possibility of counterclaims. According to our data on US patent transactions, we observe the increasing importance of large companies as a source of NPE patents. Before 2010, patents acquired from large companies represented fewer than 10% of the total patents acquired by NPEs, while after 2010 this share increased to more than 30%.

segments unrelated to alleged infringements with essentially the same frequency as they target cash in segments that are related to alleged infringements (Cohen et al., 2019). Third, NPEs hold and frequently litigate patents that are likely to be at least partially invalidated (Cohen et al., 2016; 2019). Moreover, these patents are granted by "lenient" examiners, defined as those who "require applicants to make fewer changes to the text of the patent, such as clarifying a claim or withdrawing a claim deemed to be obvious or to bear on a non-patentable subject matter" (Feng and Jaravel, 2020). These patents are subject to a higher litigation risk and, for this reason, are often acquired by NPEs, which may exploit the comparative advantage in patent litigation. Fourth, NPEs are accused of targeting specific courts to maximize their chances of obtaining a favourable judgment. In US, NPEs do often bring patent lawsuits in the Eastern District Court of Texas (>40% of all cases over 2007-2017), which is by no means a leading centre of innovation (Ansell et al., 2018). Conversely, in the same period, operating companies bring patent lawsuits the Eastern District Court of Texas less frequently (7% of cases) (Cohen et al., 2019).

On the other hand, recent studies provide evidence that NPEs are not only involved in frivolous litigations. Indeed, some evidence indicates that, contrary to common belief, NPEs do not assert patents of lower quality than those asserted by operating companies (Shresta, 2010; Risch, 2012), and that, on average, they hold patents of high technological quality (Fischer and Henkel, 2012; Orsatti and Sterzi, 2019a; 2019b). By investing in valuable IP assets, NPEs exploit their comparative efficiency advantage in deploying and enforcing patents (Steensma et al., 2016).

Overall, the evidence seems to indicate that the typical NPE business model involves acquiring valuable patents – at least for large NPEs – and using them opportunistically, and exploiting patent market frictions and their specialization in patent monetization. Indeed, legal specialization, technological selection and precise targeting and timing are traits that do not seem to characterise producing companies involved in patent litigation.

Impact on downstream innovation

Extant studies largely agree that NPEs generally do more to harm than promote innovation. On the one hand, NPEs do not act as intermediaries in the market; they rarely transfer technology to implementers, either directly or indirectly. For example, Feldman and Lemley (2015) found that among their survey respondents who took patent licenses from NPEs, in no more than 10%

of cases did they receive any technical knowledge in conjunction with the patent license: "With almost complete unanimity, respondents who took licenses from NPEs, rarely received technical knowledge, transfer of personnel (including consulting agreements) or joint ventures along with the patent license" (Feldman and Lemley, 2015, p.27).

On the other hand, NPEs inflict higher costs (litigation and licensing) on target firms. Drawing on a survey conducted by RPX on 250 firms targeted by NPEs, Bessen and Meurer (2013) estimated the direct costs[48] of NPE patent lawsuits at $29 billion in 2011.[49] Tucker (2014) reported a case study of Acacia Research Corporation, a well-known NPE, to study how NPE litigation affects technology sales. The author found that the sales of products related to patents affected by litigation with Acacia fell considerably as a consequence of a reduction in incremental product innovation during the period of litigation. In addition, Appel et al. (2019), by exploiting heterogeneity in US State anti-troll laws, have shown that patent infringement initiated by NPEs adversely affects the ability of high-tech startups to create jobs, innovate, grow and raise capital.

Two more recent papers (Orsatti and Sterzi, 2019b; Abrams et al., 2019) investigate the impact of NPE patent acquisition on follow-on innovation and reach similar conclusions. Orsatti and Sterzi (2019b) use subsequent citations received by USPTO patents acquired by NPEs to proxy for downstream innovation. To study the impact of NPE patent acquisition, they compare the number of citations received by patents acquired by NPEs, both before and after the transfer, with the number of citations received by operating companies (or patents that are never transferred) with similar characteristics. They find that, NPEs target patents that are on average older and of higher technological importance than those acquired by operating companies. However, after a transfer occurs, patents purchased by NPEs show a marked decline in their citation rate, something that is not observed for other patents of the same age and from the same field. The authors also find that the negative effect is mainly driven by specific NPEs, namely those that operate opportunistically and build lower quality patent portfolios.

Although NPEs do increase the costs of targeted firms, without transferring technology and expertise, in theory they may also serve as tax collectors for inventors from whom patents have

[48] In their calculation, the direct costs include the cost of outside legal services, licensing fees, and other costs incurred in response to NPE-litigation risk.

[49] Schwartz and Kesan (2013) have however contested the analysis proposed by Bessen and Meurer (2013), arguing that their results were not based on a random or representative sample, and that the estimated costs by the authors be viewed as the "highest possible limit".

been bought. Early evidence, however, in this regard is scarce. Bessen and Meurer (2013) reported that NPEs pass on only 5% of the revenues obtained from defendants to end- inventors. Conversely, Schwartz and Kesan (2014) report that in 2011 Acacia (the largest publicly traded NPE in the United States) paid more in royalties to inventors than it did to their patent attorneys.

5. Policy recommendations

General recommendations

The large volume of patents and the excessive fragmentation of property rights render patent clearance infeasible as a practical exercise, so that companies routinely ignore patents and independently develop the requisite technologies themselves (Lemley, 2008). This is particularly true for high-tech sectors, and notably Computers & Communication, that have far outpaced other sectors since the mid-1990s (Marco et al., 2015b).

The increasing number of patent filings in high-tech sectors is not explained by increasing R&D investments, but especially by "the needs of players for large patent portfolios and their consequent drive to obtain patents" (Hall, 2004 p. 46). Patents in high-tech sectors are in fact often used for other reasons than to protect the invention resulting from R&D investments and the importance of market (i.e. trade of technologies), defensive (cross-licensing) and reputation strategies (to signal assets and competencies) have significantly increased in importance over time (Orsenigo and Sterzi, 2010).

In the face of this striking sectoral heterogeneity in the ways patents are used, it thus becomes natural to question whether patent laws should explicitly recognise different patent standard for different industries (Burk and Lemley, 2003; Encaoua et al., 2006; Orsenigo and Sterzi, 2010). Indeed, ever since the early development of the economic theory of patents, the issue was considered whether an optimal patent design should in principle differ across technologies and sectors. This question is now being increasingly raised. As Burk and Lemley (2003) argue, technological and industry differences are actually already applied in the practice of patent laws:

> "*This seeming paradox - a monolithic legal incentive for wildly disparate industries - is resolved by the realization that, despite the appearance of uniformity, patent law is actually as varied as the industries it seeks to foster. A closer examination of patent law demonstrates that it is unified only in concept. In practice the rules actually applied to different industries increasingly diverge. The best examples of such divergence are found in biotechnology and computer software cases, where the courts have applied the common legal standards of obviousness, enablement, and written*

> *description to reach radically different results. As a practical matter, it appears that although patent law is technology-neutral in theory, it is technology-specific in application*" (Burk and Lemley, 2003, p. 1577).

On the one side, when imitating is less costly than inventing and when firms have no economic means nor do they have technical solutions for protecting their invention, then there is need for further legal protection. This is the case of *discrete* technologies, i.e. technologies where a new product or process is composed of relatively few patentable elements (Roycroft and Kash 1999; Kingston 2001), typical of sectors like drugs, chemicals, steel, and metal products. On the other side, in (*complex*) technologies where a new product or process is composed of numerous separately patentable elements (as it is the case of Computers & Communication, Electronics, and Semiconductors), it becomes more difficult to appropriate the revenues through the intellectual property system (Levin et al. 1987; Cohen et al. 2000). However, it becomes easier to exercise hold-up threats on downstream firms: in other words, when a firm depends on other companies patents in order to manufacture its products, the patent holder can acquire great bargaining power and extract a value from the patent which is a greater than what it would be attributable to the economic value of the patent alone (Orsenigo and Sterzi, 2010). Patent monetization indeed reflect technology differences and, not surprisingly, litigation rates are relevant in complex technologies and, in particular, in computer industry (Helmers, 2018).

General Recommendation 1

Patent laws should thus explicitly recognise sectoral differences.

As discussed throughout the study, notice failure is a significant competitive concern and a potential impediment to innovation. Information asymmetries lead to market imperfections and distortions, hindering the negotiation process, with potential licensees being left in a position in which they are at a marked disadvantage before even entering into a licensing discussion. Incorrect and misleading patent ownership information imposes considerable costs on the patent system through both persistent litigation and higher transaction costs (Menell and Meurer, 2013). In contrast, by informing the public about the outer bounds of a patentee's right to exclude, an effective patent notice limits the uncertainty regarding infringement liability and

clarifies the landscape of patent rights. The lower this uncertainty, the less time and effort a firm needs to spend on patent clearance and on resolving disputes and the more it can invest in activities that patent systems aim to incentivize.

Patent litigation is fundamental for the smooth functioning of the patent system. This is because patent rights are useless if they cannot be enforced. Litigation permits patent owners to assert their right to receive compensation for their inventive efforts. Yet, litigation, and the threat thereof, can also become a burden onto the patent system when opportunistic (and abusive) behaviours are pervasive, diverting attention away from innovative business behaviour (Lemley and Melamed, 2013). With this balance in mind, we think that it is urgent that legislative initiatives be taken to improve the transparency of patent ownership and to limit abusive litigation practices.

Attempts to hide patent ownership, though the non-registration of the transfer and the use of shell companies, should be deemed to constitute an **inappropriate use of intellectual property**. Because of such behaviour, patent holders are able to bargain for compensation far beyond the value of the right (what Feldman, 2013, calls the "magnification" of the rights). Therefore, as long as notice is not guarantee and parties may lack knowledge that they are infringing others' rights, property rule mechanisms, such as injunctive reliefs, cannot facilitate market transactions for the use of the IP. On the contrary, they might create backwards incentives for patent holders, who may opportunistically hide their patents to pursue the profits of infringement suits against unintentional infringers, especially when the patented invention is only a small component of the infringing product (Menell and Meurer, 2013; Ard, 2019). In these cases, a patentee who wins injunctive relief is in a position to demand all profits associated with the product up to the cost of switching to a non-infringing design regardless of the patent's value. For this reason, liability rules, such as judicially-determined license, should be preferred in cases where the unintentional infringer made reasonable efforts in patent clearances and found no apparent conflict (Ard, 2018) or when the patent holder deliberately submerge notice of their claims. **As long as notice is not guarantee, liability rule mechanisms should be preferred to property rules**. Patent holders that decide to keep the patent hidden rather than to publicize it should not be in the position to obtain property rules for infringement, but rather compensatory damages. Similarly, patent law should also recognize the unintentional infringer's reasonable search efforts as a shield against property rule enforcement (Ard, 2018).

General Recommendation 2

As long as notice is not guarantee, liability rule mechanisms should be preferred to property rules.

Specific recommendations with regard notice failure

The following represents a limited set of policy recommendations we propose to address notice failure, which would go some way to reducing the lack of transparency.

Patent offices should be endowed with substantive rule-making authority (Masur, 2010) and should play a central role in patent policy. Patent offices should be then called on to make patent ownership information more readily available, to help tracking formal changes of property, and to implement legislative initiatives to facilitate patent clearance and limit ex-post licensing and litigation. The most direct means of addressing notice failure is to provide a transparent, comprehensive and easily searchable index of all patent owners. Moreover, any legislative initiatives in this regard should be concerned not only with the scope of ownership, but also with the timing of disclosure and with the corrective actions for non-compliance with requirements regarding disclosure of ownership (Gorbatyuk and Kovacs, 2019).

A number of these very concerns were voiced a few years ago by the USPTO (2014) in the accompanying notice of proposed rulemaking under the title "Changes to Require Identification of Attributable Owner".[50] To our knowledge, this notice represents one of the few attempts[51] to make patent ownership information more transparent. Despite the fact that the EPO and the European Commission also acknowledge flaws in the recordation of patent ownership changes (Giuri et al., 2015), the USPTO Notice has yet to be matched by equivalent initiatives in Europe (Gorbatyuk and Kovacs, 2019).

[50] Changes to Require Identification of Attributable Owner, 79 Fed. Reg. 4105, 4106 (Jan. 24, 2014) (considered for codification at 37 C.F.R. pt. 1; currently abandoned). Among others, the USPTO identifies the following objectives: i) *Ensure that the information the USPTO provides concerning published applications and issued patents is accurate and not misleading*; ii) *enhance technology transfer and reduce transaction costs for patent rights*; iii) *reduce risk of abusing patent litigation*.

[51] Another notable attempt is the bill "End Anonymous Patents Act" (https://www.eff.org/files/deutch-end-patent-anonymity.pdf) introduced in US in 2013 by Representative Ted Deutch. The bill requires disclosure of ownership and transfers of ownership of patents and prevents patentees to collect damages if they had failed to properly disclose.

Specific Recommendation 1

Effective registration of changes in ownership at patent offices, within a strict time window after their execution.

Although patent offices do impose strict requirements regarding adequate disclosure of the identity of the initial applicant(s) of a patent, their requirements are much less strict once patent rights have been assigned to other parties.

To make patent ownership information more transparent, patent offices should require patent owners to update information concerning ownership even after patent prosecution, when a patent is not explicitly under review. In other words, the patent market should be considered an integral part of the same system that examines and grants the patent rights, while today it escapes its control. In addition, patent holders should be called on to register and disclose changes of ownership to the public when these have been executed, within a strict and clear time window.

Specific Recommendation 2

Effective identification of the beneficial owner(s).

Even when formal ownership is properly recorded, this information is not complete for understanding who has the eventual right to assert the patent. For example, if parties sign exclusive license deals, the ownership information would be misleading since the licensing information is not recorded at the patent office. Similarly, when ownership changes are recorded in the name of a subsidiary (as occurs when NPEs make use of shell companies), the name of the "ultimate parent entity[52]" is not easily identifiable and it may be difficult for a third party to know who the real parties-in-interest are.

In line with the opinion expressed by the USPTO (2014), additional information about beneficial owners and the ultimate parent entities with an interest in the patent (both as titleholder and enforcement entity) should be then collected in a "transparency register" by the

[52] An ultimate parent entity is defined as an "entity which is not controlled by any other entity".

patent office. To the best of our knowledge, information about entities of this type is not collected by any patent office.

The identification of the attributable owner(s) would thus re-balance the negotiation process between patent holders and alleged infringers, helping the latter to determine who actually owns which patents and whether they are patents for which the alleged infringers already have licenses (Scott Morton and Shapiro, 2013).

Specific Recommendation 3

Patent holders should be required to declare their willingness to license out and to disclose whether their patent(s) has actually been licensed out.

Transparent patent ownership allows practicing firms to undertake broad patent clearances and subsequently license all the IP they need to develop their products or associated inventions. However, because of the number of patents issued, patent clearances are often highly burdensome. Knowing whether a given patent is on the market – or whether it has already been licensed – would further facilitate freedom-to-operate analyses (Feldman, 2013; Anderson, 2015). At the same time, it would also permit a patent holder willing to license its patent to make a signal to that effect to the market. To some extent, a similar function is already performed by private institutions, such as Standard Setting Organizations (SSOs), that promote notice of intellectual property rights and reduce ex-post holdouts (Lemley, 2002).

Specific Recommendation 4

Corrective actions for non-fulfilment of disclosure requirements.

To make these requirements effective, the legitimacy of the contractual transaction should be conditioned on the fulfilment of disclosure requirements. A voluntary recordation system is insufficient to achieve a satisfactory level of patent transparency and the effective enforcement of requirements must incorporate penalties for non-compliance that are clearly administered.

Any failure to comply with disclosure requirements should lead to the abandonment of the patent (Gorbatyuk and Kovacs, 2019). Additionally, courts should consider whether patent holders misused their patent rights, by failing to provide adequate notice and by not fulfilling

all the obligations with respect to patent transparency with the implicit aim of winning for themselves a better position in negations with alleged infringers and of protecting themselves from liability. We believe the following three corrective actions are necessary. First, if patent holders do not provide notice (by avoiding or delaying registration of the transfer and/or when the effective beneficiaries are unknown), they should be penalized by the court when they assert the patent. Second, licensing rights should only come into effect when all disclosure requirements have been met. And, third, when patent holders transfer their intellectual property rights to third parties to protect themselves from liability, the court should be able to ignore the structure of the scheme created.

6. Case studies

The lack of transparency regarding the holdings of an entity seeking to license one or more of its patents is an obvious source of information and bargaining asymmetries that has been well-documented throughout this report. By not requiring adequate disclosure, institutions create market frictions that some patent holders may exploit to their own advantage. NPEs, for example, conceal their identity by creating numerous shell companies, thus making it increasingly difficult to determine the actual ownership of a patent and more complex to hold anyone accountable, since the shell may have no meaningful assets and, thus, be much less vulnerable to countersuits.

Examples of large NPEs, such as *Intellectual Ventures* and *Acacia*, that use shell companies to hold patent assets, are notorious. However, not so well known are the cases of small NPEs that use offshore structures for monetization purposes, facilitated by the fact that it is possible to register multiple companies at the same address with the help of companies that sell incorporation services with a low-price tag.

In the first case study ("*NPEs and the use of dormant companies for IP monetization: the case of UK*"), we show that registered dormant companies – entities that engage in no significant activity, have no accounting transactions, do not trade and do not receive any form of income – hold thousands of patents. In UK, there are about 4,645 dormant companies with at least one patent and 776 of them hold at least one patent for which they do not appear as the original assignee. By excluding companies that have reported revenues in the past or that are subsidiaries of companies that are non-dormant, we end up with a final set of 224 dormant NPEs registered in UK that hold more than 14,000 patents. These entities are small, employ nobody and are invisible: about 40% have no website and provide no contact details (email or telephone). Contrary to large and known NPEs who hold patents mainly in the ICT industry, UK dormant companies hold most of their patents in Biotechnology, Civil Engineering, Transport and Chemical Engineering. On average, these patents are of relatively low technological quality but have a high risk of litigation.

In the second case study ("*An example of a dormant NPE in the UK: Dragon Green Development Balboa SA*"), we analyse in detail the business model of Dragon Green Development Balboa SA (DGDB), a dormant company identified in the first case study. DGDB is an NPE based in an offshore country (the Republic of Panama) which makes extensive use

of dormant companies in the UK to acquire, hold and litigate patents. DGDB exploits the Panamanian, British and German legal systems to create a structure suitable for patent litigation. The shell companies created in the UK hold between 1£-100£ in capital thereby enabling them to hold IP rights without being required to pay any taxes. The companies are directed by proxy directors, maintaining in anonymity the real individuals behind the company and shielding them from legal action. They have no website, no contact address and make no attempt to advertise their products or services. DGDB is a good example of how, even a small NPE, without having to make large investments, can exploit information frictions, and in particular the lack of transparency in patent ownership in Europe.

Case Study #1

NPEs and the use of dormant companies for IP monetization: the case of UK

Abstract

Implicit to the structure of the patent system is the idea that anyone attempting to license a patent can recognize those who hold the necessary rights and identify the territory that the patent holders claim as their own. However, today, NPEs often use offshore structures and dormant companies to hold patent assets with the aim of obfuscating patent ownership. Dormant companies do not carry out any business, do not have any source of income, do not pay taxes, but can hold IP assets.

By considering companies that are registered as dormant companies and that have not any link with producing companies, our paper proposes a new methodology to identify intellectual property (IP) monetization entities which normally escape the media attention.

There are about 850 IP dormant companies registered in fiscal year 2019 in Europe that hold patents; 776 of them are based in the UK. By considering entities with no link with any non-dormant company and with at least one patent transferred, we find 224 IP dormant companies registered in UK, holding more than 14,000 patents issued by various patent offices (mainly, from GB, EP, US and CN); some of them (15%) have the parent company outside the UK.

IP dormant companies in the UK are small, employ nobody and are invisible: about 40% have no website and provide no contact details (email or telephone). Contrary to large and known NPEs, IP dormant companies in the UK do not focus on the ICT industry, but hold most of the patents in Biotechnology, Civil Engineering, Transport and Chemical Engineering. On average, these patents are of relatively low technological quality but have a high risk of litigation.

Since these entities are often small and are not identified as NPEs by specialized websites and data providers, our study points out that the presence of NPEs in the patent market is usually underestimated.

1. Case Background

Implicit to the structure of the patent system is the idea that anyone attempting to license a patent can recognize those who hold the necessary rights and identify the territory that the patent holders claim as their own. In parallel, innovators should be able to inspect easily the patent landscape in which they wish to innovate, so to assess cheaply any limit to their freedom to operate.

NPEs often use offshore structures and dormant companies when acquiring patent assets with the explicit aim of obfuscating patent ownership. The main benefit of such a strategy is the lack of knowledge regarding beneficial ownership (i.e., who it is that actively benefits from a company's activities). Control over all assets and companies under another company incorporated in a non-transparent offshore is in fact unknown. This allows for certain entities or organizations to remain hidden while launching campaigns, be it for the acquisition of qualified positions in specific corporations or for launching a set of IP litigation actions.

Some NPEs are large patent aggregators that may own hundreds, even thousands, of IPs, backed by massive private equity funds with billions in capital raised by investors. However, most of them are smaller entities, often not so visible, and their business consists in holding patent assets solely for the purpose of litigating them (FTC, 2016). These entities are, in some cases, interested in low-value and quick settlements (Chien, 2014; Lemley and Melamed, 2013). Some NPEs use shell and dormant companies to acquire patents, others *are* dormant companies, since they do not report any kind of business activity nor receive any form of income for several years before launching patent litigation campaigns.

Despite the general consensus that shell and dormant companies are used primarily for tax evasion[53], our evidence shows that thousands of dormant companies hold patent assets also for IP monetization.

The aim of this case study is to shed further light on this phenomenon, by identifying and characterizing dormant companies in the UK that hold patent assets for monetizing (and litigation) activity.

[53] https://www.ft.com/content/302546b8-df6e-11e3-8842-00144feabdc0

2. Dormant companies as vehicles for holding patents

A company is considered **dormant** if it does not trade and does not receive any form of income. According to ORBIS IP, a dormant company is *"still registered, but has no significant activity (and no significant accounting transactions during the accounting period)".*

Dormant companies are, in general formed for some future project and in relation to which they may hold only intellectual or real-estate property. There are about 29 million registered (in the fiscal year 2019) dormant companies worldwide, the majority of them based in the United States (see Figure 3). In Europe, dormant companies number less than 2 million, most being concentrated in United Kingdom (680,000), Spain (583,000), Romania (129,000) and Czech Republic (123,000). Legislation regulating dormant companies differs from country to country, which in part explains the differences in number of companies recorded. For instance, in France dormant companies are dissolved after two years of inactivity[54] and in Germany a limited liability company is required to have a minimum capital of 25,000€.[55]

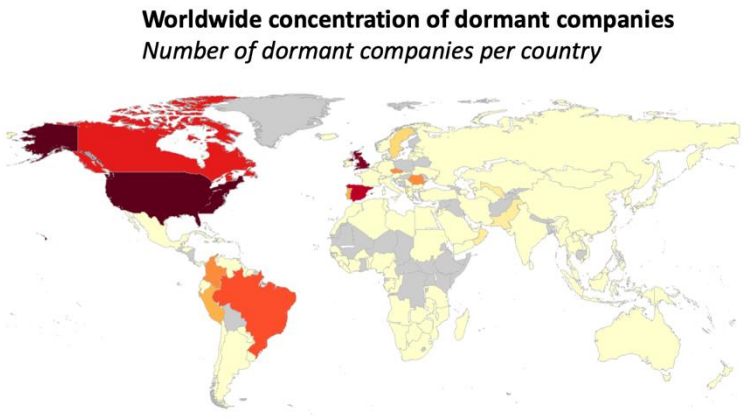
Dormant companies may hold patents for a variety of reasons. Sometimes, dormant companies hold patents for the purpose of fiscal optimization, i.e. when they are subsidiaries of operating companies. On other occasion, dormant companies hold patent for commercialisation reasons: this is the case, for example, of some university spin-offs, such as those created by the University of Manchester and University of Lancaster. Finally, dormant companies may hold transferred patents for IP monetization, in order to make it difficult to determine who actually owns them and whether it is a patent for which target firms already have a license (Feldman, 2014; Scott Morton and Shapiro, 2013; FTC, 2016).

In some cases, NPEs are born as dormant companies, sharing no ties with any operating one. This status allows patent holders not only to hide patents and obfuscate their ownership, but also to hold only a limited amount of capital to shield the company should it lose the court action. If indeed the company loses its litigation, any damage can be limited to the capital it holds and it cannot be held liable for any litigation costs. Dormant companies may change their status when they monetize their patents and generate revenues, when they are sold or when they are shut down.

[54] Article R. 123-130 of the French Trade Code.
[55] Miller, R. ed., 2007. Annual of German and European Law: Volume II and III. Berghahn Books.

According to Orbis IP, there are about 11,000 active dormant companies in the United States that hold at least one transferred patents and 776 in the UK, representing around 0.1% of the UK's dormant companies (see Figure 2).

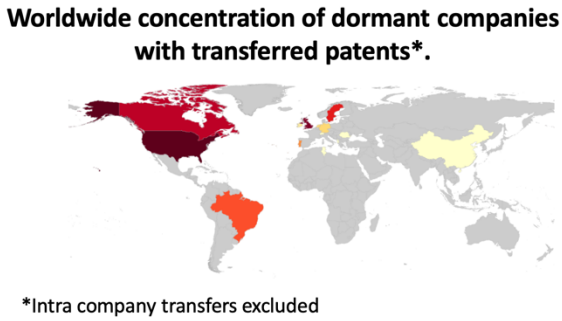
Figure 1. Number of dormant companies by country



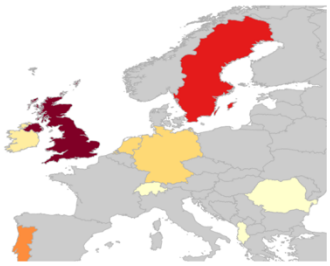
	Number of Companies	% of Dormant companies
USA	26 436 224	43,27%
UK	679 609	10,22%
Spain	583 098	17,34%
Canada	378 915	20,61%
Brazil	150 656	0,66%
Romania	129 390	8,27%
Czech Republic	123 399	5,72%
Colombia	113 445	1,95%
Portugal	91 227	12,40%
Peru	88 022	4,16%

The figure shows the number of registered (in fiscal year 2019) dormant companies per country. Source: Orbis IP

Figure 2. Number of dormant companies holding patents by country



Zone	Number of Companies
USA	10984
United Kingdom	776
Canada	541
Sweden	69
Brazil	9
Portugal	7
Hong Kong S.A.R.	6
Germany	3
Netherlands	3
Ireland	2



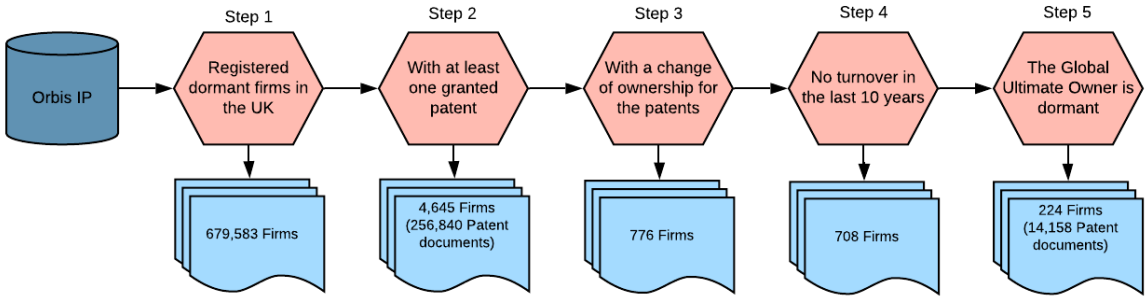
The figure shows the number of registered (in fiscal year 2019) dormant companies that hold at least a patent that has been acquired from a different entity. Intra company transfers are excluded. Source: Orbis IP

3. Dormant companies for IP monetization in the UK

3.1 Methodology

According to Orbis IP, there are 4,645 dormant companies registered in the UK with at least one patent; of these, 776 dormant companies (17%) hold at least one transferred patents (i.e., a patent for which they do not appear as the original assignee). The second country by number of active dormant companies holding transferred patents is the Sweden, with 69 dormant companies registered in 2019 (See Figure 2).

Figure 3. Data identification methodology used to identify dormant companies holding patents in the UK



The figure shows the different steps taken to identify UK Dormant NPEs. The number of patents refers to patent documents. Source: ORBIS IP.

Figure 3 shows the different steps we took to identify the UK's active dormant companies. Starting from the sample of 776 identified IP dormant companies registered in the UK, in step 4 we verified their status of "dormant company", by analysing their financial accounts to ensure they had no turnover in the last 10 years.[56] We checked to ensure that these firms had indeed filed Dormant Company accounts and we excluded 68 of the 776 companies as they had reported revenues in the past. In so doing, we removed former trading companies that had been created for purposes other than that of being dormant.[57]

[56] If a company is considered dormant, it can file what are called "dormant accounts". These are an abridged version of accounts. The OpenCorporates database (https://opencorporates.com) tracks companies that file accounts of this type.

[57] Some companies are dormant from the day they are formed. Other companies, however, actively carry out a business for a while but then cease trading – at least for a period. We exclude these companies from the analysis.

In the final step (step 5), we checked that the companies had not been created for the purpose of financial/tax optimization and/or that they were not monetization entities of practicing entities. Indeed, our data showed that some IP dormant companies are part of (large) operating groups in which some companies do appear as non-dormant, generating revenues. These non-dormant companies may assign patents to dormant companies if these patents are intended for future use or if the company does not want its competitors to be aware of their IP strategy. It may also be the case that the dormant company monetizes the patents and returns a percentage of the future revenues generated by its patent monetization activities to the operating company (patent-privateering model[58]). In order to exclude dormant companies that are part of a group of operating companies, we imposed the condition that all the companies in the group, including the Global Ultimate Owner (GUO) - highest parent company - should be dormant (Figure 4). A GUO is defined by ORBIS IP based on the shareholding structure of the company and so is the shareholder with the highest direct or total percentage of ownership. After excluding dormant companies that are part of groups with non-dormant companies, we end up with a final set of 224 active dormant NPEs holding 14,158 patent documents.

Figure 4. Networks of dormant companies

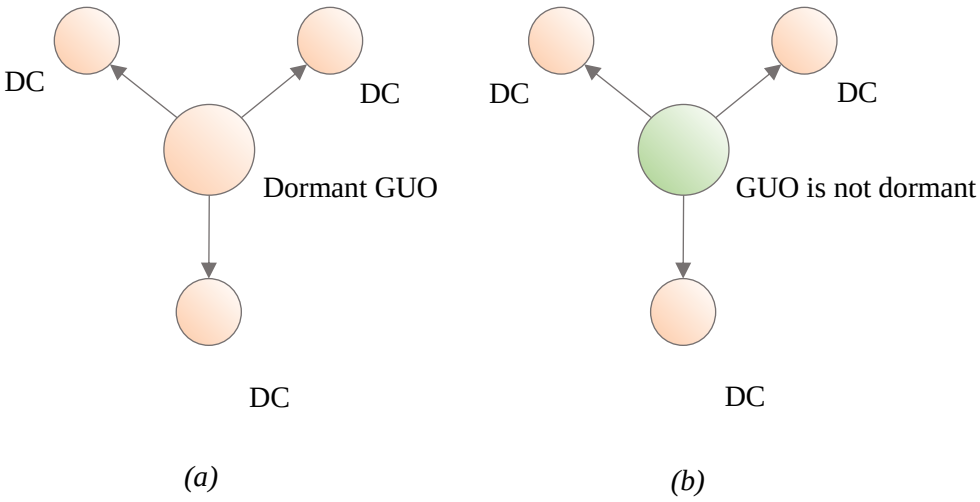


Figure (a) shows a network in which all the companies in the group are dormant. Figure (b) shows a network in which the GUO is not dormant.

[58] Privateering is the practice of an operating company transferring its patents to a shell/dormant company for the purpose of patent monetization (Lemley and Melamed, 2013).

3.2 Firm characteristics

Young firms

Figure 5 shows the dynamics of the incorporation of the 224 active dormant companies identified in the UK. It can be seen that the majority of these firms are relatively young (<10 years) and that around 25% of them were created in the last five years. Although entities created for IP monetization purposes, because of their young age only 17 identified UK dormant companies (8%) appear as plaintiffs or defendants in patent litigation cases - at May 2020 -.[59]

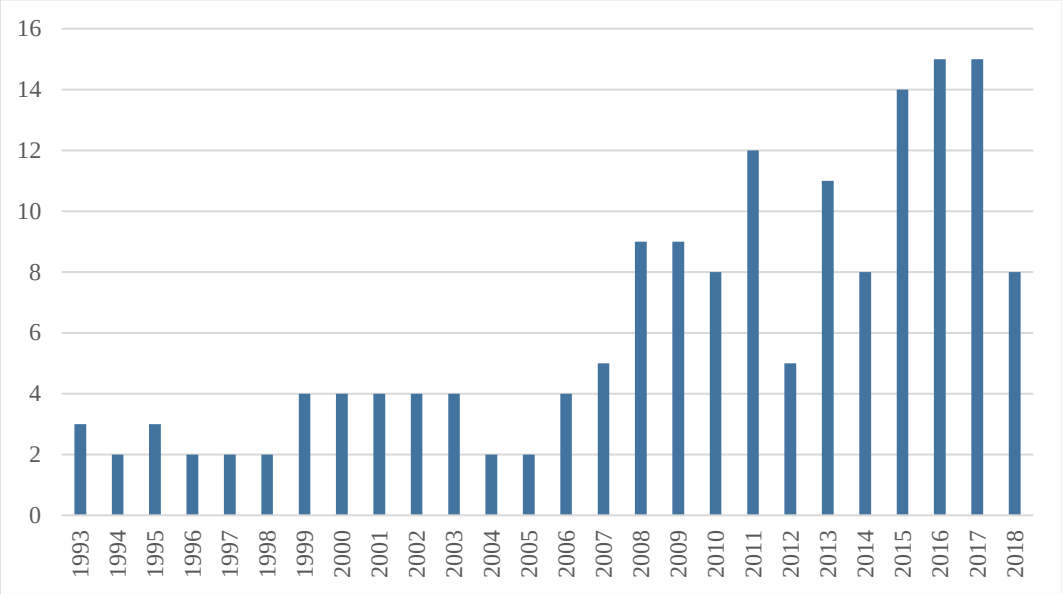
Moreover, since we have information only for the 'active' dormant companies, we cannot conclude that this is a growing dynamic since some dormant companies registered in the past are now defunct. However, the fact that most of these firms are young suggests that in the UK the phenomenon of dormant companies as a vehicle for monetizing and asserting IP assets is far from being marginal and one that looks likely to increase significantly in the near future.

Small, with no employees, but global

The UK dormant companies identified here form part of small groups: on average there are 1.3 firms per group and typically there are no other companies in that group. Moreover, in all instances, not only do the UK dormant companies not report any revenues (in accordance, that is, with their status as dormant companies), they have no employees. Moreover, in about 40% of the cases, they are invisible entities, with no website no contact details (email or telephone) (see Figure 6). However, some of them are international (15%), as their GUO is based outside the UK, above all in the USA, Luxemburg, and Germany (see Figure 7).

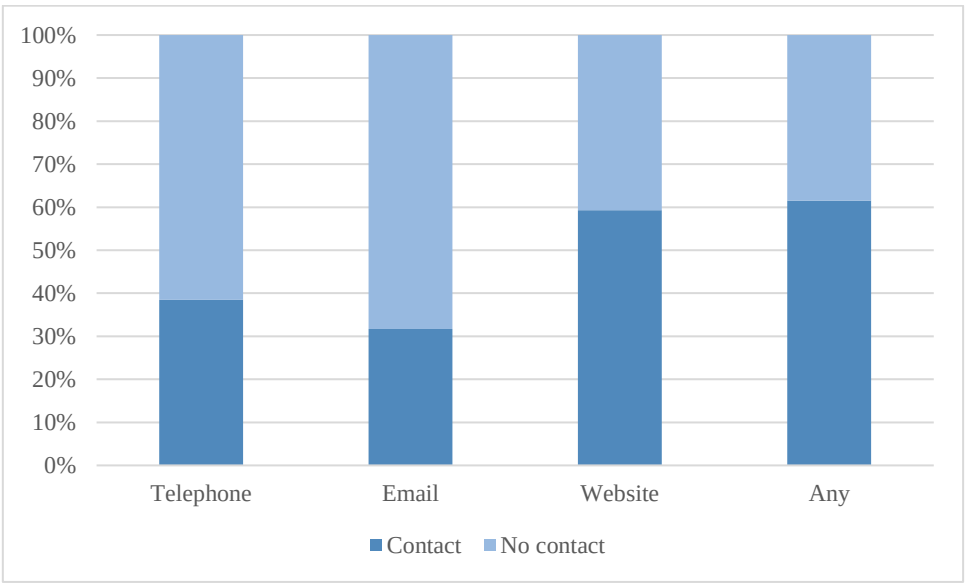
[59] Data on patent litigation come from Darts-IP (https://www.darts-ip.com), a data provider of intellectual property cases worldwide and it is used on a daily basis by leading law firms, corporate counsel, and courts alike.

Figure 5. Temporal dynamics of the incorporation of dormant companies in the UK



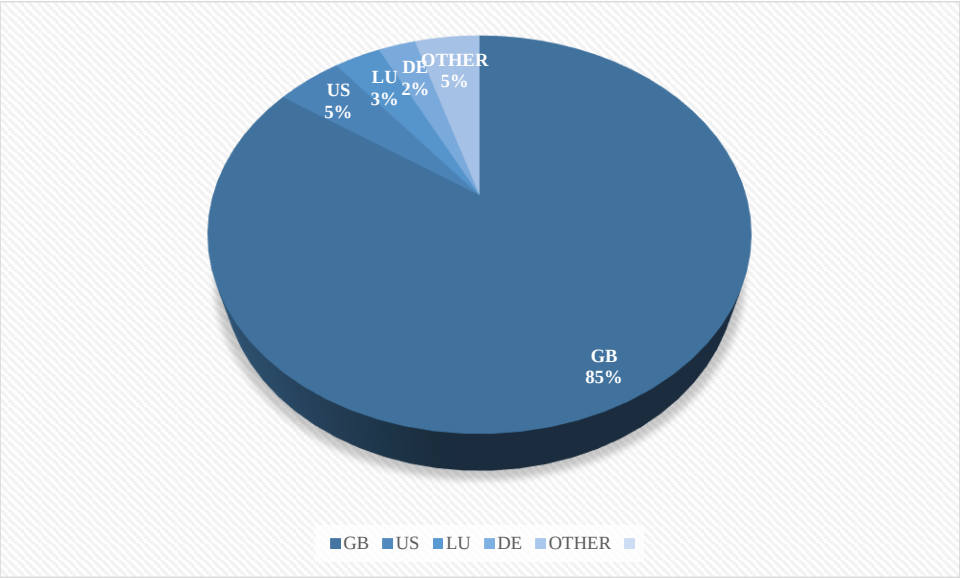
This figure shows the year of registration of the 224 UK dormant companies identified. Data related to dormant companies that are no longer registered (i.e. defunct dormant companies) are not included in this figure. Source: Orbis IP.

Figure 6. Visibility of the UK's dormant companies



This figure shows the percentage of UK dormant companies identified that report some kind of contact details (telephone number, email, website or one of these elements). Source: Orbis IP.

Figure 7. Internationalization of the UK's dormant companies



The figure shows the percentage of UK dormant companies by country of residence of the GUOs.
Source: Orbis IP

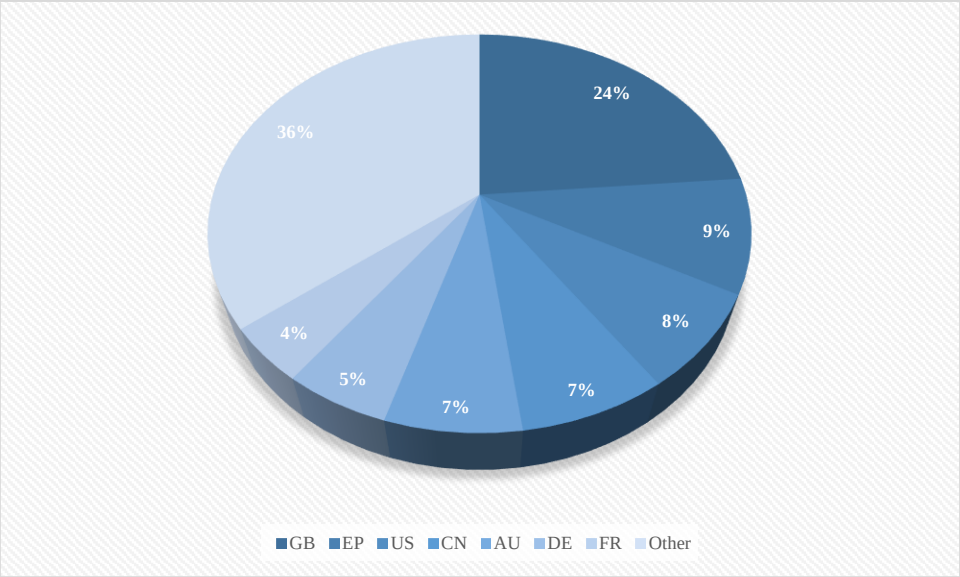
3.3 Patent portfolio characteristics[60]

The 224 UK dormant companies identified hold in total 14,158 patent documents, of which only 3,348 (24%) were issued at the UK Patent Office, highlighting the international dimension of the phenomenon (see Figure 8). Apart form the UK, they hold patents issued primarily at the EPO (9%), USPTO (8%), and SIPO (China) (7%).

Figure 9 shows the distribution of patents issued at the EPO by technological domain (2011 WIPO Technology classification). With respect to the average distribution of EPO patents, UK dormant companies hold patents primarily in *Biotechnology* (representing the 9.33% of dormant company patents, while only 3.21% of all EPO patents falls in this technological field), *Civil Engineering* (8.33% v. 3.07%), *Transport* (7.94% v. 4.57%), and *Chemical Engineering* (6.94% v. 2.58%). Contrary to larger and better-known NPEs, the ICT industry seems not to be the main target of dormant companies active in the UK. Being of small size, these entities cannot easily exploit the economies of scale typical of monetization activities in the ICT sector and complex technologies, where large patent aggregators collect many patents covering similar technologies.

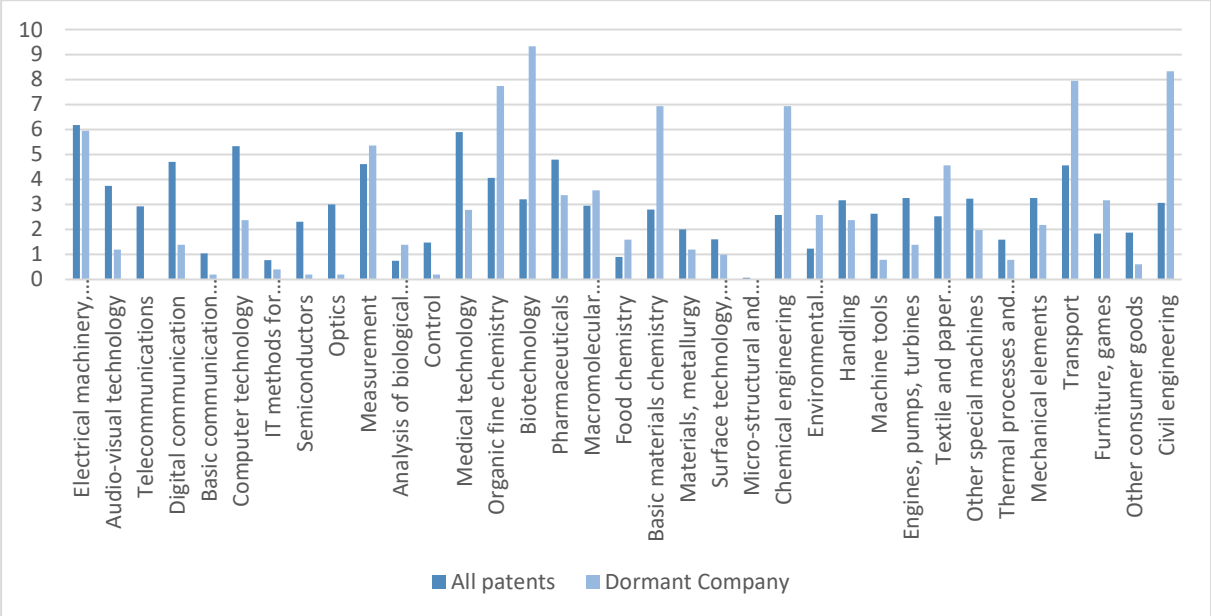
[60] In this section we consider only UK dormant company patents filed at the EPO.

Figure 8. Patent documents by patent office



The figure shows the percentage of UK dormant company patents by patent office. Source: Orbis IP

Figure 9. Distribution of patents by technological domains (patents issued at the EPO)



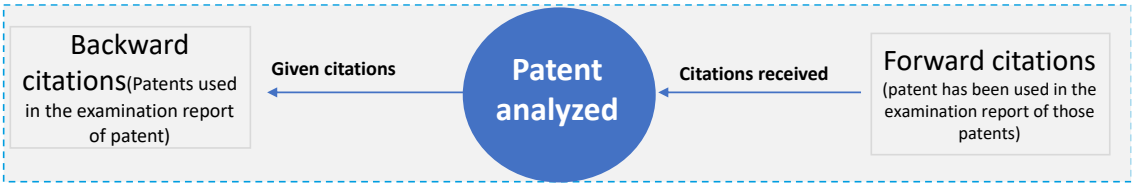
The figure shows the percentage of patents issued at the EPO by technology (2011 WIPO technological classes).

As regards to patent characteristics, NPEs are accused to buy low quality patents to engage in frivolous litigations (Chien, 2010), although recent evidence has however also shown that this is not always true (Fisher and Henkel, 2012; Orsatti and Sterzi, 2019).

In this section, we thus study the characteristics of patents held by UK dormant companies and check whether these patents are different from other EPO patents in patent quality and patent scope.

First, in order to measure patent quality, we consider the number of citations received by EPO patents in a given time window (five years after the filing date). Patent citations, extensively used in the literature for assessing patent quality (Trajtenberg, 1990; Albert et al., 1991; Sterzi, 2013; Sterzi et al. 2019), are included in the patent document to delimit the scope of the property right and identify the relevant prior art. This means that if patent X cites patent Y, it can be reasonably assumed that Y is a technological antecedent of X and that the knowledge embedded in Y has been developed by X. A citation received by a patent is called a "forward citation" and implies that the invention is being used for the creation of new inventions (See Figure 10). A patent that receives a high number of citations is thus considered of high value.

Figure 10. Illustrating patent citations



A simple comparison between the number of citations received by patents held by dormant companies and other patents[61] shows that the former receive a significant lower number of citations in the first five years from the publication date (0.51 citations vs. 0.83 citations, t-test for mean difference showing t = 2.69).

[61] The empirical exercise is based on data from OECD Patent Quality Indicators database, January 2020 (Squicciarini et al. 2013).

Second, to measure the possible fields of application for the technology (patent scope), we consider the number of distinct assigned four-digit International Patent Classification (IPC) classes as commonly done in extant research (Lerner, 1994).[62] The greater the number of IPC classes, the larger the patent scope. A simple t-test for mean differences shows that patents held by dormant companies active in UK have a significant larger patent scope than other patents (2.08 vs. 1.92, t-test for mean difference showing t = 3.08), and so a higher probability of being infringed (Fischer and Henkel, 2012).

Differences in patent quality and patent scope might reflect differences in technological domain and filing year between dormant company and non-dormant company patents. To take into account for sectoral and year differences, we thus estimate probit models[63] - where the dependent variable is one when the patent is held by a dormant company active in UK and zero otherwise – that include among the regressors thirty-five dummies identifying the patent technological classes (2011 WIPO) and twenty-three dummies identifying the patent filing year.[64] Estimates results (shown in Table 1) confirm the previous results, showing that dormant company patents do receive fewer citations, regardless the number of controls included in the model. In particular, estimates results show that the predicted probability to observe a patent held by a dormant company active in the UK goes from above than 0.02% for patents with no citations (about 73% of patents held by UK dormant companies) to below 0.01% for patents with patents more than six citation (see Figure A3 in Appendix). Similarly, estimates results also show that the probability that a patent is held by a UK dormant company increases with the scope of the patent and thus the probability that it is infringed (see again Figure A3 in Appendix).

In sum, patent acquisition and filing strategies of dormant companies active in UK seem to differ from those of large NPEs, which often select patents of high technological quality in the ICT industry.

[62] Following Squicciarini et al. (2013), for each patent document P, the patent scope index is defined as
$SCOPE_p = n_p; n \in \{IPC_1^4; \ldots; IPC_i^4; IPC_j^4; \ldots; IPC_n^4\} \,\&\, IPC_i^4 \neq IPC_j^4$
where n_p denotes the number of distinct 4 digit IPC subclasses listed in the patent p document.

[63] Results based on logit and OLS models give similar results and are shown in Appendix (Table A3 and Table A4).

[64] OECD Patent Quality Indicators database (ver. January 2020) includes EPO patent date with filing years from 1978 to 2018. However, in some years we do not observe any patent held by dormant companies active in UK. These years are dropped from the analysis.

Table 1. Dormant and non-dormant company patent quality. Probit results

VARIABLES	(1) PROBIT	(2) PROBIT	(3) PROBIT	(4) PROBIT	(5) PROBIT	(6) PROBIT
Patent Quality	-0.0362***	-0.0292**	-0.0295***	-0.0397***	-0.0323***	-0.0311***
	(0.0110)	(0.0104)	(0.0105)	(0.0113)	(0.0107)	(0.0107)
Patent Scope				0.0357***	0.0401***	0.0223**
				(0.0085)	(0.00877)	(0.00997)
Constant	-3.531***	-4.145***	-4.193***	-3.600***	-4.230***	-4.237***
	(0.0130)	(0.0228)	(0.238)	(0.0210)	(0.231)	(0.240)
Observations	2,643,326	2,610,537	2,525,892	2,643,326	2,610,537	2,525,892
Pseudo R2	0.00	0.02	0.05	0.00	0.02	0.05
Filing Year FE	NO	YES	YES	NO	YES	YES
Tech. Field FE	NO	NO	YES	NO	NO	YES

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Patent quality is proxied by the number of citations received in the first five years from the application date. Patent scope is proxied by the number of distinct assigned four-digit International Patent Classification (IPC) classes). Among the controls, we include 35 technological classes (2011 WIPO) and filing year dummies (1995 – 2016). Source for patent characteristics: OECD Patent Quality Indicators database, January 2020 (Squicciarini et al., 2013).

4. Conclusions

In this case study, we have shown that in the UK there are more than two hundred dormant companies – defined as entities that have no significant activity and accounting transactions, do not trade and do not receive any form of income – registered in 2019. These companies have no link with any operating company, have never reported any revenues in the past and hold transferred patents.

These companies are, on average, part of small groups, with no employees, but hold more than 14,000 patents issued by various patent offices (mainly, from GB, EP, US and CN). In about 40% of the cases, they are invisible entities, with no website or contact details (email or telephone), but sometimes they are global, with their parent company based outside the UK. Contrary to large and known NPEs, UK dormant companies do not focus on the ICT industry, but hold most of the patents in Chemicals. On average, these patents are of relatively low technological quality but have a high risk of litigation. All together, these characteristics suggest that these companies have a particular type of business that is being undertaken by "*bottom-feeder*" NPEs (Lemley and Melamed, 2013) - entities that are particularly interested in quick and low-value settlements.

Case Study #2

An example of a dormant NPE in the UK: Dragon Green Development Balboa SA

Abstract

Dragon Green Development Balboa SA (DGDB) is a non-practicing entity (NPE) with a substantial litigation record against various companies in Germany. Based in the Republic of Panama, DGDB makes extensive use of dormant companies in the United Kingdom to acquire, hold and litigate patents.

DGDB is involved in thirteen UK dormant companies, either as director or as shareholder, and holds fifteen patents. The entity has initiated six infringement suits over the course of its twelve-year existence, winning one action.

DGDB exploits the Panamanian, British and German legal systems to create a complex ownership structure suitable for patent litigation. The dormant companies created in the UK hold between 1£-100£ in capital thereby enabling them to hold IP rights and file patent infringement lawsuits without being required to pay any taxes. These companies are directed by proxy directors, maintaining in anonymity the real individuals behind the company and shielding them from legal action. They have no website, no contact address and make no attempt to advertise their products or services.

1. Case Background

The previous case study has shown that active dormant companies holding acquired patents in Europe are based almost exclusively in the United Kingdom, where they represent 90% of dormant companies currently registered in Europe. The present case study examines a company known as Dragon Green Development Balboa SA (henceforth, DGDB), a NPE based in the Republic of Panama that makes extensive use of UK dormant companies to monetize and assert patent assets in Europe.

Although DGDB is no longer active, it makes an interesting case study for three reasons: first, it illustrates how some NPEs use dormant companies to buy and monetize patents; second, it demonstrates how difficult it can be to identify who actually owns a patent and to obtain information about the patent holders; and third, it shows how the boundaries of dormant companies are fluid and constantly evolving, which makes them much less vulnerable to countersuits and more complex to hold anyone accountable.

2. Company presentation

2.1 Origin and incorporation

DGDB does not operate alone, nor does it operate in its own name. The company was created on 8 November 2007, and incorporated in Panama. The advantages of incorporating a company in Panama are numerous and range from the possibility of registering a company within two weeks and guaranteeing anonymity, to avoiding the need to present any accounts to the government (Appendix A1 reports several other advantages).

The original incorporation document issued by the Register of Panama only contains the names of the individuals listed in Table 1 (for reasons of privacy, we report only their initials in this document). However, given that each of them is involved in more than five hundred other companies, we may question whether they are the “real” stakeholders behind DGDB’s strategy, or whether they merely execute the administrative and legal tasks, or even whether they are just figureheads. In fact, it is explicitly stated in the company’s incorporation document that the board of directors can use proxies to represent themselves, the “real” individuals being able to act via the figureheads. The latter have no legal responsibility, as is also stated in the incorporation document.

The actual board of the company cannot be identified in any public data source. Moreover, in the incorporation document it is explicitly specified that the company holds 100 shares for a total capital of 10,000 USD and that individuals *A. M. C. P.* (Signatory/Representative) and *L. V.* (Director and President) hold one (1) share each. This means ninety-eight shares are unaccounted for, making it impossible to know who owns the company. The document also states that all decisions made by the company must be validated by a simple majority vote (in some cases unanimity is required). Therefore, neither *A. M. C. P.* nor *L. V.* have control over the company. In addition, Article 8 of the incorporation document states that in the meetings of the board of directors, the directors may be represented by one or more proxies who do not have to be directors of the company but who must be appointed by public or private document, with or without powers of substitution (see Appendix A2 for original text).

Table 1. Individuals listed in the incorporation of DGDB

Name	Function	Number of companies
D. I. C.	Director and Treasurer	843
J. E. A.	Director and Secretary	583
L. V.	Director and President	927
M. E. Q. DE C.	Signatory/Representative	864
A. M. C. P.	Signatory/Representative	1813

The table shows the initials (full names not reported to protect anonymity) of individuals involved in the creation of DGDB, their function and the number of other companies in which they appear (as directors, treasurers, presidents or representatives) at February 2020. Source: Orbis, OpenCorporates.

2.2 Corporate structure

A patent search revealed that DGDB is not the current or past assignee of any patent (Source: Questel Orbit, Google Patent, Espacenet). In fact, DGDB acquires patents only through subsidiaries and dormant companies.

To identify the affiliates of DGDB we rely on Orbis[65] and OpenCorporates[66], which provide data directly from the national registers (the methodology used for identifying DGDB subsidiaries is described in Appendix A3).

[65] Orbis is a financial database, it contains data from financial reports of companies as well as shareholder and management information (directors, ultimate corporate owners, etc.) (https://www.bvdinfo.com/en-gb)

[66] OpenCorporates contains official company data extracted directly from national registers (https://opencorporates.com), Orbis uses OpenCorporates as one of its data sources.

A complex and opaque network of shell companies

We identify ten companies in which DGDB acts as a director. However, since both Orbis and OpenCorporates only allow searches to be made in fields related to the role of company directors – and not as shareholders – we suspect that the number of companies in the DGDB network is likely to be more than ten.

In fact, a search conducted in additional data sources (among others, Companies House - https://www.gov.uk/government/organisations/companies-house) has led to the identification of three new companies in which DGDB acts as a shareholder. Given that this is an indirect search (i.e., we need first to identify the company and read its statements to determine if DGDB is a shareholder), the actual scope of influence of the DGDB group is still underestimated.

Table 2 contains information about the thirteen companies identified as belonging to DGDB. The data show that DGDB was a director in ten of the thirteen companies and a shareholder in six; in three of these six, DGDB had a dual role as both director and shareholder.

Table 2. DGDB and its network of companies

Company Name	Position held by DGDB	Incorporation date
ALPHA PHYSICAL AND LASER LIMITED	Director/Shareholder	14/11/2007
ALPHA LONDON MECHANICAL LTD.	Director/Shareholder	15/11/2007
LONDON EXPERT ELECTRONIC LTD.	Director	15/11/2007
MANCHESTER BIOGENE TIGER LTD.	Director	15/11/2007
MANCHESTER BIOLOGICAL LTD.	Director	15/11/2007
DOUBLE EAGLE MEDICAL LTD.	Director	29/11/2007
LONDON FUTURE OPTICAL LTD	Director	29/11/2007
MANCHESTER TELECOMMUNICATIONS DEVELOPMENT LTD.	Director	30/11/2007
DRAGON CHEMICAL ENGINEERING LTD	Director/Shareholder	03/12/2007
CAPRICORN BIOCHEMICALS LTD.	Director	01/01/2008
LONDON PACKET RADIO LTD	shareholder	25/11/2011
LONDON SMART BELLOWS LTD	shareholder	25/05/2012
LONDON SMART CASES	shareholder	25/05/2012

Source: Orbis, OpenCorporates and Companies House. The methodology used to identify the companies is described in the Appendix A3.

Figure 1. The network of directors and secretaries formed around DGDB

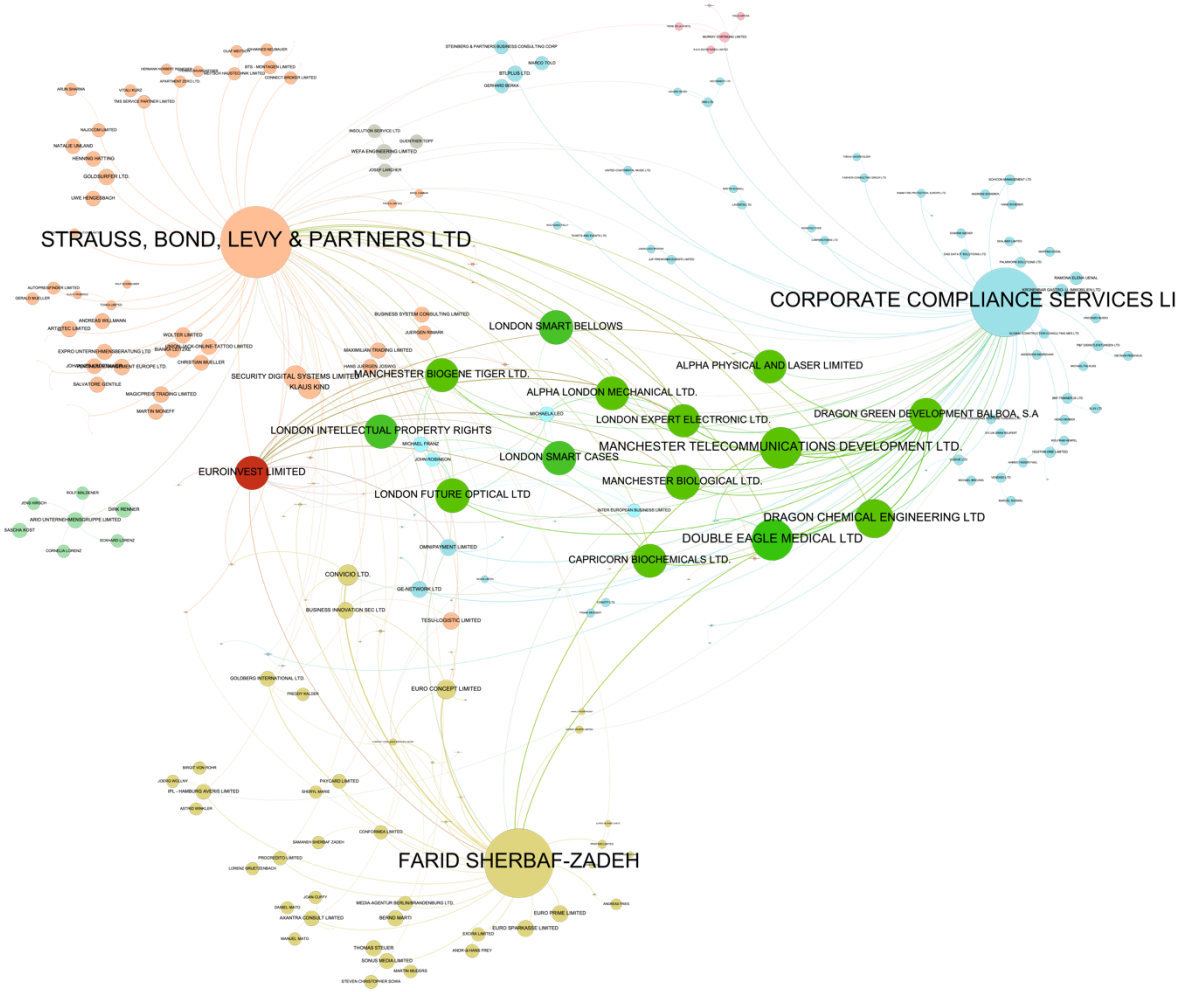


Figure 1 shows the network linking all directors, secretaries and shareholders of the DGDB group. Each node in this network is a company or an individual that acts as a director, secretary or shareholder.

Two anonymous legal addresses

Five companies were created a week after the incorporation of DGDB, and a further five companies followed not long after. At the beginning of 2008, DGDB consisted of ten companies. Interestingly, after almost four years without creating any additional companies, DGDB became the shareholder of three new companies, without appearing as director, suggesting a change in its strategy for monetizing patent assets. To illustrate how DGDB is founded on an extensive and complex structure of companies, Figure 1 shows the network

linking all DGDB directors, secretaries and shareholders. Each node in the network is a company or an individual that acts as a director, secretary or shareholder in the group. The network also shows that DGDB is indirectly linked to EUROINVEST LIMITED (a company founded and incorporated by P.C.V. on 30/01/2002 in the United Kingdom), the company that in 2018 would incorporate all the companies of the group, and the service providers "STRAUSS, BOND, LEVY & PARTNERS LTD", "CORPORATE COMPLIANCE SERVICES" and "FARID SHERVAF-ZADEH" who play the role of company secretaries in the DGDB companies (as in many other firms).

All thirteen companies are incorporated in the UK, and practically all of them have the exact same legal address. More specifically, twelve companies are located at *The 606 Centre, 5A Cuthbert Street W2 1XT, London* and one is located at *Carpenter Court 1, Maple Road SK7 2DH, Stockport* (See Figure 2).

Figure 2. Geographical locations of DGDB shell companies in the UK

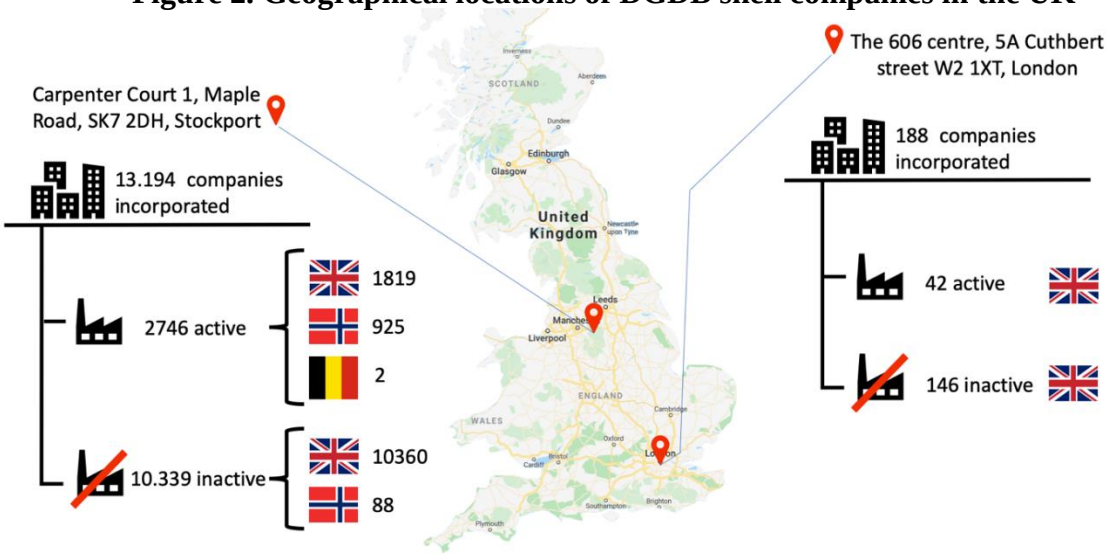


Figure 2 shows the number of companies located at the same address as the companies of DGDB.

Interestingly, the same addresses are reported by a large number of other firms. According to *OpenCorporates*, the first address (*The 606 Centre, 5A Cuthbert Street W3 1XT, London*) appears as the legal address of almost 200 other companies (of which, 42 are active today) and the second address (*Carpenter Court 1, Maple Road, SK7 2DH, Stockport*) of more than 13,000 different companies (2,746 of which are active today). It is in fact possible for multiple

companies to have the same address given that companies selling incorporation services provide a registration address in their packages.

The British company *Informdirect*[67] for instance offers a package that includes a "prestigious London address":

> *"If you wish to keep your residential address private, you can use the cost effective Registered Office Service provided by our partner, Registered Office (UK), and use of one of their addresses (choose from three London addresses, including W1, EC1 and WC2 postcodes, or an Edinburgh address). They can either scan and email or forward official registered mail to you. By default, they will be scanned and emailed, but you can change this preference at any time."*

There is also an option to use their address as a business address:

> *"This service may be particularly useful if you want to keep your own address private even from the people you do business with. It gives you the appearance of trading from a London or Edinburgh address. »*

The service packages sold by these companies are tailored towards anonymity for the individuals who wish to create a company. Although we have no proof of this, it seems very likely that DGDB used legal service providers to incorporate their companies.

This suspicion is further bolstered by the fact that the official incorporation documents of the UK DGDB companies report as shareholders and directors names that cannot be used to identify real persons ("STRAUSS, BOND, LEVY & PARTNERS LTD" and "CORPORATE COMPLIANCE SERVICES LIMITED"). For this particular purpose, a service provider, such as *SFM* (https://www.sfm.com/), offers nominee directors and nominee shareholders:

> *"The nominee director service may be used where a client doesn't wish to be personally appointed or has to meet local requirements. The name of the director will appear in the corporate documents, in any business contract and sometimes in the jurisdiction's business registers.*
>
> *Upon appointment of a nominee direction, nominee service agreement will be signed between the client and the nominee. It will guarantee the client that the*

[67] https://www.informdirect.co.uk/formation-packages/capital-pcls/

> *nominee can only act or sign documents upon the client's request and with the client's prior approval. Professional directors introduced by SFM work with the highest level of integrity and confidentiality."*

This means that the names of the individuals we are able to identify thanks to the original incorporation documents have no influence on the decisions made by the company.

Dormant companies

The companies linked to DGDB all have a specific industry code: 99.99/9 (UK SIC Classification 2007). This particular code is reserved for **dormant companies**, defined by Companies House as:

> *"A company that has no significant accounting transactions during the accounting period."*[68]

Dormant companies do not carry on any kind of business activity or receive any form of income. Dormant companies can remain dormant indefinitely and is not required to pay taxes. They are, however, allowed to hold intellectual property even though the companies themselves are unable to pay for the patent fees or for the transfer of the patent itself. The act of litigation does not invalidate this status as long as no fees are paid or money received.

The companies of DGDB have 1£ or 100£ in capital. This low capital level might shield the companies should they lose a court action, given that all companies are limited liability companies. In addition, according to section 144 of the German Patent Act, parties which due to their economic situation are not able to pay the court fees and its attorney fees may request that the legal costs be lowered for this party. This is what happened, for example, in a patent invalidation case in which the defendant was Manchester Telecommunications Development, a DGDB dormant company, and the plaintiff was AVM Computersysteme Vertriebs (Bundesgerichtshof Appeal, 03-09-2013).[69]

[68] A dormant company is different from a non-trading company (UK SIC 74990). The latter can still be involved in financial transactions while a dormant company cannot.

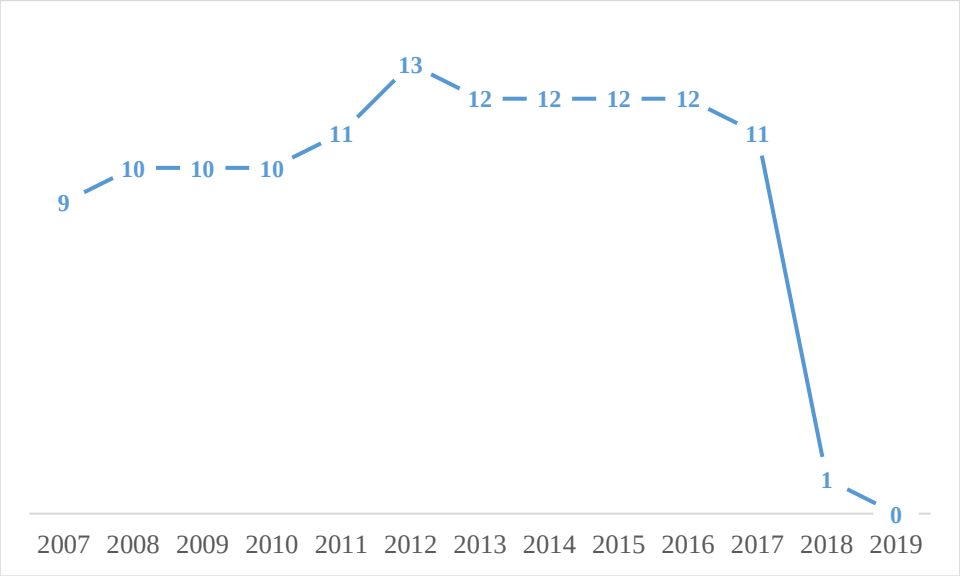
[69] The case followed the infringement lawsuit initiated by Manchester Telecommunications Development (MTD) against AVM Computersysteme Vertriebs (AVM). The patent court declared the patents null and void and asked MTD to pay the legal costs incurred by AVM. MTD requested a reduction in accordance with Section 144 (Patent Act), which allows the Court to reduce the costs when the defendant's assets are insufficient to cover the legal costs. The Court rejected the request.

A group in constant flux

The DGDB group consists of thirteen companies, but it is in constant flux. We can distinguish between two distinct phases in the life of the group: in the first phase (2007-2015), DGDB incorporated new dormant companies and acquired and litigated patent assets; in the second phase (2017-2019), DGDB either shut down companies or transferred them to EUROINVEST LIMITED (See Figure 3). The companies without patents were thus dissolved, with the exception of LONDON SMART CASES which remains active. The patents were then transferred to LONDON INTELLECTUAL PROPERTY RIGHTS, a subsidiary of EUROINVEST LIMITED.

It is worth noting that EUROINVEST was involved in the creation of DGDB as an initial director and subscriber of the company. Moreover, various secretaries and directors of the DGDB companies also held positions in the companies of EUROINVEST (see Figure 1). Based on this evidence, we can conclude that the main beneficiaries of EUROINVEST were also the main beneficiaries of DGDB, and that DGDB and EUROINVEST were in fact one and the same entity.

Figure 3. Evolution in number of DGDB companies over time



Number of registered DGDB shell companies by calendar year. Source: OpenCorporates, Orbis.

3. Business model

3.1 Patent portfolio acquisition

Heterogeneous patent portfolio

To learn more about the DGDB business model, we need to inspect the patents that were transferred to DGDB. Table 3 provides detailed information about the patents held by the companies of DGDB (including intra-group transfers).

Table 3. Details of the patents held by the DGDB Group

Date of transfer	DGDB Shell Company (as acquirer)	Patent Number	Previous Owner - Type	Previous Owner	Country	Technology
30/10/2008	MANCHESTER TELECOMMUNICATIONS DEVELOPMENT	DE10211642 A1	Inventor	M.G.	DE	Telecommunications
30/10/2008	ALPHA LONDON MECHANICAL LTD	DE202006018745U1	Inventor	A.E.G.F.	DE	Machine Tools
30/10/2008	DRAGON CHEMICAL ENGINEERING	DE19834095	Inventor	H.Z.	DE	Environmental technology
30/10/2008	MANCHESTER TELECOMMUNICATIONS DEVELOPMENT	DE50210968	Inventor	M.G.	DE	Basic communication processes
30/10/2008	MANCHESTER TELECOMMUNICATIONS DEVELOPMENT	DE10148799	Inventor	M.G.	DE	Basic communication processes
30/10/2008	MANCHESTER TELECOMMUNICATIONS DEVELOPMENT	DE19630515	Inventor	M.G.	DE	Basic communication processes
04/12/2008	MANCHESTER TELECOMMUNICATIONS DEVELOPMENT	DE20204265 U1	Inventor	M.G.	DE	Basic communication processes
30/04/2009	LONDON FUTURE OPTICAL	DE10050370 B4	Inventor	T.B.	DE	Other consumer goods
07/01/2010	DOUBLE EAGLE MEDICAL	DE10220060 B4	Inventor	G.F.	DE	Computer technology
07/01/2010	DOUBLE EAGLE MEDICAL	DE10350078 B3	Inventor	G.F.	DE	Computer technology
15/09/2011	ALPHA PHYSICAL AND LASER LIMITED	DE10109989 B4	Inventor	G.F.	DE	Transport
20/10/2011	LONDON SMART BELLOWS	DE19719863 C1	Company	CREATION BELLOWS HODING LIMITED	DE	Mechanical elements
19/01/2012	MANCHESTER BIOGENE TIGER LTD	DE19926640 C2	Inventor	R.F.	DE	Computer technology
20/09/2012	LONDON SMART BELLOWS	DE19719863 C1	Inventor	R.W.	DE	Mechanical elements
10/10/2013	LONDON INTELLECTUAL PROPERTY RIGHTS	DE10220061	Inventor	G.F.	DE	Computer technology

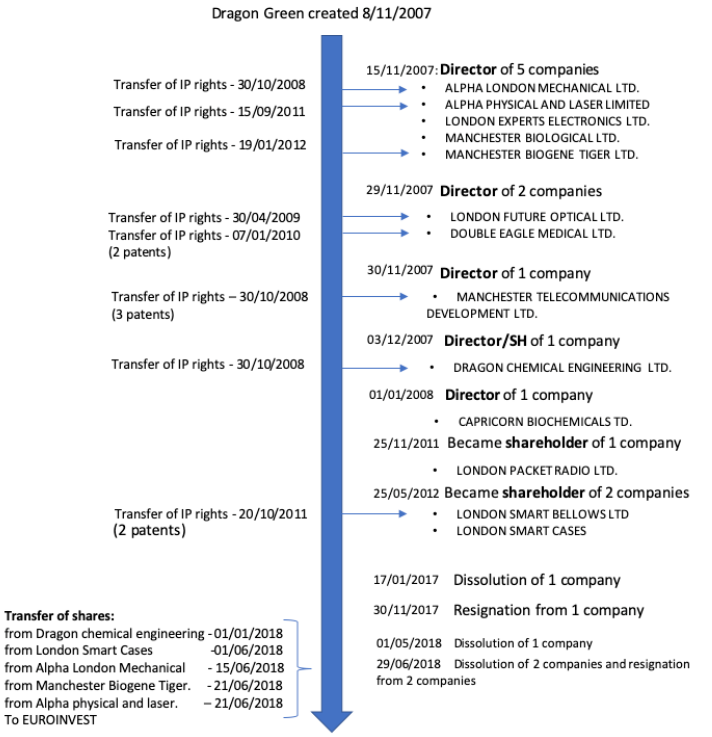
Sources: Questel Orbit and Google Patents.

Three details emerge from the data. First, we observe that DGDB only bought German patents and bought them exclusively from German inventors,[70] suggesting that, although the headquarters of DGDB is in Panama and all its subsidiaries are located in the UK, the

[70] It can be hypothesized that it is easier to convince inventors to sell patents or that they are more willing to sell (Leiponen & Delcamp, 2019). Moreover, any financial transactions can be easily kept secret if the company pays the inventor directly.

operational business unit had its home in Germany. Second, one company bought several patents, in different years, from the same inventor, *M.G.*, suggesting that the inventor might have had an active role in the company. Third, the patent acquisitions concerned very different technological fields, but each dormant company acquired patents in just one technological field. When a company acquired more than one patent, these were technologically close and had a number of citations in common.[71] This may reflect the different types of agreement entered into with different patent sellers and it would have made it easier for DGDB to segregate revenue originating from different sources (FTC, 2016). Interestingly, the name of the companies often gives an indication of the technological domain of the patents that they hold.

Figure 4. DGDB Timeline and IP transfers



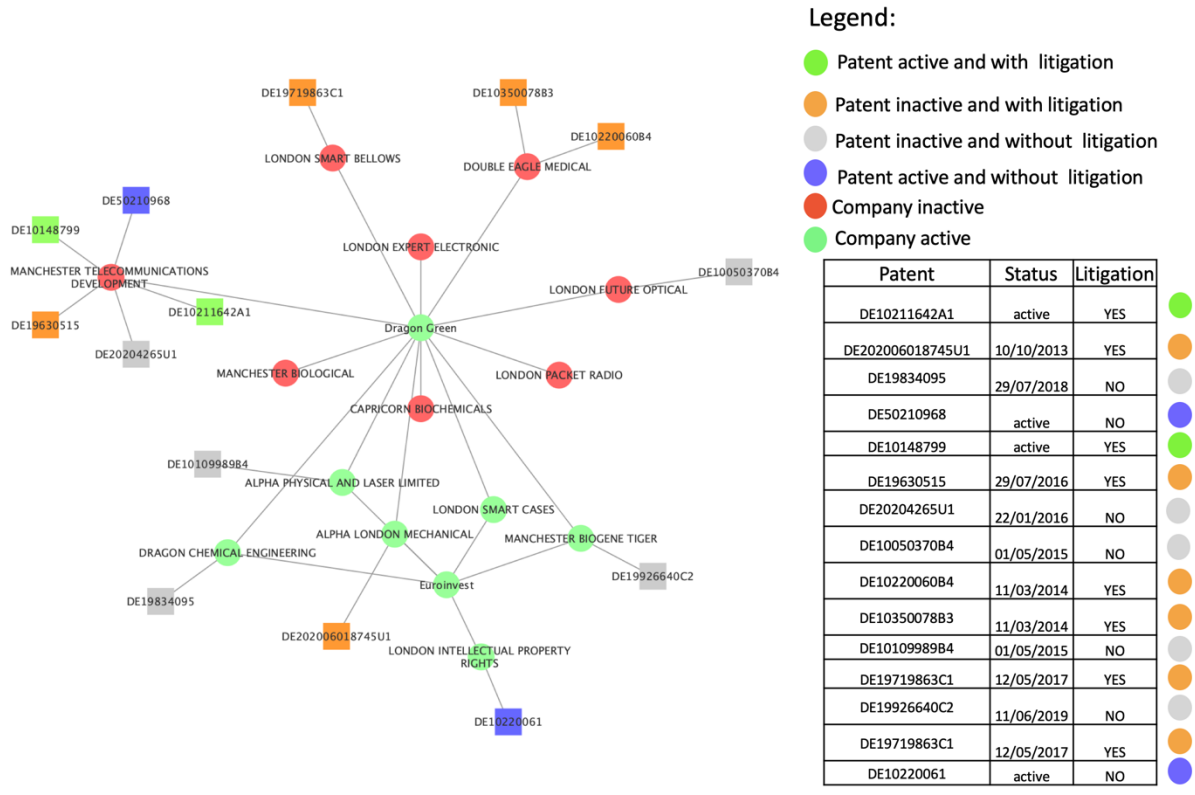
Sources: Google Patents, Questel Orbit, Orbis, Companies House, OpenCorporates

[71] We use the International Patent Classification to identify technological domains.

The patent portfolio acquisition timeline and the evolution of DGDB's corporate structure are shown in Figure 4. Eight of the thirteen companies acquired at least one patent and in almost all cases the patent transfer was registered at least 10 months after the company creation. Note that we can only observe the date at which the company decided to communicate the transfer to the patent office, thus creating the date that allowed the company to initiate litigation. It is entirely possible that a company waited before notifying the patent office, since it was under no obligation to do so.

Generally, the patent transfers to the DGDB companies anticipated a litigation event, if any. In only one case was the opposite true: in the case of the patent transfer to LONDON SMART BELLOWS the original inventor of the patent was sued in 2008, while the patent transfer was registered in 2012, just two months before the end of the proceedings (in which the *Bundesgeirchthof* declared the patent valid).

Figure 5. Mapping of the patents held by DGDB



Patent	Status	Litigation
DE10211642A1	active	YES
DE202006018745U1	10/10/2013	YES
DE19834095	29/07/2018	NO
DE50210968	active	NO
DE10148799	active	YES
DE19630515	29/07/2016	YES
DE20204265U1	22/01/2016	NO
DE10050370B4	01/05/2015	NO
DE10220060B4	11/03/2014	YES
DE1035007883	11/03/2014	YES
DE10109989B4	01/05/2015	NO
DE19719863C1	12/05/2017	YES
DE19926640C2	11/06/2019	NO
DE19719863C1	12/05/2017	YES
DE10220061	active	NO

Figure 5 shows the different companies linked to DGDB and the patents they held. It is evident that some companies were created without an observed patent transfer. Other companies such as MANCHESTER TELECOMMUNICATIONS DEVELOPMENT held five patents that were used for litigation. The latter, however is no longer active and the patents have been transferred. Sources: Questel Orbit, Google Patents, Darts-IP, OpenCorporates.

In order to facilitate understanding, Figure 5 presents a network linking the shell companies with the patents and, moreover, it specifies whether these patents were used for litigation purposes. The network shows that not all companies held patents (though the possibility remains that the patent acquisition was not registered). MANCHESTER TELECOMMUNICATIONS DEVELOPMENT held five patents, three of which were used for litigation. In all these cases, the company lost the infringement suits: however patents that remain active were later transferred to LONDON INTELLECTUAL PROPERTY RIGHTS.

Table 4 records information about the inventors that transferred patents to DGDB. Most of them were quite prolific, in some cases filing more than 30 patents. However, Table 4 also shows that the inventors did not sell their entire patent portfolio to DGDB. In most cases only one patent was transferred with the exception of inventor M.G., who transferred five of her 28 patents.

Table 4. Inventor details

Inventor name	*Patents filed*	*Patents transferred to DGDB*	*Patents involved in litigation*
M.G.	28	5	4 (of which, 2 after being transferred to DGDB)
F.G.	81	4	3 (of which, 2 after being transferred to DGDB)
W.R.	9	1	2 (of which, 2 after being transferred to DGDB)
H.E.	33	1	1 (after being transferred to DGDB)
F.H.	6	1	1 (before being transferred to DGDB)
H.Z.	3	1	1 (after being transferred to DGDB)
A.E.G.F.	8	1	1 (after being transferred to DGDB)

Sources: Darts IP, Google Patent, Orbit (Questel)

Interestingly, among the inventors who transferred their patents to DGDB, several appear as directors and shareholders of their own SME, although their patents are not assigned to their own companies. Moreover, although no clear links between inventors and DGDB can be established (other than through the transfer of a patent) and no links can be identified between the inventors themselves (in terms, that is, of localization, family relation or academic education), we suspect that some of the inventors may have been the originators of DGDB. This can be the case, for example, of W. R., who appears as the director of two UK companies with names that are similar to one of DGDB's shell companies and that are specialized in providing

legal services helping individuals to set up Limited Companies and monetize patent assets (See Annex 5.4).

Patent portfolio quality

It is well known that all patents are not created equal. Indeed, a vast literature exists identifying indicators that allow the value of a patent to be assessed. For the purposes of this analysis, we focus on patent citations. A citation received by a patent is known as a "forward citation", indicating that the invention is being used for the creation of new inventions. A patent that receives a high number of citations is thus considered as being of high value. Trajtenberg (1990) and Albert *et al*. (1991) were among the first scholars to demonstrate empirically that highly cited patents have a higher economic and technological importance and, since then, almost all scholars have used forward citations to approximate the value of a patent.

Figure 6 summarizes the main characteristics of the patents acquired by DGDB. The data show that five patents have not received any citations. Note that the number of citations was computed as of November 2019 and, therefore, includes any citations that might have been made after the purchase by DGDB. Only two patents appear to have a relatively high number of citations. In general, patents in the DGDB portfolio received almost all their citations before transfer to DGDB: the average number of citations per patent being 1.5 before transfer and less than 0.5 after transfer.[72] The relatively low number of citations received by the DGDB patents suggests that the quality of the DGDB patent portfolio is not especially high. Moreover, the fall in the number of citations received by the patents after transfer to DGDB suggests that the company did not buy patents for the further development of that technology.[73] This is particularly evident for the most frequently cited patent *DE19926640*, transferred to DGDB in 2012, which had received seven citations before transfer (between 1999 and 2012) and only one citation after transfer (between 2012 and 2019).

A second indication of patent quality is the geographical extension of the patent (Putnam, 1996). Protecting the invention in different countries expands the potential market for the products

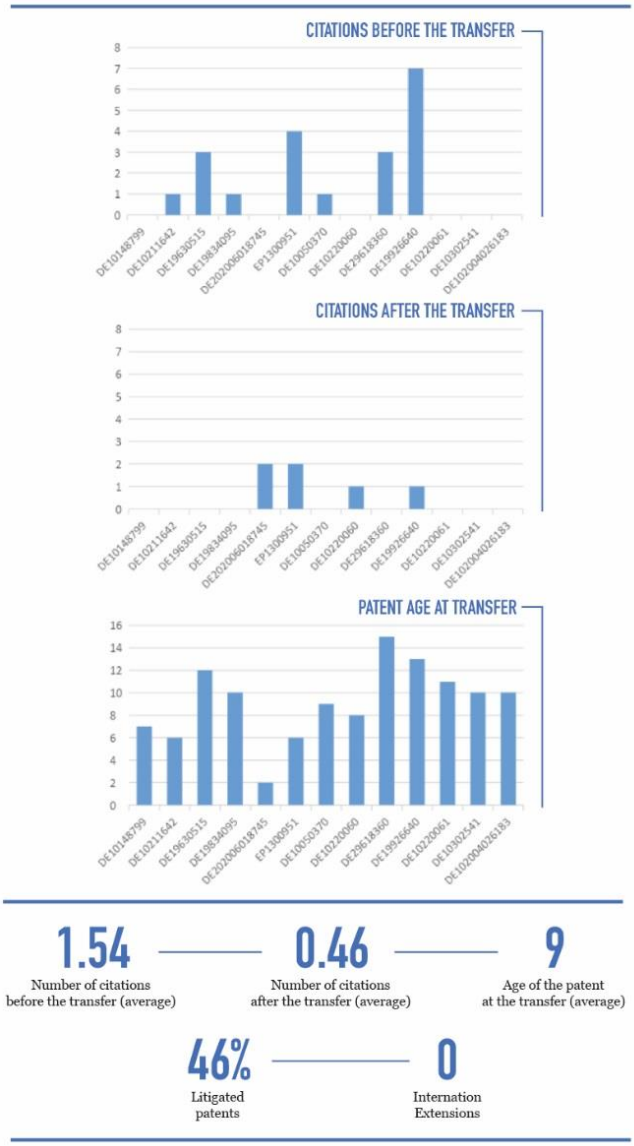
[72] Note that this difference is not due to a truncation issue since on average each patent is observed nine years before and nine after the transfer.

[73] Orsatti and Sterzi (2019a, 2019b) and Abrams et al. (2019) measure the impact of patent transfers to NPEs on innovation dynamics by comparing the number of citations the patents receive before and after the transfer. They observe a fall in the number of citations received by patents after they have been transferred to an NPE.

using the invention. An assignee who protects her invention in a larger number of markets expects more from her invention than an assignee protecting it in only one market. With the exception of patent *EP1300951*, which was filed at the European Patent Office, all the other acquired patents were filed at the German National Patent Office. However, although international protection for the European patent application was initially requested for patent *EP1300951*, the assignee did not complete it and the patent is only valid in Germany.

Finally, with the exception of one patent acquired when it was two years old (DE202006018745), all the other patents acquired by DGDB were transferred at least 6 years after filing, and most of them after 10 (See Figure 6).

Figure 6. Patent Portfolio Characteristics



3.2 Litigation activity

DGDB began its litigation activity in June 2009 when one of the dormant companies in the group (MANCHESTER TELECOMMUNICATIONS) initiated an infringement action against AVM COMPUTERSYSTEME VERTRIEBS GmbH (AVM), a consumer electronics company

founded in 1986 in Berlin. In 2015, AVM employed 570 people and generated sales of 400 million euros. Three more cases were initiated in the following three years. In these cases, and also in that of all the other litigation cases, the name of DGDB does not officially appear, but the plaintiffs are the dormant companies as shown in Table 5.

The only dormant company that succeeded in winning its suit for infringement was ALPHA LONDON MECHANICAL. The patent concerned (DE202006018745U1) included just one independent claim, stating that the invention was a "part for a knife or cutting tool, producible by laser sintering"[74] and it is cited twice in its lifetime. Recently, on 26 November 2019, ALPHA LONDON MECHANICAL filed a new lawsuit for an infringement action against the same defendant (F.S.), more than nine years after the previous case had been concluded. However, in the available databases, ALPHA LONDON MECHANICAL appears as the patent owner only of the patent asserted in 2010 and which is now expired. It is therefore impossible to determine for which patent the company is now claiming infringement.

With the exception of the 2010 case initiated by ALPHA LONDON MECHANICAL, the DGDB companies have lost all their infringements suits (their patents being invalidated) or no decision has yet been reached (See again Table 5).

In the German judicial system, when a patent is used to sue someone for infringement, there is an automatic procedure to invalidate the target patent (so-called bifurcated patent litigation system), where patent infringement and validity are decided independently by different courts[75]. When invalidity actions were taken against the DGDB dormant companies, in three cases the patents were validated, in three other cases they were invalidated and in one case no decision has (yet) been made. Each DGDB dormant company initiated infringement actions against just one company. Interestingly, two DGDB dormant companies appeared as defendants in litigation cases for patent invalidity actions, without their appearing as plaintiffs in any infringement action cases. This is probably due to the reaction of some companies on receiving a letter threatening action from a DGDB dormant company.

[74] https://patents.google.com/patent/DE202006018745U1/en?oq=DE202006018745(U1)

[75] See Cremers et al. (2016) for a discussion of the implication of Germany's bifurcated patent litigation system for litigation strategies.

Table 5. Patent litigation activities

Plaintiff	Defendant	Date	Nature of the action	Patent Holder	Patent	Decision
ANONYMOUS	**LONDON SMART BELLOWS & R. W.**	25-06-2008	Invalidity Action	Defendant	DE19719863(C1)	Patent Valid
MANCHESTER TELECOMMUNICATIONS DEVELOPMENT	AVM COMPUTERSYSTEME VETRIEBS	30-06-2009	Infringement action	Plaintiff	DE19630515(A1)	No infringement
AVM COMPUTERSYSTEME VETRIEBS	**MANCHESTER TELECOMMUNICATIONS DEVELOPMENT**	19-07-2010	Invalidity Action	Defendant	EP1300951(A2)	No winner
MANCHESTER TELECOMMUNICATIONS DEVELOPMENT	AVM COMPUTERSYSTEME VETRIEBS	27-07-2010	Infringement action	Plaintiff	DE10148799	No infringement
MANCHESTER TELECOMMUNICATIONS DEVELOPMENT	AVM COMPUTERSYSTEME VETRIEBS	27-07-2010	Infringement action	Plaintiff	DE10211642(A1)	No infringement
ALPHA LONDON MECHANICAL	F. S.	19-08-2010	Infringement action	Plaintiff	DE202006018745(U1)	Infringement
AVM COMPUTERSYSTEME VETRIEBS	**MANCHESTER TELECOMMUNICATIONS DEVELOPMENT**	01-12-2010	Invalidity Action	Defendant	DE10211642(A1)	Patent Valid
AVM COMPUTERSYSTEME VETRIEBS	**MANCHESTER TELECOMMUNICATIONS DEVELOPMENT**	02-12-2010	Invalidity Action	Defendant	DE20204265(U1)	Patent Valid
ANONYMOUS	**DOUBLE EAGLE MEDICAL**	04-03-2011	Invalidity Action	Defendant	DE10350078(B3)	Patent Invalid
ANONYMOUS	**DOUBLE EAGLE MEDICAL**	04-03-2011	Invalidity Action	Defendant	DE10220060(A1)	Patent Invalid
MANCHESTER TELECOMMUNICATIONS DEVELOPMENT	AVM COMPUTERSYSTEME VETRIEBS	15-12-2011	Infringement action	Plaintiff	DE19630515(A1)	NA
MANCHESTER TELECOMMUNICATIONS DEVELOPMENT	AVM COMPUTERSYSTEME VETRIEBS	15-12-2011	Other action	Plaintiff	Anonymous	NA
ANONYMOUS	**LONDON OPTICAL CAR SYSTEMS**	13-04-2018	Invalidity Action	Defendant	DE000010302541(A1)	No decision yet
ALPHA LONDON MECHANICAL	F. S. | K.B.	26-11-2019	Infringement action	Plaintiff	Unknown	No decision yet

This table presents the litigations involving DGDB dormant companies (in bold). Each line in the table represents a different litigation case. The dark blue lines correspond to the cases won by DGDB (either their patent remained valid after an invalidity action or they won an infringement case). The light blue lines correspond to the cases lost by DGDB (either their patent was declared invalid or no infringement was identified).

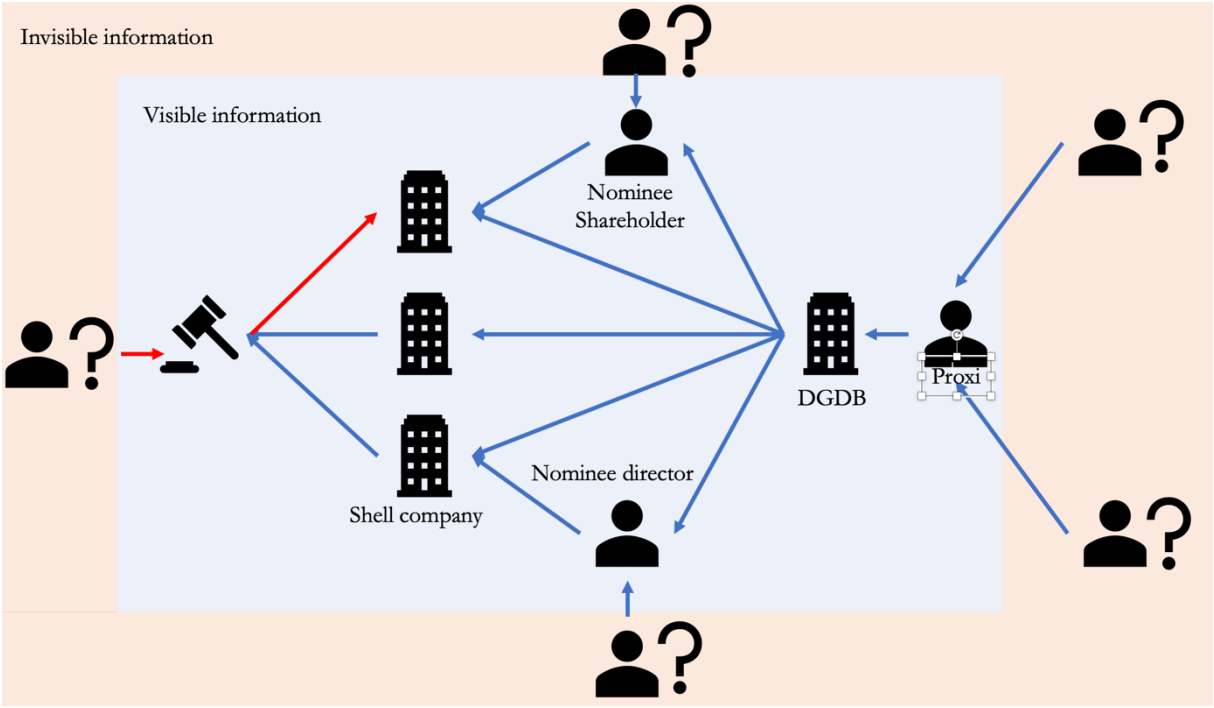
4. Discussion

What does emerge from our study is that the structure of DGDB was carefully organized to ensure that what is visible of the company provides no information about the individuals who control and reap the rewards from the IP assets acquired on the patent market. The beneficial owner of DGDB is not listed in the public records nor is his or her identity disclosed to the public authorities as the legal owner.

This can be attributed to both the lack of ownership transparency in corporate formation and to the opacity of the patent system. On the one hand, corporation laws vary from state to state, and some states (such as Panama) do not collect and verify information identifying beneficial owners. On the other hand, information about changes in patent ownership is not always recorded by the Patent Office, and even when formal ownership is properly registered, this

information reveals very little as to who has the right to assert the patent. Moreover, registration at the Patent Office does not necessarily coincide with the moment when the transfer actually occurred.

Figure 7. Corporate structure: *Visible* and *Invisible* Information



The blue zone in the figure shows the data we are able to identify through our data sources (shell companies, DGDB, nominee directors and shareholders, and litigations). However, the people influencing what we observe (red zone) remain unidentified. We know they exist based on our observations but we cannot identify them.

In the case of DGDB, the use of nominee directors and nominee shareholders ensured that the individuals or companies that acted as directors were visible (those identified here), but the individuals making the decisions remained hidden. These nominees were in general involved in many different companies (in one case more than 1,800), giving rise to doubts about the actual existence of these individuals.

7. References

Abrams, D.S., Akcigit, U., Oz, G. and Pearce, J.G., 2019. The Patent Troll: Benign Middleman or Stick-Up Artist? (No. w25713). National Bureau of Economic Research.

Albert, M.B., Avery, D., Narin, F. and McAllister, P., 1991. Direct validation of citation counts as indicators of industrially important patents. *Research policy*, 20(3), pp.251-259.

Anderson, N.P., 2015. Striking a balance: The pursuit of transparent patent ownership. *Berkeley Technology Law Journal*, 30(4), pp.395-444.

Ansell, L., Arad, R., Branch, D., Lee, H., Pasha, A., & Robinson, P. 2018. PwC Patent Litigation Study.

Appel, I., Farre-Mensa, J. and Simintzi, E., 2019. Patent trolls and startup employment. *Journal of Financial Economics*, 133(3), pp.708-725.

Ard, B.J., 2018. More Property Rules than Property: The Right to Exclude in Patent and Copyright. *Emory LJ*, 68, p.685.

Arora, A., Fosfuri, A., Gambardella, A., 2001. Markets for Technology: The Economics of Innovation and Corporate Strategy. MIT Press, Cambridge, MA.

Bartels, A. 2018. European Tech Market Expected to Continue Slow Growth Through. ZDNET (Aug. 16, 2017, 13:29 PDT), http://www.zdnet.com/article/europeantech-market-will-continue-to-grow-slowly-at-around-2-in-euros.

Bessen, J. and Meurer, M.J., 2005. Lessons for patent policy from empirical research on patent litigation. *Lewis & Clark L. Rev.*, 9, p.1.

Bessen, J. and Meurer, M.J., 2014. Essay, The Direct Costs from NPE Disputes, *Cornell L. Rev*, 387, pp.422-23.

Blind, K., Edler, J., Frietsch, R. and Schmoch, U., 2006. Motives to patent: Empirical evidence from Germany. *Research Policy*, 35(5), pp.655-672.

Burk, D.L. and Lemley, M.A., 2003. Policy levers in patent law. *Virginia Law Review*, pp.1575-1696.

Carlon, T.L., 2017. The Innovation Act (HR 9): The Impact It Will Have on Non-Frivolous Lawsuits. *Syracuse J. Sci. & Tech. L.*, 34, p.28.

Chien, C.V., 2010. From arms race to marketplace: the complex patent ecosystem and its implications for the patent system. *Hastings Lj*, 62, p.297.

Chien, C.V., 2012. Patent assertion entities. Presentation to the Dec, 10.

Ciaramella, L., Martínez, C. and Ménière, Y., 2017. Tracking patent transfers in different European countries: methods and a first application to medical technologies. *Scientometrics*, 112(2), pp.817-850.

Clugston, C.J. and Kim, W., 2017. The Unintended Consequences of the Injunction Law after eBay v. MercExchange: An Empirical Study of the Effects on Injunctions in Patent Law. *Journal of the Patent and Trademark Office Society*.

Cohen, W.M., Nelson, R.R. and Walsh, J.P., 2000. Protecting their intellectual assets: Appropriability conditions and why US manufacturing firms patent (or not) (No. w7552). National Bureau of Economic Research.

Cohen, L., Gurun, U.G. and Kominers, S.D., 2016. The growing problem of patent trolling. *Science*, 352(6285), pp.521-522.

Cohen, L., Gurun, U.G. and Kominers, S.D., 2019. Patent trolls: Evidence from targeted firms. *Management Science*, 65(12), pp.5461-5486.

Cotropia, C.A., Kesan, J.P. and Schwartz, D.L., 2014. Unpacking patent assertion entities (PAEs). *Minn. L. Rev.*, 99, p.649.

Cremers, K., Gaessler, F., Harhoff, D., Helmers, C. and Lefouili, Y., 2016. Invalid but infringed? An analysis of the bifurcated patent litigation system. *Journal of Economic Behavior & Organization*, 131, pp.218-242.

Dolak, L.A. and Bettinger, B.T., 2008. eBay and the BlackBerry: A Media Coverage Case Study. *Akron Intell. Prop. J.*, 2, p.1.

Du Plessis, M., Van Looy, B., Song, X. and Magerman, T., 2010. Data production methods for harmonized patent statistics: Patentee sector allocation 2009. Eurostat Working Paper-Annual Report 2009.

Encaoua, D., Guellec, D. and Martínez, C., 2006. Patent systems for encouraging innovation: Lessons from economic analysis. *Research policy*, 35(9), pp.1423-1440.

Feldman, R., 2012. Rethinking patent law. Harvard University Press.

Feldman, R. and Ewing, T., 2012. The giants among us. *Stanford Technology Law Review*, 1.

Feldman, R., Price, W. and Nicholson, I.I., 2013. Patent Trolling: Why Bio & Pharmaceuticals Are at Risk. *Stan. Tech. L. Rev.*, 17, p.773.

Feldman, R., 2014. Transparency. 19 *Va. J. L. & Tech*. 272.

Feldman, R. and Frondorf, E., 2015. Patent demands and initial public offerings. *Stan. Tech. L. Rev.*, 19, p.52.

Feldman, R. and Lemley, M.A., 2015. Do patent licensing demands mean innovation. *Iowa L. Rev.*, 101, p.137.

Feng, J. and Jaravel, X., 2020. Crafting intellectual property rights: Implications for patent assertion entities, litigation, and innovation. *American Economic Journal: Applied Economics*, 12(1), pp.140-81.

Fischer, T. and Henkel, J., 2012. Patent trolls on markets for technology–An empirical analysis of NPEs' patent acquisitions. Research Policy, 41(9), pp.1519-1533.

FTC (US Federal Trade Commission) 2016. Patent assertion entity activity: An FTC study. Retrieved September, 6, 2017. Available at: https://www.ftc.gov/reports/patent-assertion-entity-activity-ftc-study

Fusco, S., 2013. Markets and Patent Enforcement: A Comparative Investigation of Non-Practicing Entities in the United States and Europe. *Mich. Telecomm. & Tech. L. Rev.*, 20, p.439.

Gabison, G.A., 2015. Lessons that Europe can learn from the US patent assertion entity phenomenon. *Information & Communications Technology Law*, 24(3), pp.278-302.

Gaessler, F., 2016. Enforcing and trading patents. *Innovation und Entrepreneurship*.

Giuri, P., Hirsch, D., Szepanowska-Kozlowska, K., Selhofer, H., Temple Lang, J. and Thumm, N., 2015. Report of the expert group on patent aggregation. European Commission.

Gorbatyuk, A. and Kovács, A., 2019. Patent notice (failure) in the era of Patent Monetization. Available at SSRN 3404128.

Graham, S.J., Marco, A.C. and Myers, A.F., 2018. Patent transactions in the marketplace: Lessons from the uspto patent assignment dataset. Journal of Economics & Management Strategy, 27(3), pp.343-371.

Hall, B.H., 2004. Exploring the patent explosion. *The Journal of Technology Transfer*, 30(1-2), pp.35-48.

Helmers, C., 2018. The economic analysis of patent litigation data (Vol. 48). WIPO.

Holte, R.T., 2014. Trolls or Great Inventors: Case Studies of Patent Assertion Entities. *Louis ULJ*, 59, p.1.

Jeruss, S., Feldman, R. and Walker, J., 2012. The America Invents Act 500: Effects of patent monetization entities on US litigation. *Duke L. & Tech. Rev*., 11, p.357.

Kingston, W., 2001. Innovation needs patents reform. *Research Policy*, 30(3), pp.403-423.

Krazit, T. and Broache, A., 2006. BlackBerry saved. CNET news. com, accessed on May, 26, p.2008.

Jones, M., 2006. Permanent injunction, a remedy by any other name is patently not the same: how ebay v. mercexchange affects the patent right of non-practicing Entities. *Geo. Mason L. Rev.*, 14, p.1035.

Le Bas, C. and Pénin, J., 2014. Patents and innovation: Are the brakes broken, or how to restore patents' dynamic efficiency?. Document de Travail, (2014-2).

Lee, W.F. and Melamed, A.D., 2015. Breaking the Vicious Cycle of Patent Damages. *Cornell L. Rev.*, 101, p.385.

Leiponen, A. and Delcamp, H., 2019. The anatomy of a troll? Patent licensing business models in the light of patent reassignment data. *Research Policy*, 48(1), pp.298-311.

Lemley, M.A., 2002. Intellectual property rights and standard-setting organizations. *Calif. L. Rev*., 90, p.1889.

Lemley, M.A., 2008. Ignoring patents. *Mich. St. L. Rev*., p.19.

Lemley, M. A. and Shapiro, C., 2006. Patent holdup and royalty stacking. *Tex. L. Rev*. 85, 1991.

Lemley, M.A. and Melamed, A.D., 2013. Missing the Forest for the Trolls. Colum. L. Rev., 113, p.2117.

Lerner, J., 1994. The importance of patent scope: an empirical analysis. *The RAND Journal of Economics*, pp.319-333.

Leslie, C.R., 2008. Antitrust and patent law as component parts of innovation policy. *J. Corp. L.*, 34, p.1259.

Levin, R.C., Klevorick, A.K., Nelson, R.R., Winter, S.G., Gilbert, R. and Griliches, Z., 1987. Appropriating the returns from industrial research and development. *Brookings papers on economic activity*, 1987(3), pp.783-831.

Liu, X., 2012. Joinder under the AIA: Shifting non-practicing entity patent assertions away from small businesses. *Mich. Telecomm. & Tech. L. Rev.*, 19, p.489.

Love, B.J., Helmers, C., Gaessler, F. and Ernicke, M., 2016. Patent assertion entities in Europe. Mimeo.

Lu, J.J., 2012. The myths and facts of patent troll and excessive payment: have nonpracticing entities (NPEs) been overcompensated?. *Business Economics*, 47, pp.234-249.

Macdonald, S. 2004. When means become ends: considering the impact of patent strategy on innovation. *Information Economics and Policy*, 16(1), 135-158.

Magliocca, G.N., 2006. Blackberries and barnyards: Patent trolls and the perils of innovation. *Notre Dame L. Rev.*, 82, p.1809.

Marco, A.C., Myers, A., Graham, S.J., D'Agostino, P. and Apple, K., 2015a. The USPTO patent assignment dataset: Descriptions and analysis.

Marco, A.C., Carley, M., Jackson, S. and Myers, A., 2015b. The USPTO Historical Patent Data Files Two Centuries of Innovation. Available here: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2849514

Martin, S. and Partnoy, F. 2011. Patents as Options, in F. Scott Kieff and Trpy A. Paredes, eds. Perspectives on Commercializing Innovation, Cambridge, UK.

Masur, J.S., 2011. Regulating Patents. *The Supreme Court Review*, 2010(1), pp.275-326.

Mayergoyz, A., 2009. Lessons from Europe on How to Tame US Patent Trolls. *Cornell Int'l LJ*, 42, p.241.

McDonough III, J.F., 2006. The myth of the patent troll: an alternative view of the function of patent dealers in an idea economy. *Emory LJ*, 56, p.189.

Mejer, M. and de la Potterie, B.V.P., 2012. Economic incongruities in the European patent system. *European Journal of Law and Economics*, 34(1), pp.215-234.

Menell, P.S. and Meurer, M.J., 2013. Notice failure and notice externalities. *Journal of Legal Analysis*, 5(1), pp.1-59.

Ménière, Y., Dechezleprêtre, A. and Delcamp, H., 2012. Le marché des brevets français. Une analyse quantitative des cessions à partir des inscriptions dans le Registre national et le Registre européen des brevets. Rapport d'étude réalisée pour l'INPI.

Orsatti, G. and Sterzi, V., 2019a. Do Patent Assertion Entities Harm Innovation? Evidence from Patent Transfers. Mimeo. Available here: https://www.dropbox.com/s/0ngo1l0gdktdxis/Orsatti%20and%20Sterzi%202019.pdf?dl=0

Orsatti, G. and Sterzi, V., 2019b. NPEs, the Market for Patents and Follow-on Innovation. Evidence from Patent Transfers at the USPTO. Mimeo. Available at: https://npeie.org/wp-content/uploads/2020/03/Orsatti-and-Sterzi-2019.pdf

Orsenigo, L. and Sterzi, V., 2010. Comparative study of the use of patents in different industries. Knowledge, Internationalization and Technology Studies (KITeS), 33. Avalaible at: https://ideas.repec.org/p/cri/cespri/kites33_wp.html

Osenga, K., 2014. Formerly manufacturing entities: Piercing the patent troll rhetoric. *Conn. L. Rev.*, 47, p.435.

Pénin, J., 2012. Strategic uses of patents in markets for technology: A story of fabless firms, brokers and trolls. *Journal of Economic Behavior & Organization*, 84(2), pp.633-641.

Perkins, D. and Mills, G., 1996. Patent infringement and forum shopping in the European Union. *Fordham Int'l LJ*, 20, p.549.

Reitzig, M., Henkel, J. and Heath, C., 2007. On sharks, trolls, and their patent prey—Unrealistic damage awards and firms' strategies of "being infringed". *Research Policy*, 36(1), pp.134-154.

Risch, M., 2012. Patent troll myths. *Seton Hall L. Rev.*, 42, p.457.

Roycroft, R.W. and Kash, D. 1999. The Complexity Challenge: Technological Innovation for the 21st Century, Francis Pinter, London

Schwartz, D.L., 2012. The Rise of Contingent Fee Representation in Patent Litigation. *Ala. L. Rev.*, 64, p.335.

Schwartz, D. and Kesan, J., 2014. Analyzing the Role of Non-Practicing Entities in the Patent System. *Cornell Law Review*, 99, p.425.

Scott Morton, F. and Shapiro, C. 2013. Strategic patent acquisitions. *Antitrust Law Journal* 2, 463-499.

Scott Morton, F. and Shapiro, C., 2016. Patent Assertions: Are We Any Closer to Aligning Reward to Contribution?. *Innovation Policy and the Economy*, 16(1), pp.89-133.

Seidenberg, S., 2006. Troll control. *ABAJ*, 92, p.51.

Shrestha, S.K., 2010. Trolls or market-makers-an empirical analysis of nonpracticing entities. *Colum. L. Rev.*, 110, p.114.

Stengel, J.L. and Trautmann, K.P., 2016. Determining United States Jurisdiction over Transnational Litigation. *Rev. Litig.*, 35, p.1.

Steensma, H.K., Chari, M. and Heidl, R., 2016. A comparative analysis of patent assertion entities in markets for intellectual property rights. *Organization Science*, 27(1), pp.2-17.

Squicciarini, M., Dernis, H. and Criscuolo, C., 2013. Measuring patent quality. OECD Science, Technology and Industry Working Papers, No. 2013/03, available at : http://dx.doi.org/10.1787/5k4522wkw1r8-en.

Sterzi, V., 2013. Patent quality and ownership: An analysis of UK faculty patenting. *Research Policy*, 42(2), pp.564-576.

Sterzi, V., Pezzoni, M. and Lissoni, F., 2019. Patent management by universities: evidence from Italian academic inventions. *Industrial and Corporate Change*, 28(2), pp.309-330.

Taylor, A.K., 2006. What Does Forum Shopping in the Eastern District of Texas Mean for Patent Reform. *J. Marshall Rev. Intell. Prop. L.*, 6, p.i.

Thumm, N. and Gabison, G., 2016. Patent Assertion Entities in Europe: Their impact on innovation and knowledge transfer in ICT markets (No. JRC103321). Joint Research Centre (Seville site).

Thumm, N., 2018. The good, the bad and the ugly–the future of patent assertion entities in Europe. *Technology Analysis & Strategic Management*, 30(9), pp.1046-1056.

Trajtenberg, M., 1990. A penny for your quotes: patent citations and the value of innovations. *The Rand Journal of Economics*, pp.172-187.

Tucker, C.E., 2014. Patent trolls and technology diffusion: The case of medical imaging. Available at SSRN 1976593.

Weintraub, R.J., 1994. International Litigation and Forum Non Conveniens. *Tex. Int'l LJ*, 29, p.321.

Williamson, O.E., 1979. Transaction-cost economics: the governance of contractual relations. *The journal of Law and Economics*, 22(2), pp.233-261.

Williamson, O.E., 1985. The Economic Institutions of Capitalism. New York, New York Free Press.

8. Annex

Chapter 2

A1. Litigation costs in Europe

Table A1. Litigation costs in Europe

Member state	Cost of 1st Instance (€'000s)	Cost of 2nd Instance (€'000s)
United Kingdom	150 to 1500	150 to 1000
France	50 to 200	40 to 150
Germany (both actions)	50 to 90	90 to 150

Source: IAM Magazine, May/June 2010

A2. Identification of NPE patent applications at EPO

The identification of NPE-acquired patents required three steps.

First, we produced an extensive list of NPEs active in the European technology market. This was achieved by exploiting several external sources of information about NPEs that are active worldwide. As a primary source of data we collect information contained in patent litigation data from the UK, Germany and the US. We put together NPEs' names originally collected by Love et al. (2016)[76,77] and by Cotropia et al. (2014). We then complement this list of NPEs with information from web sites specialized in monitoring the NPE activity.

Second, we cleaned the list of applicants retrieved from the EP-Register database (ver. November 2015)[78] to track their patenting history at the EPO. The EP-Register database contains all the publicly available bibliographic, procedural and legal status information on European patent applications as they pass through each stage of the granting process. We restrict our analysis to EP patents filed during the period 1997-2012.

Third, in order to identify EP applications assigned to NPEs, we performed a semantic matching procedure between entity names included in the aforementioned NPE list and the 'cleaned' applicant names recorded in the EP-Register database.[79]

[76] Love et al. (2016) define 7 groups of potentially non-practicing entities: (1) IP Licensing Co., Acquired Patents; (2) IP Licensing Co., Owned by Inventor or Failed Product Producing Co.; (3) University, University IP Licensing Spin-off, or Other Research Institution; (4) Start-up, Suing Pre-Product; (5) Individual; (6) Industry Consortium; (7) IP Subsidiary of a Product-Producing Co. For the purpose of our study, we only extract information contained in groups (1) and (2).
[77] We thank Fabian Gaessler for providing these data.
[78] https://www.epo.org/searching-for-patents/legal/register.html#tab-1
[79] See Orsatti and Sterzi (2019a) for further details.

A3. Presence of NPEs in different technological fields

In what follows, we show the share of patents transferred to NPEs over the total number of patents transferred (to NPEs or operating companies) for different technological fields. Using data from the OECD (Patent Quality 2018), we assigned each patent to one technology. The OECD uses the IPC-Technology concordance table developed by the WIPO (rev. 2011). The taxonomy is structured in 5 sectors and 35 fields, as follows:

1. **Electrical engineering**: 1. Electrical machinery, apparatus, energy 2. Audio-visual technology 3. Telecommunications 4. Digital communication 5. Basic communication processes 6. Computer technology 7. IT methods for management 8. Semiconductors

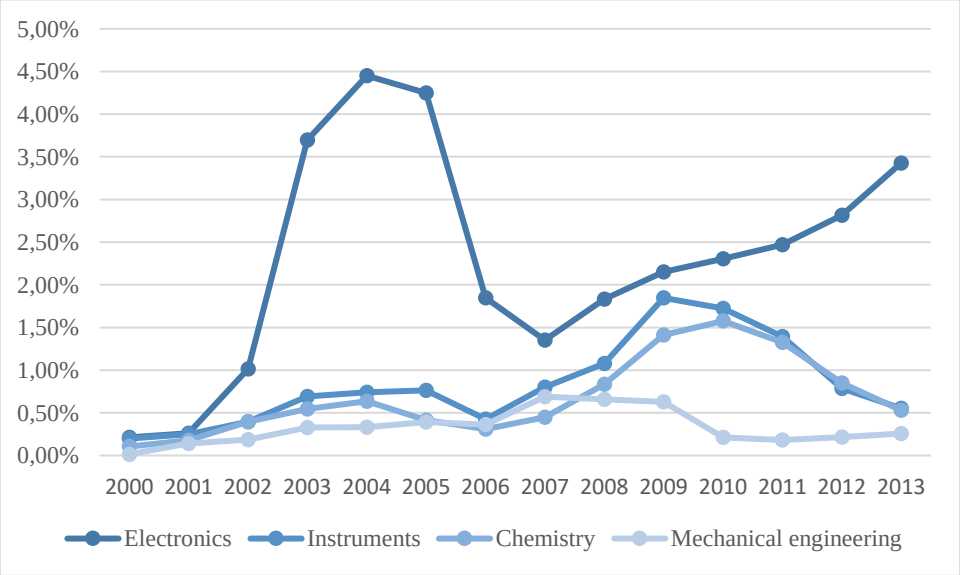
2. **Instruments**: 9. Optics 10. Measurement 11. Analysis of biological materials 12. Control 13. Medical technology

3. **Chemistry**: 14. Organic fine chemistry 15. Biotechnology 16. Pharmaceuticals 17. Macromolecular chemistry, polymers 18. Food chemistry 19. Basic materials chemistry 20. Materials, metallurgy 21. Surface technology, coating 22. Micro-structural and nano-technology 23. Chemical engineering 24. Environmental technology

4. **Mechanical engineering** 25. Handling 26. Machine tools 27. Engines, pumps, turbines 28. Textile and paper machines 29. Other special machines 30. Thermal processes and apparatus 31. Mechanical elements 32. Transport

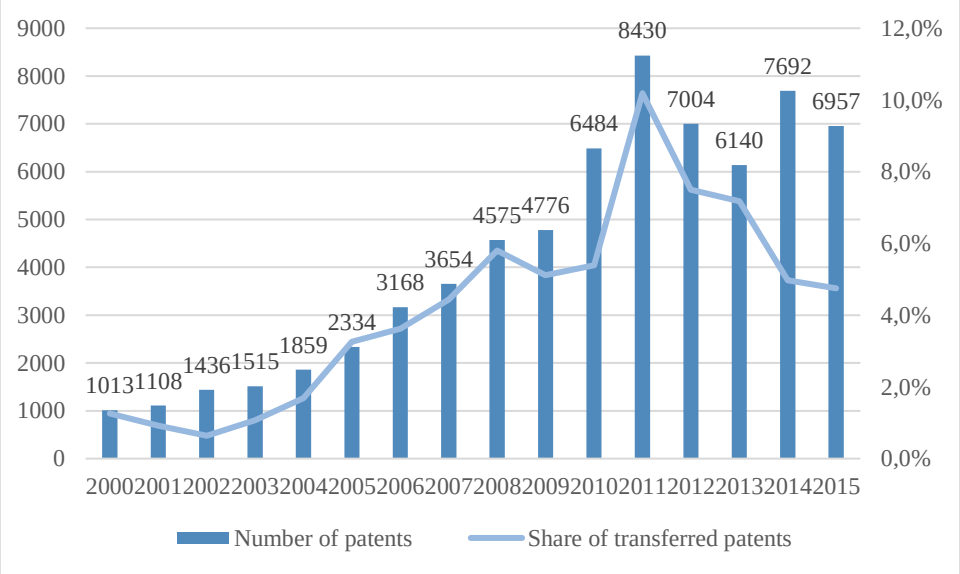
5. **Other fields** 33. Furniture, games 34. Other consumer goods 35. Civil engineering

Figure A1. Share of EP patents transferred to NPEs, by technological fields



The figure shows the share of NPE-transferred patents, defined as the ratio between the number of patents acquired by NPEs and the total number of transferred patents, by year of transfer (3-year average).

Figure A2. Share of USPTO patents transferred to NPEs

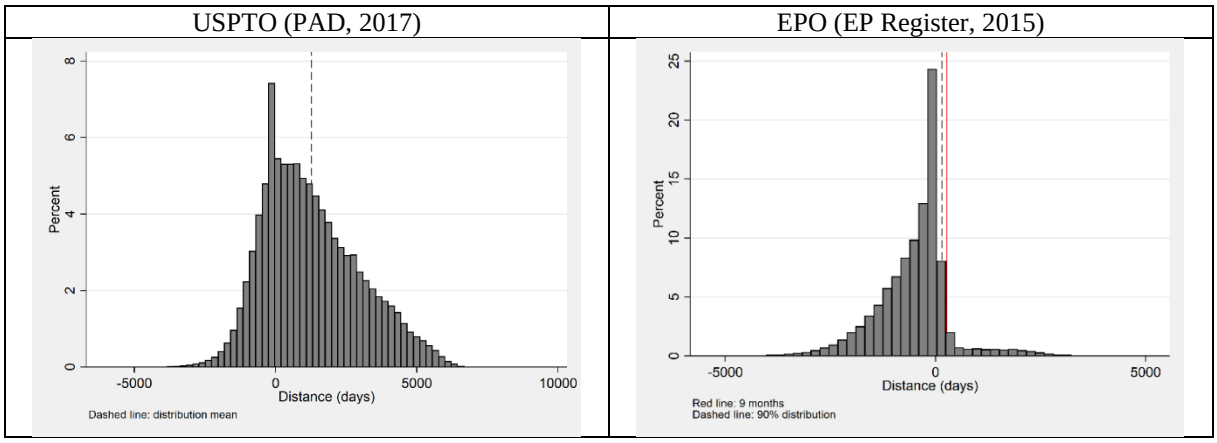


The figure shows the share of NPE-transferred patents at the USPTO (Orsatti and Sterzi, 2019b), defined as the ratio between the number of patents acquired by NPEs and the total number of transferred patents, by year of transfer (3-year average).

Chapter 3

A1. Changes of ownership at the USPTO and EPO

Figure A3. Tracking changes of patent ownership at the USPTO and EPO



Source: Based on US PAD 2017 (Graham et al., 2018) for USPTO and EP Register 2015.

Chapter 6

Case Study #1. The use of shell companies for IP monetization: the case of dormant companies in the UK

A1. UK dormant companies

According to Companies House, a dormant company in the UK has no "significant accounting transactions" during the accounting period (https://www.gov.uk/dormant-company/dormant-for-companies-house). In other words, to be dormant, a company has dormant accounts but is active, since it is registered. No "significant accounting transactions" means no entries in the company's accounting records. The amount paid for shares when the company is first formed and the few costs that the company may incur to keep the company registered at Companies House do not count as significant accounting transactions. According to Companies House, significant transactions do not, in fact, include:

- filing fees paid to Companies House
- penalties for late filing of accounts
- money paid for shares when the company was incorporated

Dormant companies do not carry out any business and do not have any other source of income, including investment income. Nevertheless, dormant companies might hold intellectual or real-estate property. One benefit of having dormant company status is that it reduces the statutory burden on a company. A private company that qualifies as both 'small' and 'dormant' need only submit to Companies House an unaudited abbreviated balance sheet and certain prescribed notes. Another benefit of having dormant company status is it allows the entity to accumulate and hold patents without the need to present detailed information regarding patent ownership.

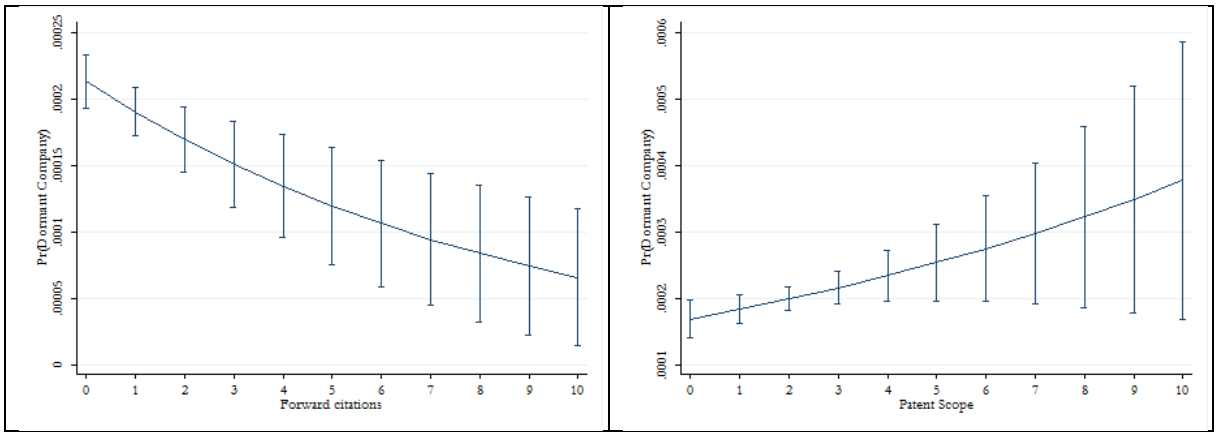
A2. USPTO patents: identification of assignees' sectors of activity

To compare the quality of patents acquired by UK registered dormant companies with other types of patent holder we allocated each assignee at the USPTO to one sector of activity. To do so, we exploited the EEE-PPAT database (Du Plessis et al., 2009), which categorizes patentees into private business enterprises, universities/higher education institutions, governmental

agencies, and individuals. It was developed by ECOOM in partnership with Sogeti and is external to PATSTAT. Reported quality levels of 99% are obtained in terms of completeness and accuracy. USPTO patent applicant names are thus assigned to specific sectors when a match is made between the applicant name and a name on the EEE-PPAT list.

A3. UK dormant company patent charateristics: Probit models

Figure A3. Estimated probability of observing a dormant-company patent as function of *patent quality* and *patent scope.*



The figures show the predicted probability that a EPO patents is held by a dormant company active in UK, as function of patent quality (proxied by the number of citations received in the first five years from the application date) and patent scope (the number of distinct assigned four-digit International Patent Classification (IPC) classes). Both the regressions control for technological fields and filing years (model (6) of Table 1, pag. 60). Sources: OECD Patent Quality Indicators database, January 2020 (Squicciarini et al., 2013).

Chapter 6

Case Study #2. An example of a dormant NPE in the UK: Dragon Green Development Balboa SA

A1. Main advantages of incorporating a company in Panama

(Source: https://www.bizlatinhub.com/ten-reasons-incorporate-company-panama/)

- Company registration in Panama takes approximately two weeks
- There is no need to be in the country during or after the process
- No accounts have to be presented to the government

- Board meetings may be held anywhere in the world
- No income tax on revenue obtained outside of Panama
- Panama offers bearer shares that allow the owner to remain anonymous
- Corporate objectives can be kept out of the Articles of Incorporation
- Bank secrecy laws that punish disclosing account information to third parties
- Panama has no mutual legal assistance treaties (MLATs)
- The directors, shareholders and officers can be of any nationality and live in any country

A2. Key information retrieved from the original incorporation document of Dragon Green Development Balboa

" […] El agente residente de ninguna forma es, ni se hace, responsable por las actividades de la sociedad, así como tampoco por las actividades de los directores, dignatarios ni por los resultados y/o efectos de los actos, negocios, asuntos, operaciones, y demás hechos y actos que ejecute o mande a ejecutar y/o realice la sociedad, ya sea a través de personas autorizadas o por interpuesta persona; ni tampoco es responsable por les acciones civiles, penales, laborales, fiscales y de cualquier índole o naturaleza que ejecuten contra le referida sociedad particulares o instituciones privadas o publicas por actos cometidos por la sociedad en el giro de sus negocios"

"[…] las acciones que la sociedad emite tendrá un valor nominal de cien dólares cada una, las cuales serán al portador. El registro de acciones y demás libros exigidos por la ley serán llevados en la Republica de Panamá o en cualquier lugar que señale la junta directiva."

"[…] Todas las resoluciones de la junta general de accionistas deberán ser aprobadas por el voto afirmativo de accionistas que representen la mitad mas une de las acciones presentes, salvo las que a continuación se enumeran para les cuales será necesario el voto afirmativo de la totalidad des las acciones emitidas y en circulación."

"[…] En las reuniones de la junta directiva los directores podrán hacerse presentar por apoderado o apoderados, que no necesitan ser directores y que deberá ser nombrados por documento publico y privado con o sin poder de sustitución."

A3. Corporate structure identification: methodology

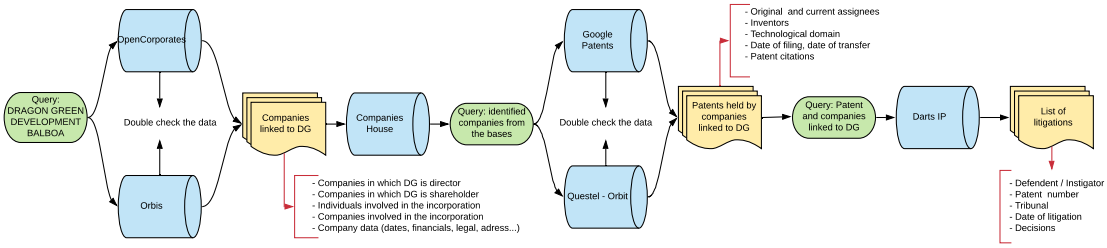
For the purpose of this study we exploited three types of data. First, we used the data needed to delimit the scope of the DGDB group. For this purpose, we drew on data from financial

databases. *OpenCorporates* (https://opencorporates.com) and Orbis were used to identify the firms linked to DGDB. The use of two databases allowed us to confirm that the information was correct and we verified all information by reading the official documents available at Companies House.

Second, we exploited the data needed to identify the patents held by the companies of the DGDB group. We used *Orbit* (*Questel*) and *Google Patents* to identify the patents. *Google Patents* is a free online database containing around 17 million patents filed at the larger patent offices. *Orbit* contains 115 million patents and offers worldwide coverage. Patent documents are rich in terms of information, indicating for example the technological domains, changes of ownership, inventors' names and citation information. Both databases were used to double check all information, and all the graphs were produced manually by the authors. We highlight this point to emphasize that the information is neither easily or readily obtained. In addition to the financial costs associated with these data sources, understanding and treating the data are both processes that require time to master.

Finally, we exploited litigation data. For this purpose, we used the Dart-IP database, which covers more than 3 million cases taken from more than 3,000 courts worldwide.

Figure A4. Data Acquisition Methodology



The graph shows the queries made and the data resulting from these queries.

A4. Key inventors

Inventor R.W. transferred only one patent to DGDB, but her case is interesting since she also created two companies in Great Britain: INNOVATION BELLOWS DUO LTD (in 2008) and

BELLOWS HOLDING LTD (in 2012). These two companies were not identified as DGDB companies, but their names are similar to one of DGDB's dormant companies (namely, LONDON SMART BELLOWS LTD). Although BELLOWS HOLDING LTD is a dormant company (Source: Opencorporates), INNOVATION BELLOWS DUO LTD is not and, directed by GO AHEAD SERVICE LTD (Source: Opencorporates), it offers customers the possibility of creating an English or Irish Limited Company entirely online – with almost 50,000 company start-ups they claim to be market leaders in Germany (Go Ahead Website[80]). In addition, this company is also a subsidiary of FORIS AG, a legal-financial services company in Germany with an active presence in the business of patent monetization.[81]

[80] https://go-ahead.de/gruender-akademie/ueber-go-ahead/

[81] The company operates in three different business areas:

- Litigation funding: the company enforces the client's rights at their own financial risk. Regardless of the outcome, the client is protected against all costs associated with the dispute.
- Monetization: the company swaps disputed claims for liquidity. They offer to enforce the client's claims and provide a cash advance.
- Shelf company incorporation: the company creates fully compliant shelf companies in no time with all legal protections.

GREThA UMR CNRS 5113
Université de Bordeaux
Avenue Léon Duguit
33608 Pessac – France
Tel : +33 (0)5.56.84.25.75
http://gretha.u-bordeaux.fr/

LAREFI
Université de Bordeaux
Avenue Léon Duguit
33608 Pessac – France
Tel : +33 (0)5.56.84.25.37
http://larefi.u-bordeaux.fr/

Derniers numéros – Last issues

- 2020-09 **Ressources naturelles et guerres civiles au Moyen-Orient**
  by Mahdi FAWAZ
- 2020-08 **Poverty and COVID-19 in Developing Countries**
  by Olivier BARGAIN, Ulugbek AMINJONOV
- 2020-07 **La France en guerre économique au printemps 2020 comme à l'automne 1914**
  by Hubert BONIN
- 2020-06 **Trust and Compliance to Public Health Policies in Times of COVID-19**
  by Olivier BARGAIN & Ulugbek AMINJONOV
- 2020-05 **Covid-19 and fine wines: the 'perfect blend' for a severe headache?**
  by Jean-Marie CARDEBAT & Philippe MASSET & Jean-Philippe WEISSKOPF
- 2020-04 **When choosing is painful: anticipated regret and psychological opportunity cost**
  by Emmanuelle GABILLON
- 2020-03 **Emergence et viabilité d'une filière de production dans l'imagerie médicale : les syndicats face à la politique industrielle française**
  by Samuel KLEBANER
- 2020-02 **Understanding the Dynamics of Value Chains with Irreversible Investments**
  by Lionel COSNARD
- 2020-01 **Coming from afar and picking a man's job: Women immigrant inventors in the United States**
  by Edoardo FERRUCCI & Francesco LISSONI & Ernest MIGUELEZ

Ion LAPTEACRU and Ernest MIGUELEZ are the scientific coordinators of the Bordeaux Economics Working Papers. The layout and distribution are provided by Cyril MESMER and Julie VISSAGUET.

GREThA and LAREFI joint Working Paper series