

The law and economics of technology markets and intellectual property intermediaries

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1. Introduction. An apparently inexplicable difference

10 The worldwide market for intellectual property (IP) rights is worth billions of US dollars, particularly as far as proprietary technology transactions are concerned¹.

15 Developed and less-than-developed countries (as well as companies of any size) invest considerably in R&D to come up with new products (concepts, components, processes etc.) and enabling technologies; firms and research institutions (including universities) resort to intellectual property protection to preserve their competitive advantage and to enable the transfer of technology². One of the many (otherwise positive) consequences of the overall investments in R&D is the massive production of patents, that way too often remain for the large part inexplicably unexploited, while hiding great value³.

20 There is a worldwide movement to foster the growth of businesses that facilitate, or directly carry out, the exchange of intellectual property rights in response to certain changes in markets and in light of new paradigms of corporate innovation. New entities specializing in the intermediation of intellectual property have been around for a while on the markets for technologies and they are seen as major forces that concur in mobilizing unused IP rights and technologies. When looking at the main players of the IP market, the lion's share is for U.S. intermediaries and Asian players are also escalating⁴.
25 Europe is trying to catch up, but differences remain, and they threaten to yield serious negative consequences for the European internal market and for the European economy as a whole.

Many legal and non-legal factors concur to shape a market for the exchange of IP and empirical studies are wanted to establish significant correlations between causes and

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¹ See T. Yanagisawa, D. Guellec, *The Emerging Patent Marketplace*, STI Working Paper 2009/9, at 7. International receipts for intellectual property (considering patents, copyrights and trademarks) increased to 190 B USD in 2009 (it was 2.8 B USD in 1970, 10 B USD in 1985, and 110 B USD in 2004) and the three main players of such market are U.S., Japan, and the European Union; data are available in the World Intellectual Property Organization, *Intellectual Property Report 2011*, Geneva, 2011, at 61.

² Europe has poured money in R&D and it will invest even more under the Horizon Europe Framework Programme.

³ As the European Commission had already noted in the Communication *Europe 2020. A strategy for smart, sustainable and inclusive growth*, COM(2010) final 2020, at 12, «[i]t is not only the absolute amounts spent on R&D that count – Europe needs to focus on the impact and composition of research spending» (emphasis added).

⁴ See F. Tietze, C. Hestatt, *Technology Market Intermediaries and Innovation*, Druid Conference Paper 2012, 12, fn. 27 («Counting for 80% of the TMIs [*scil.*: technology market intermediaries], by far the majority of the TMIs seems to be based in the US clustering around two centres at the west and east coasts»). Similar conclusions in M. Benassi, A. Di Minin, *Playing in between: patent brokers in markets for technology*, 39 *R&D Management* 68, 76 (2009).

30 effects, antecedents and consequences⁵. A wealthy stream of literature both in economics
and in management studies is still addressing markets for technology and the role of IP
intermediaries, their business models and their contribution towards efficient markets⁶.
There seems to be general consensus on the fact that, following a trajectory of
35 specialization in technology markets, intermediaries are largely responsible for their
creation and animation. Quite surprisingly, very little relevance is given in scholarly
works to legal determinants of technology markets and to the role legal systems have in
providing suitable background conditions for markets to develop and players to specialize
40 also geographically⁷. As a consequence, there is a gap in the legal studies about the
competitiveness of markets for technology and the way legal rules hinder or foster such
markets by acting on incentive for institutions and individuals.
This article aims at filling the gap in the legal literature, providing arguments that rely on
differences in (IP) laws as determinants of IP markets and to make sense of the apparently
inexplicable difference of Europe vis-à-vis United States in terms of economic
45 performance of the respective markets for technology⁸. No suggestions or comments are
provided on the relative importance of legal as opposed to non-legal factors, although
when comparing national markets the burden of legal differences is straightforward and
the limitedness of macro-economic justifications becomes apparent.
To a more general level, the purpose of this article is to contribute to the relatively recent
50 literature that tightens legal structures and rules to competitiveness of legal systems,
providing an explanation in terms of comparative law and economics of what likely
makes Europe less appealing with respect to the United States (and possibly Asian
countries, including Japan) as to the development of IP or technology markets and
ultimately why a European IP market for technology transaction is not expanding,
55 notwithstanding the financial resources that European institutions at large are injecting in
the economy⁹.

⁵ One possible explanation for differences among legal systems and in economic performance relies on the notion of regulatory competition. As far as technology markets are concerned, some states are doing better than others as their legal systems are more conducive to welfare-enhancing transactions. P. Larouche, *Legal Emulation Between Regulatory Competition and Comparative Law*, TILEC Discussion Paper 2012-017, 8, criticizes the paradigm of regulatory competition, as it only considers legal factors and assumes «an impoverished view of law», without taking into account the way rules are applied and in which context. Undoubtedly, a purely legal analysis does not explain much of the differences that determine competition among legal systems, and yet, as it is for IP intermediaries and should result clear at the end of this paper, it is exactly the law that accounts for a significant part of the reasons that *probably* explain why Europe is lagging behind.

⁶ For instance, Tietze, Hestatt, *supra* note 4, at 2, aim filling a gap in the economic literature, providing an explanation why TMIs currently emerge on the markets for technology and how they affect IP transactions. See also F. Gu, B. Lev, *Markets in Intangibles: Patent Licensing*, SSRN-id275984, 2001, and A. Hagi, D. Yoffie, *Intermediaries for the IP market*, HBS Working Paper 12-023, 2011, 2. See also J.A. Malackowski, *The Intellectual Property Marketplace: Past, Present, and Future*, 5 *J. Marshall Rev. Intell. Prop. L.* 605 (2006) on development of the US market for IP. A general review of the literature is offered by J. Howells, *Intermediation and the role of intermediaries in innovation*, 35 *Research Policy* 715 (2006).

⁷ I. Troy, R. Werle, *Uncertainty and the Market for Patents*, MPIfG Working Paper 08/2, 2008, 7 («[C]onventional economics, including institutional economics, is aware of the difficulties of the market exchange of IP but seems to be unable to offer an explanation»).

⁸ «Differences in law», as it is used in the text, is quite an equivocal formula, since in every legal system there can be differences that can affect a market and its players. At the bottom, the kind of legal differences that account for the purposes of this paper are those at statutory level and the interpretation provided by courts.

⁹ Also considering the data quoted in Yanagisawa & Guellec, *supra* note 1, it has to be clear that everywhere markets for technology are in their incipiency. As J. Palfrey, *Intellectual Property Strategy*, Cambridge,

This paper takes a myopic view and tries to shed some light on probable legal antecedents of different comparative economic performances¹⁰. Once exact reasons of the European lag are identified, appropriate policy measures can be implemented to improve the legal setting and render Europe as competitive as other markets for what concerns IP exchanges¹¹.

2. IP intermediaries: how the industry organizes to exploit intellectual property as an autonomous asset class

Intellectual property rights have multiple uses, along a spectrum that goes to merely defensive, in connection with manufacturing and distribution of goods and services, to proactive uses when IP rights are licensed to enable someone else to practice the proprietary technology¹². These two extremes of the spectrum are sometimes referred to as direct (or industrial) and indirect (or contractual) use of IP. In the former case, IP rights are the powerful tool used by companies to retain on the product market (downstream) the competitive advantage earned with investments in innovation. In the latter, IP is an autonomous asset that can become the subject matter of (series of) profit-generating transactions in the upstream market where inputs for production are exchanged. Although there are cases of companies using IP only in connection with manufacturing processes or, at the opposite, exclusively as asset class, generally many companies fall in between and do both (although with different intensity)¹³. In sectors with strong incremental innovation, with massive corporate IP portfolios, cross-licensing deals are a pre-condition for companies to freely operate¹⁴. In other cases, players resort to granting access to their IP in exchange for money or to reach foreign markets (where direct local production would be otherwise unaffordable or difficult). Still in other situations, companies can out license their unexploited IP pursuing a light strategy of diversification¹⁵.

Transactions concerning creation, use, and diffusion of technology constitute the backbone of the so-called market for technology¹⁶. Such market «includes transactions

MA: The MIT Press, 2012, 126, puts it: «Despite all the activity associated with the valuation of intellectual property assets and the hundreds of billions of dollars involved in licensing around the world, there's no established market for intellectual property licenses and asset sales».

¹⁰ In this respect, this paper aims at responding to the call for a more functional comparative law; see Ralf Michaels, *Comparative Law by Numbers? Legal Origins Thesis, Doing Business Reports, and the Silence of Traditional Comparative Law*, 57 Am. J. Comp. L. 765 (2009).

¹¹ In several scientific contributions a review of legislative and regulatory framework is considered instrumental to effective operations of markets for technology. See, for instance, I.A. Cockburn, *Is the Market for Technology Working? Obstacles to Licensing Inventions, and Ways to Reduce Them*, NBER, 2007, 3.

¹² European Commission, *Towards enhanced patent valorisation for growth and jobs*, Brussels, December 12, 2012, SWD (2012) 458 final, 3.

¹³ An explanation based on the trade-off between earnings from licensing on the technology market (profit effect) and the loss of revenues on the product market as a consequence of competitors' entry (rent dissipation effect) is provided by A. Fosfuri, *The licensing dilemma: understanding the determinants of the rate of technology licensing*, 27 Strategic Management Journal 1141 (2006), that also offers examples of companies acting along the spectrum of possibilities.

¹⁴ [Hall – Ziedonis 2011].

¹⁵ See Benassi & Di Minin, *supra* note 4.

¹⁶ Contributions of markets for technology abound. The seminal contribution is due to the work of A. Arora, A. Fosfuri, A. Gambardella, *Markets for technology: the economics of innovation and corporate strategy*, Cambridge, MA: The MIT Press, 2001. See also A. Arora, A. Fosfuri, *Licensing the market for*

85 involving patents and other intellectual property rights (IPR), know-how and patent
licensing. It also includes transactions involving knowledge that is not patentable or not
patented (e.g. software, or the many non-patented designs and innovations)¹⁷. Thus,
transactions concerning intellectual property rights are a sub-set of all transactions taking
place on technology markets; IP transactions include patent license agreements, that is to
90 say contracts that transfer proprietary technology.

In principle, transactions involving intellectual property rights are brought about directly
by IP owners (that is companies that have invested in R&D and have generated
intellectual property internally, protected with patents or with other rights). As markets
grow, exchanges of IP become complex and the match between supply and demand
95 requires professional activities, following a trajectory of specialization¹⁸. Such matching
services are provided also by professionals and companies that focus on managing and
valorizing intellectual assets, acting as intermediaries between IP owners and potential
users that are now becoming well-known and widespread¹⁹. A florid supply of such
services developed, for example, in the U.S. and it appears to be a significant trait of a
100 more mature and well-functioning technology market.

Such recent evolution towards specialization in IP deal-making and intermediation
compels two questions. First, what is technically an IP intermediary. Second, which kind
of value IP intermediaries add to IP markets and how they contribute to market
development. The latter question is specifically addressed in paragraph 4, whereas an
105 operational definition of intermediary is required at this point to make sure categories are
well described.

To a very general level, IP intermediaries are simply providers of specialized services²⁰.
With different intensity and involvement, they support or facilitate or directly accomplish
an IP exchange (acting directly as buyers and sellers) in the interest of the intellectual

technology, 52 *Journal of Economic Behavior & Organization* 277 (2003). Evidences on such markets in Europe are provided by A. Gambardella, P. Giuri, A. Luzzi, *The market for patents in Europe*, 36 *Research Policy* 1163 (2007).

¹⁷ M.P. Zuniga, D. Guellec, *Who Licenses Out Patents and Why? Lessons from a Business Survey*, STI Working Paper 2009/5, 6. For conventional definition see also Benassi & Di Minin, *supra* note 4, at 72. Cockburn, *supra* note 11, at 1, refers to «market-mediated transactions in technology» and includes «licensing agreements, technology-based strategic partnership, or R&D contracts». Regulation (EC) No 772/2004 of 27 April 2004 on the application of Article 81(3) of the Treaty to categories of technology transfer agreements, adopts a very broad definition of technology transfer agreements, including «a patent licensing agreement, a know-how licensing agreement, a software copyright licensing agreement or a mixed patent, know-how or software copyright licensing agreement, including any such agreement containing provisions which relate to the sale and purchase of products or which relate to the licensing of other intellectual property rights or the assignment of intellectual property rights, provided that those provisions do not constitute the primary object of the agreement and are directly related to the production of the contract products; assignments of patents, know-how, software copyright or a combination thereof where part of the risk associated with the exploitation of the technology remains with the assignor, in particular where the sum payable in consideration of the assignment is dependent on the turnover obtained by the assignee in respect of products produced with the assigned technology, the quantity of such products produced or the number of operations carried out employing the technology, shall also be deemed to be technology transfer agreements», art. 1(b).

¹⁸ Tietze, Hestatt, *supra* note 4, at 14.

¹⁹ Yanagisawa & Guellec, *supra* note 1, at 8 («[S]ome of the most significant recent changes in markets for IP have occurred through the emergence of new players whose business models are focused on extracting value from IP»).

²⁰ This qualification bears consequences, at least as far as European Union laws are concerned, as intermediaries enjoy the freedom to provide services in the internal market as any other service provider.

110 property owners²¹. They act as matchmakers and position themselves in a business-to-
business setting through intermediate-market transactions that serve the purpose of
‘transferring’ IP and technology from owners to users, thus connecting the supply and the
demand side of the market. In a knowledge-based society, where fundamental inputs for
115 production are represented by technologies, IP intermediaries resemble to wholesale
distributors and act to fill the gap that separates generation of IP from its use in
downstream markets²². As a matter of fact, any mature market works properly because
middlemen favor the distribution, as for retail goods, or for the market for credit (with
banks) or risk (insurers).

The comparison with distribution of physical good cannot be stretched too much;
120 however, it suggests two basic different models, along the whole spectrum of
possibilities, in which the transfer of technology is accomplished. According to a first
model, IP intermediaries act as agents (either independent or representing one of the
parties) that arrange the deal, without necessarily being part of it. In this respect, they
resemble very much to consultants, even though they can be remunerated in different
125 ways that make their involvement and commitment more stringent (e.g., as it is the case
when they are entitled to success fees or contingency fees). Yet, pure consultants cannot
be considered intermediaries, even though they are somehow instrumental in preparing
or facilitating the deal.

According to a second model, IP intermediaries play in between by acquiring and
130 reselling the technology and so becoming active part of the deal. They in-source the
technology through assignments or inbound licensees and resell it downstream with
outright sales or sub-licenses.

A significant stream of legal and business literature has dealt with examples of IP
intermediaries and even attempted a taxonomy²³. For the reasons that will be explained
135 in paragraph 4, the fundamental difference relevant to the purposes of this article boils
down to the degree a player is actively involved in the transaction, either supporting or
causing the exchange, or being directly the transferor. As it will be clear from the next
paragraphs, what appears mostly relevant is not much the presence and the role of IP
intermediaries, but rather the framework legal conditions in which they emerge and
140 prosper as main players of the market.

3. A problem for Europe. The creation of an internal market for IP

²¹ There is a variety of business models that proliferate in the market. Some intermediaries only facilitate the match between demand and supply, mostly resorting to web-based services (such as databases), whereas others are actively involved in the exchange (for a detailed account see Yanagisawa & Guellec, *supra* note 1). Although all are considered intermediaries, it is clear that the mere use of internet does not turn a company into an intermediary, exactly as an advertising company cannot be considered a distributor. Exchanges of technology and IP are mostly relational and the role of IP intermediaries is a very active one. A thorough description is offered by Hagiú & Yoffie, *supra* note 6, at 7 («a patent intermediary will be an organization (firm or not-for-profit entity) that directly facilitates the sale or licensing of patents from owners-creators to users»); A.W. Wang, *Rise of the Patent Intermediaries*, 25 Berkeley Tech. L.J. 159, 183 (2010).

²² See Wang, *supra* note 21, at 187.

²³ Excluding on line brokers and other sorts of platforms, another possible taxonomy is provided by Wang, *supra* note 21, at 166, that groups intermediaries in three broad categories: «(1) brokers, who play a bridging or market-making role for producers and consumers of intellectual property; (2) defensive aggregators, who acquire patents to provide their subscribers with freedom of operation and safety from litigation and (3) offensive aggregators, who develop and acquire patents to realize revenues through licensing or asserting their portfolios».

145 Important economic studies have discovered that there is still a large portion of patents in Europe that lie unutilized and could be tapped in to create business opportunities²⁴. The problem might expand overtime, as the rate of patent filings has not decreased over the years and typically the magnitude of portfolios exacerbates the problem of unused patents²⁵.

150 The situation is well known by European policy makers and a specific commitment in the Innovation Union Flagship Initiative of the European Commission more than ten year ago was specifically aimed at solving the problem of the so called “sleeping patents” (sometimes also referred to as “dormant”)²⁶. Economic studies have provided evidence about failures on the market for technology, that tend to perform sub-optimally, at least in Europe²⁷. To be sure, sleeping patents exist because a market is working poorly; it

155 would be conceptually wrong to state that a market does not exist at all because of sleeping patents and conceptual mistakes would translate in wrong policy options. Truth is that the sleeping patents phenomenon is not the cause, but the effect of a poorly performing market and a solution to the problem should be concerned with causes, rather than with effects. This article aims at providing an illustration of legal reasons that explain

160 why markets for technology in some regions of the world do not work as they should. The problem is broader in nature and it is not limited to awakening sleeping patents by figuring out some sort of occasional industrial use or ephemeral incentives²⁸. It is rather a matter of creating an efficient internal market for IP in Europe where individuals (whether single inventors, firms, or research institutions) have sufficient structural and

165 positive incentives to put their IP at use and firms have incentives and resources to acquire them for commercial exploitation, as well as to further invest in innovation when less

²⁴ Tietze, Hestatt, *supra* note 4, at 8. A patent not used means that it does not relate to an existing product on the market and is not currently licensed to a user. There can be several reasons why a patent is not used, both dependent on and independent from owners’ willingness. An IP owner can decide not to use a given patent for strategic reasons (blocking competitors or slowing their entry into market, although also in these cases the patent has a use). A patent can also remain unutilized for inertia. The real issue is for patents that the owner would like to use and could not find their way to the market , a way or in another. Here, again, reasons can be either legal (no freedom to operate), technological (refers to obsolete technologies or lacks complementary technologies, or it is out of standard), organizational (lack of competences and skills) or financial (no resources to develop). Above all, absent framework conditions exploitation would remain problematic even if the foregoing hurdles were removed.

²⁵ The economic crisis notwithstanding, in Europe there has been a constant growth of patent filings. The European Patent Office Reports that between 2012 and 2013 there was an increase of 2,8% with 266.000 new filings in 2013; see European Patent Office, *Annual Report 2013*, Munich, at

²⁶ Cfr. European Commission, *supra* note 12, at 5, further referring to Japanese, OECD and European surveys and data. All confirms that the problem is common to many countries; however it is particularly serious in Europe.

²⁷ Among others A. Agrawal, I. Cockburn, L. Zhang, *Deals not Done: Sources of Failure in the Market for Ideas*, NBER Working Paper 19679, November 2013, at 2 («many potentially surplus-enhancing transactions fail to occur»). Initiatives to exploit dormant patents are reported for Japan, South Korea, Japan Taiwan, (see *Asia’s patent funds – who they are, what they do*, available at <http://www.iam-magazine.com/Blog/Detail.aspx?g=236aa81f-37b8-4fe5-85a2-ef12c5a373f3>).

²⁸ As pointed out by Gambardella, Giuri & Luzzi, *supra* note 16, at 1164, we do not have to expect that the creation of markets for technology will eliminate the problem of sleeping patents altogether, «but they can contribute in reducing them».

mature research results require additional resources before reaching marketable conditions²⁹.

170 Since the value of patents is distributed asymmetrically (with few patents having enormous value and the great majority having little value³⁰), it becomes crucial to ensure an overall well-functioning market as a condition to unveil the innovation potential of Europe. At the end, the European landscape has been considered still mostly supply-side driven, «due to the lack of adequate matching interfaces between the supply and the demand for scientific knowledge»³¹, but even interfaces are responsive to the legal
175 environment.

One regulatory option to stimulate transactions is compulsory licensing or march-in rights for unused technologies, but it is a solution that is probably worse than the disease it is aimed to cure, and it assumes in a too simplistic way that the underuse of patents is only a matter of willingness of patent holders. As an option, it gained momentum at different
180 times and eventually during the covid-19 pandemic for patents on vaccines³².

A report prepared by an IPR Expert Group created by the European Commission few years ago explored options for instruments of IP valorization in Europe, but rejected the proposals submitted (including one of compulsory licensing) and eventually ended up by reaffirming the seriousness of the problem and advocating for an urgent solution
185 (provided one exists).

A further study conducted by St. Gallen University and Fraunhofer went further, by considering the opportunity to create a financial market based on IP assets. The conclusions are somewhat consistent with the other study, as no financial markets can be devised if the market for IP remains illiquid due to lack (or low volume) of transactions.
190 Interestingly, also the Technology Transfer Division of the European Investment Bank has been studying the market and suggesting instruments to regain competitiveness in Europe leveraging on untapped intellectual property resources. One ambitious proposal has been put forward that aims at solving the issue. If a market in Europe does not exist, a suggested option contemplated the foundation of a pan-European platform to “mimic”
195 the market and favor the creation and the growth of operators that aggregate around the platform³³. Absent other solutions, the platform underlies a quasi-market approach, since expected transaction do not come from spontaneous adjustments of supply and demand, but from an intermediate institutional layer artificially created by policy action to stimulate the demand of IP rights.

200 The ongoing debate in Europe and the proposal for policy intervention testify the urgency of the problem. However, the debate so far has not provided convincing and final

²⁹ Yanagisawa & Guellec, *supra* note 1, at 41 («In order to promote innovation throughout the entire society in this open innovation era, enhancing the smooth circulation of IP, notably patents, is crucial»). Cockburn, *supra* note 11, at 11, refers to failures of markets for technologies in terms of costs for the «deals not done».

³⁰ Among others, M.A. Lemley, C. Shapiro, *Probabilistic Patents*, 19 *J. Econ. Persp.* 75, 81 (2005); G. Parchomovsky, R. Polk Wagner, *Patent Portfolios*, 154 *U. Pa. L. Rev.* 1, 24 (2005) (featuring patents as «lottery tickets»).

³¹ J. Darcy, H. Kraemer-Eis, O. Debande, D. Guellec, *Financing Technology Transfer*, EIF Working Paper 2009/02, 9.

³² The European Commission has meaningfully divided obstacles that are results of institutional failures and those due to market failures; European Commission, *supra* note 12, at 11.

³³ As previously noted in the text, the solution of an intellectual property rights valorization instrument was envisioned by the Commission in the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, *A Single Market for Intellectual Property Rights. Boosting creativity and innovation to provide economic growth, high quality jobs and first class products and services in Europe*, COM(2011) 287 final, 8.

evidence of viable solutions. Many options contemplate the operations of intermediaries, but even intermediaries require a set of background conditions to work and, most of all, a conducive legal environment whose features have not been studied. In order to further
205 understand the working conditions of a technology market a focus on intermediaries is needed, particularly focusing on positive experiences.

4. Why IP intermediaries exist and how they add value to IP transactions

210 One of the plausible explanation for the existence of intermediaries is that willingness to license of large and small IP owners is not enough to enter IP transactions when the complexity of the market requires specialized resources and a dedicated management. License agreements (and technology transactions in general) are costly and heavily
215 negotiated and marketing the technology requires skills, competences and a network of relationships that IP owners do not necessarily have³⁴. Even larger companies (let alone small ones) sometimes lack internal expertise and organization to out-license their technology. In the end, one consideration prevails: having someone that helps suppliers to find partners «would substantially increase transactions in patent markets»³⁵.
220 Beyond explanations based on specialization for the growth of IP intermediaries, there is a number of notable factors that can be accounted for the need of intermediaries and that can help to understand why IP intermediaries exist and how they act within technology markets³⁶. Importantly, such factors are not specific of a given legal system; they rather represent universal and recurring traits in the production and exploitation of technology and related IP rights. Because of these recurrent characteristics of the markets, the
225 difference between Europe and other parts of the world in terms of market development for IP intermediaries appears even more inexplicable.

4.1. Market for technology and vertical disintegration

230 Technology markets allow firms to specialize and concentrate on their core business. They can do internally what they do best and partner with other firms downstream or upstream using IP as the connecting force³⁷.
Moreover, a number of markets for complex goods or for goods with very long and expensive development stages rely on vertical disintegration and cooperation among
235 firms and institutions at different levels of the value chain. Cooperation is based on IP, as a tradable asset that is improved at any stage of the market while approaching the final end-user.

³⁴ Indeed, data collected by Benassi & Di Minin, *supra* note 4, at 73 supports the view that patent brokers and intermediaries exist as providers of «hybrid form of governance for transactions on technology markets» where transaction costs are positive and relevant. Troy & Werle, *supra* note 7, at 8, do not argue about the relevance of transaction costs, but refer to the difficulties that conventional and institutional economics have in explaining other factors that affect IP unless classified as transaction costs.

³⁵ Zuniga, Guellec, *supra* note 17, at 24.

³⁶ According to Troy & Werle, *supra* note 7, at 17, intermediaries arrange the transaction using their particular technical, legal and commercial expertise, and provide decisive information particularly as far as the value of IP exchanged is concerned.

³⁷ This pattern of “division of innovative labor” has been firstly observed and described by A. Arora, A. Gambardella, *The changing technology of technological chance: general and abstract knowledge and the division of innovative labour*, 23 *Research Policy* 523 (1994).

240 The very existence of markets for technology draws from the need to exchange
fundamental inputs among technology producers and users. As the value chain
increasingly disintegrates and IP becomes dispersed, professional intermediaries are
required to move the technology downstream towards manufacturing firms³⁸. In this
respect, they act also as aggregators, forming clusters and portfolios that increase the
commercial value of the technology to be licensed or sold by also increasing the freedom
to operate for manufacturing companies (and reducing risks related to market entry)³⁹.

245 4.2. Open innovation

Open innovation is also partly responsible for the increased role of IP intermediaries.
Open innovation is the new paradigm «of innovative activities across firm boundaries to
250 optimize the use of internal and external sources of innovation»⁴⁰.

Henry Chesbrough has theorized about open innovation as a new way to organize R&D
and profit from commercialization of technology⁴¹. The insistence on reaching out
beyond corporate boundaries to identify resources and exchange inputs is a major drive
for improving the ability to partner with others⁴². Intermediaries act as facilitators, by
255 increasing the number of transactions or the profitability for each transaction (either more
revenues or more profits or both)⁴³; sometimes, they are the very innovators in the
business model a new technology requires to reach the market⁴⁴.

260 4.3. Entrepreneurial university

Traditionally, universities and public research organizations have been powerful
generators of technology and since the passing of the Bayh-Dole Act, U.S. universities
have been champions in transferring to market the research's results, thus setting the
standard for the entire world⁴⁵. In recent years, there has been a growing attention not just
265 for their traditional role as research and educational institutions, but also as players of
innovation. The so called “third mission” for universities gives them a responsibility in

³⁸ Providing added-value services, such as evaluation of the assets; see Wang, *supra* note 21, at 187.

³⁹ Also in the field of IP commercialization portfolio effects are relevant; see Parchomovsky & Polk Wagner, *supra* note 30, at 9.

⁴⁰ Darcy, Kraemer-Eis, Debande, Guellec, *supra* note 31, at 8.

⁴¹ H. Chesbrough, *Open Innovation: The New Imperative for Creating And Profiting from Technology*, Cambridge: Harvard Business School Press, 2006, at 51 («Instead of managing intellectual property (IP) as a way to exclude anyone else from using your technology, you manage IP to advance your own business model and to profit from your portfolio»).

⁴² Chesbrough, *supra* note 41, at 57 («Open innovation companies use licensing exclusively to create and extend markets for their technology»). For empirical evidence about the importance of external sources of innovation for U.S. manufacturing companies see A. Arora, W.M. Cohen, J.P. Walsh, *The Acquisition and Commercialization of Invention in American Manufacturing: Incidence and Impact*, NBER Working Paper 20264, 2014.

⁴³ Tietze, Hestatt, *supra* note 4, at 6 («Firms that engage increasingly in open innovation thus need to acquire dedicated knowledge and management competences for external exploitation as well as acquisition of technologies, IP assets and particularly patents»).

⁴⁴ For the implications on business models that open innovation has, see H. Chesbrough, *Open Business Models*, Boston, 2006.

⁴⁵ See, among others, M.L. Good, *Increased Commercialization of the Academy following the Bayh-Dole Act of 1980*, in D.G. Stein (ed), *Buying or Selling Out? The Commercialization of the American Research University*, New Brunswick, New Jersey, and London: Rutgers, 2004, 48.

the management of IP and in its downstream exploitation in an entrepreneurial manner⁴⁶. Under this new paradigm of entrepreneurial universities, also European public research institutions «are playing an ever-increasing role with licensing of industrial property rights becoming more important»⁴⁷.

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Universities have internal technology transfer offices (TTOs⁴⁸), in charge for managing the faculty-generated IP. TTOs cannot be considered as distinct IP intermediaries, since they are not technically autonomous entrepreneurial entities. Although they act as part of partly vertically integrated organization as universities are, still they somehow play in between as intermediaries do.

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Also universities and public research organizations resort to intermediaries, as an alternative to, or as a support for, TTOs⁴⁹. Intermediaries provide more specialized services, critical mass and professional resources that universities in most cases do not have (or cannot afford) and, in this respect, they bring efficiency in the technology commercialization process⁵⁰.

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In any event, the entrepreneurial university is another factor that justifies the emergence of IP intermediaries. Since universities are evolving towards this new model, one would expect intermediaries to appear everywhere. Yet, once again, there is a concentration in some areas, to the exclusion of others. This article claims that this is mostly due to the legal context where TTOs and intermediaries work. The Bayh-Dole Act and legislations that found inspiration in this fundamental body of law are the most striking evidence of how legal factors can well be determinants of a functional technology market.

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4.4. The enormous magnitude of transaction costs

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The magnitude of transaction costs typically associated with an IP market is such that only few, large operators can engage in repeated transactions, survive and be successful⁵¹. As a consequence, markets tend to be oligopolistic and concentrated, whereas small and medium enterprises as well as other operators are usually excluded or strive to derive some economic consequence from their portfolios.

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⁴⁶ The so called “third mission” refers to a more active involvement of universities not just in education and research, but also in bringing innovation on the market. The European Commission has provided soft law directives for universities and public research organizations to improve their skills in the management of IP. See European Commission, *Recommendation on the management of intellectual property in knowledge transfer activities and Code of Practice for universities and other public research organizations*, COM(2008) 1329. Brussels, 2008.

⁴⁷ Communication from the Commission to the European Parliament, the Council and the European and Social Committee, *An industrial Property Rights Strategy for Europe*, COM(2008) 465/3, 4.

⁴⁸ These offices have different names; sometimes are referred to as KTO (knowledge transfer office), TLO (technology licensing office) and alike.

⁴⁹ In limited cases, universities create their own captive IP intermediary as an external (fully-owned) subsidiary to outsource the IP management and commercialization services. One notable examples is ISIS Innovation Ltd for the University of Oxford, the Max Planck Innovation GmbH for the Max Planck Society, or TT Factor S.r.l. for the FIRC Institute of Molecular Oncology and the European Institute of Oncology.

⁵⁰ It is worth noting that research institutions with efficient TTOs have a better performance; see A. Arundel et al., *Respondent Report of the Knowledge Transfer Study (data for 2010)*, empirica GmbH, 2012. Data reported by Agrawal, Cockburn, Zang, *supra* note 27, at 4, show that universities are more likely to experience deal failure at the initial stage of the licensing process «perhaps due to the embryonic nature of their inventions».

⁵¹ According to an old study of D. Teece, *The multinational corporation*, 1976, 43-44, transaction costs burn about 20% of the value of a typical technology transaction in which a multinational corporation is involved.

Proliferation of IP rights with respect to complex technologies creates patent thickets⁵². IP intermediaries also act as organizational innovators, by providing solutions to assemble pieces of scattered IP rights and to overcome the tragedy of anticommons stemming from IP congestion⁵³. If business models are scalable, IP intermediaries can also support
300 smaller firms and institutions, thus providing them access to downstream or upstream resources or complementary assets that are needed for commercializing their technologies or insourcing new promising technologies⁵⁴.

One remarkable example of transaction costs is that associated with access to standardized technologies, almost always covered by a number of patents in the hands of
305 multiple owners⁵⁵; such situations reproduce the usual hold-up problem and create serious obstacles to firms willing to enter the market for standard-embedding products. Indeed, standard technologies are a field where IP intermediaries emerged early on, as patent pool facilitators and administrators.

In general, markets for technologies are excruciated by information asymmetries, large
310 upfront fixed costs and transaction costs⁵⁶. They refer to the search for partners (searching costs⁵⁷), due diligence (information costs)⁵⁸, negotiation and closing agreements (arm-length contractual costs)⁵⁹.

IP intermediaries as professional and organized matchmakers have the ability to significantly reduce such costs and to pass onto the IP owners and buyers the efficiencies
315 created with the exchange. They have established contacts with inventors and companies

⁵² See C. Shapiro, *Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting*, 1 Innovation Pol’y & Econ. 119 (2001). Recently, within a series of workshops on the patent system, the Economic and Scientific Advisory Board of the European Patent Office has produced a paper that summarizes the contributions of scholars, practitioners and policy makers; see ESAB, *Workshops on Patent Thickets*, Munich, 2013.

⁵³ See M. Heller, *The gridlock economy: how too much ownerships wrecks markets, stops innovation, and costs lives*, New York: Basic Books, 2008, 2. It is still debated whether formalized exchanges of intellectual property can improve the situation in technology markets. Hagiu & Yoffie, *supra* note 6, at 3, believe that barriers remain high for formalized exchanges and this also suggests that the flexibility provided by intermediaries is key. See also Parchomovsky & Polk Wagner, *supra* note 30, at 42, 43 («dramatic benefits of well-constructed patent portfolios mean that there is almost certainly a market value in such activities, a fact which is borne out by the recent emergence of firms dedicated to patent portfolio construction»).

⁵⁴ Transaction costs referred to here are not necessarily those associated with opportunistic behaviors, that usually cause incompleteness in transactions and ex-post contractual frictions, but in general all costs incurred by the parties to find a satisfactory arrangement in their business relationships, as explained by the New Institutional Economics theories applied to intellectual property: see R.P. Merges, *Contracting Into Liability Rules: Intellectual Property Rights and Collective Rights Organizations*, 84 Calif. L. Rev. 1293, 1321 (1996); Id., *Intellectual Property Rights and the New Institutional Economics*, 53 Vand. L. Rev. 1857 (2000).

⁵⁵ Yanagisawa & Guellec, *supra* note 1, at 22. For an interesting description of the role of patent in standards from an historical perspective see A. John, *Pirateria* 532 (describing AT&T dominant position in collecting pieces of IP since 1876).

⁵⁶ Tietze, Hestatt, *supra* note 4, at 11. Yet, on markets for technology buyers are often sophisticated players, knowledgeable about products and technology, and such circumstance at least exclude or reduces the problem of «lemons» (Gambardella, Giuri & Luzzi, *supra* note 16, at 1166). The EU Commission says: «Even a fully transparent patent market gives rise to transaction costs» (European Commission, *supra* note 12, at 9).

⁵⁷ Cockburn, *supra* note 11, at 8; Hagiu & Yoffie, *supra* note 6, at 5.

⁵⁸ Merges, *supra* note 54, at 1317 («Input markets are notable especially for the repeated costs of locating right holders and negotiating individual licenses»). See also Agrawal, Cockburn, Zang, *supra* note 27, at 6.

⁵⁹ M.A. Lemley, *The Economics of Improvement in Intellectual Property Law*, 75 Texas L. Rev. 989, 1053 (1997).

and limited costs for acquiring the information⁶⁰. Their internal skills and competences, as well as experience, decrease due diligence costs and the negotiation stage is usually smoother, as they can rely on previous contacts and expertise as repeated players.

320 **5. Degeneration: patent assertion entities and trolls**

The strongest evidence of a tragedy of the anticommons in the field of IP is provided by the existence of the so-called patent trolls. Patent trolls are specialized companies that acquire from external sources, or generate internally (or both), great deals of patents
325 (sometimes even other kind of intellectual property rights) not to secure competitive positions on the markets for goods, but to extract as much value as possible by their IP portfolios, forcing manufacturing companies to enter license agreements under the threat that assertion initiatives can take place and can result in huge damages awards⁶¹.

Patent trolls belong to the general category of non-practicing entities (NPEs), meaning
330 entities that are not active on the market for product. They are merely IP companies that focus on asserting their IP claims (for this reason they are also called patent assertion entities, under the acronym of PAE, to mark a difference with companies and institutions that, although not practicing, do not center their business model on aggressive enforcement). However, unlike other NPEs, as universities or research institutions⁶², they
335 are not concerned in the transfer of their technology, but in the sale of the modern luxury good called freedom to operate (FTO) in highly IP-dense markets⁶³. At the same time, unlike fabless companies, they do not outsource the production by licensing the IP to subcontractors. Trolls usually target individuals or companies with the exclusive purpose of collecting royalties and other forms of payment that are collected either as payments
340 for settlements or as damages⁶⁴.

The role of trolls on the markets for technology is controversial. Practitioners and some scholars seem to argue that trolls have the merit of making somehow liquid an otherwise

⁶⁰ Due diligence costs to mitigate uncertainty on markets for technology have the same magnitude, regardless the size of the perspective buyer/licensee (Agrawal, Cockburn, Zang, *supra* note 27, at 16) which means that smaller companies find more difficult to insource technology from external sources. This is certainly one reason policy makers should be concerned, particularly if they aim at supporting small and medium enterprises.

⁶¹ See J.P. Mello, *Technology Licensing and Patent Trolls*, 12 B.U. J. Sci. & Tech. L. 388, 393 (2006). Trolls thrive particularly in fields of technology dominated by incremental innovation and complex technologies covered by multiple patents. The field of information and communication technologies is one such sector. In this respect, Trolls' business models strongly rely on the assumption that more is better, under the portfolio theory developed by Parchomovsky & Polk Wagner, *supra* note 30, at 31. Empirical data about damages reported by NPEs (including trolls) between 1995 and 2011 in the U.S. are available in PricewaterhouseCopers, *2012 Patent Litigation Study. Litigation continues to rise amid growing awareness of patent value*, 2012, at 7.

⁶² M.A. Lemley, *Are Universities Patent Trolls?* 18 *Fordham Intellectual Property Media and Entertainment Law Journal* 611(2008).

⁶³ A remarkable example of how expensive could be the freedom to operate is the Blackberry litigation. On the importance of freedom to operate for subsequent innovation see Parchomovsky & Polk Wagner, *supra* note 30, at 31.

⁶⁴ «A patent troll risks little financially when it litigates a patent suit. At worst, the patent troll will lose attorney fees and it patent rights. At best, however, the patent troll may win substantial damages and a permanent injunction», say Mello, *supra* note 61, at 394 (footnotes omitted). Since trolls do not have products on the market the can have little to fear in terms of counterclaims by the alleged infringers.

illiquid and slack market⁶⁵. Economics and legal scholars have a more circumspect perception of what trolls do and evidence has been collected to show how trolls' enforcement initiatives can harm the economy as a whole, taxing innovation⁶⁶ and causing states at international level to adopt protective measures for national companies⁶⁷.

345 The real question about trolls, after considering that their business models are based on the intricacies of patent thickets (reinforced sometimes by big numbers of low quality patents⁶⁸) and ultimately on the anticommons situation of certain technology markets, is whether trolls can be considered IP intermediaries. Undoubtedly, they are responsible for mobilizing IP rights and, under conditions of opacity concerning their activity, they could enjoy the more positive reputation of market-enablers or even market-makers and active operators of technology markets rather than sharks or trolls or 'patentterrorist'. Yet, when delving into details and carefully assessing their activities, there can be little doubt that

350 the kind of intermediation they put in place only refers to freedom to operate and does not create direct added value in terms of new products or services to appear on the market (quite the contrary, they seem to add costs to products and services the market already offers).

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⁶⁵ See, for instance, the documented work of M. Risch, *Patent Troll Myths*, 42 Seton Hall L. Rev. 457 (2012). An objective (and still puzzled) description of what trolls do is provided by T. Ewing, R. Feldman, *The Giants Among Us*, 2012 Stan. Tech. L. Rev. 1. Among other contributions see J. Chan, M. Fawcett, *Footsteps of the Patent Troll*, 10 Intell. Prop. L. Bull. 1 (2005); T. Fischer, J. Henkel, *Patent trolls on markets for technology: an empirical analysis of trolls patent acquisitions*, Center for Economic Policy Research (CEPR), London, 2009; Mello, *supra* note 61; S.K. Shrestha, *Trolls or Market-Makers? An Empirical Analysis of Nonpracticing Entities*, 110 Columbia Law Review 114 (2010).

⁶⁶ One influential study has been conducted by J. Bessen, J. Ford, M.J. Meurer, *The Private and Social Costs of Patent Trolls*, Boston University Law School Working Paper 11-45, followed by data of J. Bessen, M.J. Meurer, *The Direct Costs from NPE Disputes*, Boston University Law School Working Paper 12-34. Other evidence (on a specific case of medical imaging technology) is provided by C. Tucker, *Patent Trolls and Technology Diffusion* (November 23, 2011). Available at SSRN: <http://ssrn.com/abstract=1976593> or <http://dx.doi.org/10.2139/ssrn.1976593>. Policy makers have opened discussions on the controversial role of trolls. The Federal Trade Commission promoted a workshop on the Patent Assertion Entity (PAE) activities, to hear from the various experts and industry representatives their views on the implications for innovation and competition. Occasionally, law reforms have been proposed in the U.S. to limit the action of trolls, as is the case for a proposal of a Saving High-Tech Innovators from Egregious Legal Dispute (SHIELD) Act of 2012, presented at the House of Representative to modify chapter 29 of title 35 U.S.C. and allowing the recovery of reasonable attorney's fees by the defendant when the party alleging the infringement of a patent did not have a reasonable likelihood of succeeding.

⁶⁷ New protectionism by patents and defensive funds as defensive intermediaries.

⁶⁸ In more than an occasion, practitioners, scholars, and companies have pointed to massive quantities of low-quality patents in circulation as a major cause of patent trolling (see C. Milone, *The real problem is patent quality, not NPEs*, in *Intellectual Asset Management*, 2013, 11). Although quality per se cannot be accounted for the advent of patent trolls, there is no doubt that an inefficient patent system can cause serious problems and trolls is but one of those. Indeed, particularly in the U.S. policy makers have been working on ways to fix the patent system and regain high quality standards. Also in Europe the issue of patent quality is central to the reflections of the European Patent Office. The European Scientific and Economic Advisory Board of the EPO has launched a series of workshops on patent quality and costs (two aspects that are sometimes related) to explore potential solutions to improve the patent system and prevent phenomena of degeneration. One specific contribution on patent fees as a leverage to fix the patent systems is G. de Rassenfosse, B. van Pottelsberghe de la Potterie, *The Role of Fees in Patent Systems: Theory and Evidence*, Journal of Economic Surveys (2012). On the meaning of quality referred to patents, S. Thambisetty, *Patents as Credence Goods*, 27 Oxford Journal of Legal Studies 707, 721, 723 (2007), note that «[p]atent quality is sometimes affected by evidence of the seemingly systematic failings of patent offices».

360 What is still interesting for the purposes of this article is that trolls are mostly (although
not exclusively⁶⁹) based and active in the U.S.⁷⁰ Although they try to reach out, the
majority of deals and enforcement actions they undertake are centered on the U.S. market,
even if operations involve also foreign companies. In this case too, there is the strong
suspect the centrality of U.S. depends on legal differences and it is like if trolls lived on
365 the other side of the spectrum along a variety of situations in which there can be either
absence of transactional activities concerning IP, or excess. An efficient market for IP
lies somewhere in between the two extremes where intellectual property is exchanged as
an enabling factor or manufacturing and production.

370 **6. Legal and non-legal obstacles to the transfer of technology and the role of IP intermediaries**

The relative ease with which patent trolls have earned huge amounts of money in the U.S.,
recovering damages from manufacturing companies and signing license agreements, has
been probably instrumental to a false belief on the way IP markets work and about the
375 environment in which intermediaries act. In open innovation contexts, the reality of
patents is that of a facilitator for exchanges of technology; patents are by all means an
institution, whose function is to reduce uncertainty⁷¹. Eventually, the success of any IP
transaction depends significantly also on the intrinsic characteristics of the technology,
such as its maturity, its complementarity with other assets, its complexity, and on the
380 ability of would-be licensees to understand the characteristics and the potentials of a given
technology⁷².

It is commonplace to group all such difficulties under the common label of transaction
costs and consider them responsible for the sub-optimal development or failure of an IP
market. Transaction costs do play a crucial role in the evolution of such markets, where
385 opacity and lack of information dominate⁷³. Yet, transaction costs have very different
causes that must be tackled in order to understand both the functioning of an IP market
and the role intermediaries play. At a minimum, there must be a distinction between costs
that prevent or make difficult to identify a counterpart (buyer/seller) from costs that

⁶⁹ On Germany as an hot spot for patent litigations, see <https://www.wsj.com/amp/articles/big-tech-wants-to-alter-patent-laws-in-germany-a-hot-spot-for-litigation-11615723380>.

⁷⁰ According to Hagiu & Yoffie, *supra* note 6, at 9, there are more than 380 active non-practicing entities in the United States (as of 2011) and only thirty-five of them own more than one hundred patents.

⁷¹ It is well established in the literature that codified knowledge (with the use of patents) facilitates the transaction. See, for instance, Gambardella, Giuri & Luzzi, *supra* note 16, at 1165. For some empirical support see Arora, Cohen & Walsh, *supra* note 42, at 29.

⁷² Managerial literature has framed the concept of absorptive capacity as a pre-condition of knowledge transfer. If the recipient is not sophisticated enough, the transfer is unlikely. See W.M. Cohen, A.D. Levinthal, *Absorptive capacity: a new perspective of learning and innovation*, 35 *Administrative Science Quarterly* 128 (1990).

⁷³ See Darcy, Kraemer-Eis, Debande, Guellec, *supra* note 31, at 16. An interesting (although overly optimistic) proposal to solve the problem of transparency in patent markets is made by M.A. Lemley, N. Myrvhold, *How to Make a Patent Market*, 36 *Hofstra L. Rev.* 257, 258 (2007): «[r]equire publication of patent assignment and license terms. Doing so will magically make the market for patents work like a stock exchange». The residual uncertainty and issues on volatility will be mitigated by signals coming from other transactions concerning the same patents.

390 prevent the conclusion of an agreement once a potential buyer (or licensee) has been identified⁷⁴.

Legal and non-legal obstacles exist that delay or prevent a transaction on markets for IP and that can be mitigated by the action of IP intermediaries. Private ordering from IP intermediaries and owners plays an important role in shaping such markets, but it should be clear that the very existence of IP intermediaries depends on its turn on favorable
395 background conditions and on the sustainability and the economic convenience of intermediate IP deals.

Non-legal obstacles include: (i) low quality of protection and junk patents⁷⁵; (ii) need of complementary know-how that is required for the full exploitation of the technology⁷⁶; (iii) dimension of markets for the specific technology (niche markets⁷⁷); (iv) pricing of IP
400 rights⁷⁸; (v) level of maturity of the technology⁷⁹; (vi) need for critical mass to attract buyers⁸⁰, including the availability of homogeneous portfolios, rather than just individual titles⁸¹.

⁷⁴ The distinction between information, search and negotiation costs has been already proposed in paragraph 4.4. With respect to information, it must be added here that the markets for technology are opaque, and necessarily so. Since such intermediate-market transaction are strategic, contracts cannot be made public and details of the agreements are jealously kept secret. This obvious observation makes the proposal of A.W. Wang, *Rise of the Patent Intermediaries*, 25 Berkeley Tech. L.J. 159, 194 (2010), of creating a database to track all transactions largely impracticable.

⁷⁵ In the previous paragraph it has been explained how low quality patents can be instrumental in amassing large portfolios by patent trolls that are eventually instrumental to threaten enforcement actions. For technology markets and genuine technology transfer transactions, low quality patents increase the costs for due diligence activities and make a deal less attractive in terms of transaction costs. Moreover, low quality of protection makes patenting around possible for competitors and does not justify investments in developing new products based on the IP. On the importance of quality of the successful exploitation of patents Yanagisawa & Guellec, *supra* note 1, at 39.

⁷⁶ See Troy & Werle, *supra* note 7, at 16.

⁷⁷ One serious obstacle to technology commercialization is the magnitude of costs required for the development of the technology compared with the reduced perspective of profits. One such example is given by so called orphan drugs addressing rare diseases. For this specific diseconomies associated with the development of orphan drugs governments have provided specific resources, faster tracks and lighter regulatory burdens.

⁷⁸ There is evidence showing that in many instances a negotiation for an IP deal failed due to difficulty in agreeing on prices; see Cockburn, *supra* note 11. Evaluation of IP is a long-debated issue that attracted many studies. IP Expert Group I e poi Expert Group on Evaluation + letteratura di riferimento. On uncertainty in the evaluation of assets as a potential deal-breaker see also R.P. Merges, *Intellectual Property Rights and Bargaining Breakdown: The Case of Blocking Patents*, 62 Tenn. L. Rev. 75, 89 (1994). Thambiasetty, *supra* note 68, at 733-744, proposes an index to determine the value of knowledge assets (including patents) that could promote allocative efficiency facilitating trade.

⁷⁹ Maturation of technology as a pre-condition for licensing has been for long time pointed at as a major obstacle, since resources for proof of concepts are rather rare. As it has been noted, «[p]rojects at US universities are better financed and further developed towards their relevant markets than in Europe» (Darcy, Kraemer-Eis, Debande, Guellec, *supra* note 31, at 20), and this can be a major reason to explain why U.S. universities are more successful in IP transactions. Thambiasetty, *supra* note 68, at 728, points out originally that patents in general, and on immature technologies, suffer from the «unobservable quality» and cause inevitable asymmetry of information (the observation is consistent with the author's intuition that patents may be considered credence goods as far as their qualities are concerned). The consequences for the parties of an IP transactions are inevitably in terms of due diligence costs.

⁸⁰ Due to due diligence costs as non-scalable costs, the presence of a critical mass justifies the investment in searching and assessing more IP rights rather than just one or few titles.

⁸¹ On the incidence of patent portfolios on the value of a patent, see also Thambiasetty, *supra* note 68, at 730.

The distinction between legal and non-legal obstacles to technology markets is largely conventional; many non-legal factors are eventually also affected by legal rules⁸². It must be clear that regulation can increase or lower the costs of some activities (as it is the case for orphan drugs) and influence many aspects of a transaction at various level; this is true for IP markets no less than for any other kind of exchange.

Turning to IP intermediaries, there are specific legal factors that must be accounted for and taken into close consideration in explaining why some regional markets (e.g., the U.S.) prosper, whereas others shrink. Part of the problem in filling the gap on legal determinants of IP markets can be methodological in nature. From an empirical standpoint data and regression models do not exist that can be used to identify with some degree of statistical robustness which legal factors are the likely antecedents of a given performance for a state vis-à-vis another. For the sake of truth, the problem is not specific to IP intermediaries; all studies that link economic performance to legal factors should be supported by convincing empirical evidence. Statistics require data and data are not always available. Moreover, purely domestic data end up producing interpretations of the reality that are affected by homeward bias⁸³.

Absent reliable quantitative evidence, in a second-best world comparative legal analysis is the only available alternative heuristic tool to explain how differences in the legal rules and institutions result in all likelihood (if not in probabilistic terms) and all other things being equal, in differences in economic performance⁸⁴.

In the case of IP markets and intermediaries, the comparative analysis of European and North American markets for IP allows to use one legal system as the control variable of legal factors that in the other system are deemed to be material for explaining success or failure of the market itself⁸⁵. In a sense, the methodological challenge is about using comparative data as a means of contra factual analysis, by asking hypothetical «what if» questions and controlling the answer through exploration of other systems that can be assumed as yardstick for comparison.

7. Legal differences that matter (Europe vs. U.S.)

This article argues that, to some extent, the legal determinants of an IP market are the background legal conditions that have been traditionally overlooked in legal and economic analysis of technology markets, even though often mentioned in policy

⁸² For example, the low quality of patents can be caused by the overload of patent offices that, on its turn, can be caused by lower patentability standards or expansion of patentable subject matter introduced by statute or by judicial (or administrative) decisions.

⁸³ The foreseeable outcome of quantitative analysis that is not corrected by comparative analysis is the temptation to define rankings of legal systems that aim to be absolute.

⁸⁴ This basic assumption hinges on North's argument that organizations (in this case, IP intermediaries) react to institutional change and to formal and informal institutions that are created at political and legal level to govern uncertainty. As North 1991: 109 puts it: «[T]he organizations owe their existence to the opportunities provided by the institutional framework».

⁸⁵ The methodology proposed here of comparative law as the variable of control is consistent with the methodological suggestions provided in R. Pardolesi, M. Granieri, *The Future of Law Professors and Comparative Law*, 21 *Nat'l Italian American Bar Ass'n Journal* 1 (2013).

documents. Such background conditions relate (among other things⁸⁶) to the patent system and the enforcement system⁸⁷.

In general, the legal framework (as formal institutional framework) appears relevant for market players in the field of IP, particularly for intermediaries⁸⁸. States have improved their legislations, for example, in the field of antitrust, in order to provide reliable and predictable orientations by antitrust authorities and judges to favor R&D collaborations⁸⁹.
440 The U.S. Department of Justice and the Federal Trade Commission issued the Antitrust Guidelines for the Licensing of Intellectual Property in 1995. The European Union adopted several generations of block exemption regulations for certain categories of
445 technology transfer agreements and related Guidelines, and the Japanese Fair Trade Commission passed the Guidelines for the Use of Intellectual Property under the Antimonopoly Act in 2007⁹⁰.

While all such measures are relevant, they only provide indirect evidence that the legal system is instrumental to create or enhance the conditions of a favorable market, but they
450 leave the asset that is usually traded on the markets for IP unaffected⁹¹. In other words, antitrust scrutiny does not appear as important in the field of IP transactions more than in any other field where companies interact and exchange products or services⁹².

The field of law that is immediately responsible for defining the boundaries of intellectual property rights as tradable assets is IP legislation itself and its rules and institutions
455 (including the enforcement apparatus) account for a large part in shaping a market for IP. As of now, compared with the U.S., Europe lacks a unitary patent protection (a truly federal title) and a unitary jurisdiction and even though efforts to complete the design of the unitary patent systems are underway, when in operation the system will be far from optimal. Spatial anticommons situations and complexity will cause the market to work
460 imperfectly⁹³.

⁸⁶ Other relevant, although not determinant, legal variables include tax law and the laws of corporate organizations, that are not deal with in this paper.

⁸⁷ The EU Commission has acknowledged only recently the impact of an imperfect patent system on the market for technology in Europe. See SWD 12. Empirical evidence brought by Naomi R. Lamoreaux & Kennet L. Sokoloff, *Intermediaries in the U.S. Market for Technology, 1870-1920*, NBER Working Paper series 9017, 2002, shows how intermediaries were instrumental in creating a U.S. market for patented technologies and how they relied on the patent system as the basic institutional support. For the general observation see also Agrawal, Cockburn, Zang, *supra* note 27, at 8 («Effective intellectual property protection increases the likelihood that market participants will disclose their preferences truthfully and minimizes the likelihood they will engage in ex post opportunistic behavior once the seller reveals important details of the idea in the course of negotiation»).

⁸⁸ At least partly, this paper advocates the thesis that an exogenous change in formal institutions (such as the legal rules of the patent system) provide incentives for organizations (such as intermediaries) to exploit the opportunities provided by the economic context, as long as the benefits of any action exceed the costs associated with organizing to compete. See, *infra*, par. 8.

⁸⁹ The relationship between antitrust rules and conditions to foster innovative activities had been already tested in the Nineties with respect to the National Cooperative Research Act.

⁹⁰ Yanagisawa & Guellec, *supra* note 1, at 37.

⁹¹ Also tax incentives have been proposed to incentivize patent transactions, as testified by the measures adopted in Belgium, Luxembourg and the Netherlands. For references, European Commission, *supra* note 12, at 15.

⁹² Merges, *supra* note 54, at 1389, seems more inclined to believe in the role of antitrust rules («fair treatment under the antitrust laws will go a long way toward ensuring that organizational entrepreneurs will bring good idea to facilitate IPR exchange to fruition»).

⁹³ Other times in history, territorial fragmentation in intellectual property systems caused problems of coordination. One example, concerning the Britain empire and its territories in the XIX Century is provided by A. Johns, *Pirateria* 345.

Since the beginning of the process that is slowly conducting to a unitary patent protection system, the European Commission has insisted that «[a] clear regime for intellectual property rights is an essential condition for the single market and in making the “fifth freedom”, the free movement of knowledge, a reality»⁹⁴. Thus, even policymakers
465 recognize that, at the end, what really matters are the background conditions for a market to exist and, among such conditions, the legal infrastructure is of the essence. The Commission has come up with the catchy formula of a “fifth freedom”, beyond the traditional four freedoms of the Treaties, and this could be the political umbrella under which to adopt any necessary measure to ensure the creation of an internal market for
470 knowledge, where IP intermediaries can act and prosper⁹⁵. European IP rights policy has been interpreted as «“enabling legislation” allowing for the management of IPR in the most efficient way, thereby setting the right incentives for creation and investment, innovative business models, the promotion of cultural diversity and the broadest possible dissemination of works for the benefit of society as a whole»⁹⁶.
475 Thus, an intuitive reason for the non-existence of an efficient IP market is the absence of a truly federal system of intellectual property rights and, more specifically, of an integrated European patent system⁹⁷.

7.1. Current European patent protection as (spatial) anticommons

480 It is not the aim of this article to review all the political and economic obstacles and the institutional difficulties that have impeded so far the creation of a unitary patent system in Europe. The goal is rather to observe the implications for an IP market that comes from having failed to create such system.
485 A federal title of patent protection in Europe might not be a good thing *per se* (as someone argues), as opposed to the *status quo*⁹⁸. But it is undeniable that the *status quo* has not been conducive to a favorable environment for IP intermediaries in Europe and although an IP market can have several determinants (both legal and non-legal), other things being equal, legal factors result as decisive.
490 Comparative analysis shows that the absence of a unitary patent has several implications for the development of an IP market. Current patent protection in Europe is more expensive than in the U.S. or in Japan⁹⁹. As a consequence, small entities (including individuals, public research institutions and small and medium enterprises) have less resources in absolute terms to apply for patents and, for each patent filed, less resources
495 to cover more geographic markets. A technology that is not geographically protected in a uniform way or that leaves uncovered parts of the relevant market does not provide the

⁹⁴ See Communication from the Commission, *supra* note 47, at 3.

⁹⁵ The ability of the EU institutions to turn their plans into actual proposal of legal changes largely depends on the configuration of their powers and division of competences with Member states. As far as the internal market for IP is concerned, competences are shared and the adoption of any legal instrument by the EU institutions is subject to the subsidiarity principles.

⁹⁶ See Communication from the Commission, *supra* note 33, at 6.

⁹⁷ For a detailed account of attempts to build the community, then unitary, patent system see M. Granieri, A. Renda, *Innovation Law and Policy in the European Union. Towards Horizon 2020*, Milan: Springer, 2012, 121. According to Chesbrough, Henry, Vanhaverbeke, Wim, *Open Innovation and Public Policy in Europe*, Science | Business Publishing, 2011, 15, the current European patent system is «the most expensive and complex in the world due to its high level of fragmentation and translation requirements».

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right incentive for an intermediary to undertake a commercialization action; it will eventually result unattractive also for a potential licensee or assignee that have to invest into developing the technology before bringing it on to the market.

500 The issue here is not to make access to the patent system cheaper (something that would jeopardize both its sustainability and the quality of the patents¹⁰⁰) in absolute terms, but to provide a geographic protection that is no more expensive than what companies pay in the U.S. to cover the territories of the Union, while reducing the administrative burden to apply in several countries. Money saved by patentees in Europe can be used to obtain
505 protection abroad, making the technology even more palatable for potential licensees. Looking only to the direct financial costs of a new business environment is probably not completely correct. The real issue here is about the opportunity costs of the *status quo*, including all the missed opportunities that come from an imperfect or skimpy technology market.

510 Moreover, since unitary patent protection is still missing, European inventors cannot rely on an effective default rules regime of ownership and this is a major source of transaction costs, especially when there are situations of co-ownership by inventors and applicants of different countries, that cause what Michael Heller calls a “ownership congestion issue”¹⁰¹. Co-ownership will likely exacerbate the problems of anticommons, since a
515 potential user (or an intermediary) has to deal with a puzzle of owners¹⁰². In a context of open innovation and intense cooperation among research institutions and industries, multiple inventorship (and co-ownership of applicants) is inevitable and this is a natural feature of modern innovation cycles. Europe here is disadvantaged. First of all, because co-ownership will dramatically increase as a consequence of funding at
520 European level, where research is cooperative by definition. Second, because twenty-seven national regimes are not harmonized and there can be significant differences in the treatment of co-inventors¹⁰³. The consequence is that an intermediary has to have even larger incentives to assemble the possibly co-owned pieces of IP and has to envision larger gains from trade to overcome transaction costs associated to its service.

525 In economic terms, if fragmentation in patent protection causes transaction costs to sour and to reduce the surplus from any IP exchange, it means that intermediaries could only find convenient to work on technologies that have the potential of large returns upfront *and* that have a protection that is consistent with the size of the market. As a consequence, since also intermediaries themselves represent a transaction cost (for owners), not only
530 few technologies will find their way to the market, but only few IP owners (mostly those with large portfolios) will benefit from a technology market, even though their profits will be further reduced by an increase in transactions costs.

¹⁰⁰ For the literature on patent quality see *retro*. The relationship between costs and quality comes from the fact costs can be modulated in order to steer patentees’ behaviors (for instance, to force abandoning a patent that has become overly expensive with respect to individual benefit). At the same time, caution is in order not to discriminate individuals and firms with limited resources, that would be otherwise excluded from the patent system.

¹⁰¹ Absent a common rule on co-ownership, a situation of uncoordinated multiple owners is almost always inevitable, particularly under the European framework programs of research that reserve funding only to consortia formed by more parties, from different member states.

¹⁰² The need to avoid problems of anticommons provides a rationale for ownership of employees-generated inventions; see R.P. Merges, *The Law and Economics of Employee Inventions*, 13 Harv. J.L. & Tech. 1 (2000).

¹⁰³ Because of the current status of ratification of the Unitary Patent protection package, although there are twenty-seven legal systems in within the European Union (after Brexit), only twenty-five will grant unitary effects to European patents, thus making the situation even more complex.

535 Eventually, the market will remain underdeveloped and significant portions of
technologies will lay unutilized and without a significant chance of being exploited. That
means that European innovators and IP owners will not be able to seize the opportunity
of an internal market that in dimensions and characteristics is not significantly different
from that that their U.S. counterparts can enjoy. Importantly, while non-legal factors
(such as lack of liquidity or an underdeveloped venture capital market) can be improved
540 with a variety policy measures, an anticommons problem only requires legal answers and,
because of the structure of the European market, they must have a European reach.

7.2. Litigation

545 The negative incentives that come from the absence of a pan-European patent title are
matched by the hurdles of an even less homogeneous system of litigation. Patents in
Europe are still really national titles, that must be enforced and defended before national
jurisdictions. Costs are extremely diversified, and results of litigation are
unpredictable¹⁰⁴. Decisions of asserting a patent must take into account a number of shaky
variables, including the quality of the patent jurisdiction and the preparation of judges,
550 the separation between validity and infringement action, local costs.

For manufacturing companies there are certainly disadvantages to avail themselves of an
imperfect and expensive patent system, particularly before the probability of a disastrous
event as IP litigation can be. Litigation affects intellectual property rights at downstream
market level (products), but its potential incidence retroacts backward on the decision to
555 acquire or not a technology. If the decision is systematically negative because of
inadequate background conditions, eventually the intermediary suffers from a crucial
drawback that limits incentives and any chance to persuade companies to in-license the
technology.

560 It is hoped that once the new Unitary Patent Court will be up and running, part of the
difficulties will be likely solved¹⁰⁵. In framing the new court in Europe, rules of procedure
of the U.S. system of patent litigation again must be kept in mind as a yardstick in the
institutional framework. There is little doubt that the U.S. litigation systems as a
significant role in shaping the intellectual property environment and in creating the pre-
conditions for a market to work.

565 There are two rules that are worth attention as to their effect on positive and negative
incentives to litigation, namely the rules that awards punitive damages for willful
infringement and the so called American rule concerning costs of the trial. While being
both crucial in the dynamics of patent litigation in the U.S., such rules cannot be deemed
essential for developing an IP internal market. They are certainly instrumental to the
570 business model of the PAEs, as it shows *a contrario* the proposal of a SHIELD Act, that
among other things aims at changing the rule of attorney fees to limit the action of patent
trolls¹⁰⁶.

575 More than recovering damages and expenses, European players must have incentives to
put their intellectual property portfolios at use; however, a situation of fragmented market
is not conducive to exploitation. Of course, litigation costs enter the equation of
convenience for intermediaries and owners, since litigation must be taken into account in

¹⁰⁴ Data from the European Commission on litigation.

¹⁰⁵ At least, the fragmentation of the litigation for infringement will be eliminated and this will certainly be
an advantage for plaintiffs.

¹⁰⁶ See retro.

580 a cost/benefit analysis concerning the development and marketing efforts to bring a new technology on the market. Within the equation, even a small probability of a pervasive and uncertain litigation makes expected profits dwarf. While paradoxically an inefficient system of litigation might be beneficial in terms of preventing the action of PAEs, inefficient institutional settings are not selective and eventually discourage also non-sham actions by legitimate IP owners and, by implication, of intermediaries.

8. Competition among legal systems and European competitiveness

585 Europe has a population of about 450 million of inhabitants with an average salary that is comparable to that of other developed Western countries¹⁰⁷. There are more citizens than in the U.S. (300 million) and Japan (127 million). It is an appealing market, as the Commission has repeated insistently. And yet, it appears that in many respects European firms and entrepreneurs are not able to harvest the opportunities that such a big market offers. Likely, U.S. and other foreign companies are expanding on EU markets more than how EU companies are expanding abroad, but not necessarily on the internal market for technology.

590 The risks associated with a diminished ability of Europe to compete with U.S. and Asian countries in the market for IP are serious and should not be disregarded. A European market for IP with European-based intermediaries would be a way to earn the right return on R&D investments and to avoid companies delocalize. Importantly, IP intermediaries should favor the safe, effective, and inexpensive insourcing of IP by European companies (particularly, small and medium enterprises that do not have enough resources to develop internally new product and processes) to prevent that IP generated in Europe is bought by foreign companies for a depressed price and turned overseas into products that are then sold back in Europe. Such a consequence evokes the ghost of reverse technology transfer, that would translate in the complete failure of any European industrial policy; money spent in Europe in research and development, jobs created abroad for industrial exploitation of new technologies, technology-based goods sold in Europe, profits earned abroad.

600 Although many non-legal and legal factors account for the success of IP intermediaries, non-legal factors (such as the low maturity of research results from academic research) appear to affect all markets at worldwide level homogeneously. Legal factors instead mark the most visible differences and appear to be the real determinants for an IP market when comparing the U.S. and the European landscape. Lack of legal background conditions hits all companies, although foreign players – with an established market in their countries of origin – can easily come to Europe for IP acquisition and, later on, to cash royalties.

615 IP intermediaries can paradoxically solve part of the difficulties that prevent the creation of an efficient internal IP market for Europe. Constraints posed by institutional contexts can be a source of opportunity for market players¹⁰⁸. If such constraints are created by legal settings, there can be situations in which private players can seize the opportunity created by the context and fix it. In this respect, intermediaries prosper amidst difficulties,

¹⁰⁷ The European Patent Office estimates that the European patent, embracing thirty-eight member states and two extension states, covers an area of approximately 600 million inhabitants.

¹⁰⁸ The interaction between context and change had been investigated already by D.C. North, *Institutional Change: A Framework of Analysis*, in S.-E. Sjöstrand (ed), *Institutional Change. Theory and Empirical Findings*, Armok, NY: Sharpe, 1993, 35.

620 when there are positive externalities that they can internalize arranging deals. But if the framework is excruciated by too high obstacles, the legal environment becomes prejudicial and detrimental for all and requires external forces for a change that will reinstate the right level of incentives for market-driven initiatives.

625 There is ground for policy intervention and several options are available in the abstract, including monetary incentives to the demand side; yet, if the analysis above is correct, few of such options will make actual sense when the problem lies with legal conditions. Creating quasi-private intermediaries, or supporting their creation by supplying money, when background conditions are poor will give no guaranty that they will operate effectively and survive. No matter how long it takes, it would be much more effective and
630 consistent with the analysis to change the institutions and to remove legal obstacles that prevent intermediaries to spontaneously come into being than to indulge in creating quick fixes for a structural problem¹⁰⁹.

If Europe will not level the playing field and will not quickly resolve unsettled issues for the creation of background conditions, the European IP market will be still attractive for
635 foreign companies more than how foreign markets will appeal European companies, as far as IP acquisition is concerned. However, it will be less attractive for foreign companies to sell the technology acquired, than the opposite, when the technology offered is an opportunity for the acquiring company.

Europe is now on the verge of a new era, if unitary protection will be readily available.
640 Combined with the opportunity and the resources of the European Green Deal, there will be the chance to favor technology creation and diffusion in areas where innovation is set to bring responses to global needs. Yet, the process is still long and complex, with huge uncertainties about its configuration. Above all, the unitary effect for European patents will only be available for a limited number of countries and not for the European market
645 as such, which means that fragmentation is reduced, but not completely removed¹¹⁰. The “swiss cheese effect” in geographic coverage can still represent a negative force for undertaking upstream IP intermediation activities¹¹¹.

9. Conclusions

650 This article aims to explain how legal factors are determinants of a market for IP intermediaries and why the U.S. market appears as more conducive to new business opportunities than the European one. Non-legal factors are common to all systems, as they mostly relate to the nature of the technology and to the value chain of IP
655 commercialization. Other things being equal and absent appropriate empirical evidence (which is an apparent limitation of this work), in all likelihood certain legal factors are the ones that can better make sense of different stages of economic development for equally industrialized markets, such as Europe and the United States. Contributions by

¹⁰⁹ Gambardella, Giuri & Luzzi, *supra* note 16, at 1180; Cockburn, *supra* note 11, at 12, concludes that «there may be a role for governments to subsidize or otherwise support the creation of intermediary institutions or technologies».

¹¹⁰ Again Cockburn, *supra* note 11, at 13, points out as patent law reforms can improve the performance of technology markets. Europe too late became aware of costs and implications of a non-unitary patent protection. Several political reasons prevented the radical institutional change that would have been necessary and way too often light measures have been adopted, with high costs an poor results.

¹¹¹ The “swiss cheese effect” formula is borrowed by Parchomovsky & Polk Wagner, *supra* note 30, at 41.

660 other disciplines make this conclusion credible and worth attention. Law as a device of
social control is still relevant, and policy makers do have a role¹¹².
In trying to demonstrate the thesis, this article shares the view that the most fruitful
perspective for comparative legal studies is one that allows to understand how legal
differences account for economic development and how legal rules can be changed in
665 order for legal systems to create the best conditions to compete at global level, without
necessarily resorting to a race-to-the bottom competition¹¹³.
By no means this paper justifies that whichever solution that sounds more European is
necessarily better than the status quo for Europe. If legal rules do matter, the direction of
their change, construction and interpretation matters even more and must be done
accurately. This is a call of duty for lawyers as social engineers.

¹¹² Quite paradoxically this is a more shared conclusion among economists than among lawyers. See Agrawal, Cockburn, Zang, *supra* note 27, at 19.

¹¹³ The need to integrate policy analysis into comparative law has been advocated by P.J. KOZYRIS, *Comparative Law for the Twenty-First Century: New Horizons and New Technologies*, 69 *Tul. L. Rev.* 165, 175 (1994).