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Intermediaries for the IP market

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Introduction

Some assets are traded in liquid markets with the help of many, thriving intermediaries: houses and apartments, financial products, books, DVDs, electronics and all sorts of collectibles. Intellectual property (IP) in general and patents in particular are not among those assets. In fact, one could argue that the market for patents is one of the last large and inefficient markets in the economy. There are some obvious reasons for why the patent market is highly illiquid: IP is the ultimate intangible asset and extremely hard to value. Moreover, there are very high search and transaction costs on both sides of the market (inventors or patent owners and operating companies or patent users/buyers) and the risk of litigation makes all potential participants even more cautious.

Despite these difficulties, there could be attractive opportunities to create intermediation mechanisms to match patent creators with patent users and facilitate transactions between them, thereby allowing each side to specialize in what they do best (creators to innovate; users to build products based on the IP embedded in the corresponding patents). And indeed, during the last 5-10 years a variety of novel and intriguing intermediaries has emerged, all using different business models while attempting to bring more liquidity to the patent market.

Among these intermediaries, one might expect to see prominent, eBay-like platforms facilitating patent transactions. At least through 2011, this has not yet happened. IP transaction platforms have failed, remained sub-scale or transformed themselves into brokers or Craigslist-like listing portals. Instead, "merchant"-like intermediaries who acquire and monetize patents have achieved markedly superior scale and wield significant influence in the patent market and relevant technology sectors: NPEs (or "patent trolls"), defensive patent aggregators, and one unusual private equity firm – Intellectual Ventures – have become the most important

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intermediaries. Their chosen business models raise interesting and to date unexplored economic and strategy issues.

What accounts for the relative differences between these different patent intermediation models? Can patent intermediaries make the market more liquid, or will the inefficiencies persist? What are the efficiency implications of the emergence of these intermediaries for the patent market and society at large?

We focus on patents because most of the action in IP has been focused on patents. Patents have very recently become a particularly hot commodity due to a series of high-profile settlements and auctions involving huge price tags for patent portfolios. In 2009, Microsoft was ordered to pay $290 million for patent infringement to i4i, a small Canadian software company that claimed a version of Microsoft Word infringed its patented method for editing documents.[3] In June 2011, a consortium made of Apple, Microsoft, Sony and several other large tech companies outbid Google to buy Nortel's 6,000 patents and patent applications for $4.5 billion.[4] Google responded first by buying over 1,000 patents from IBM for an undisclosed price[5] and then by acquiring Motorola Mobile and its more than 17,000 patents for $12.5 billion.[6]

Related literature

While there is extensive economics research on licensing IP (see Kamien (1992) for a survey), probabilistic patents (Farrell and Shapiro (2008), Lemley and Shapiro (2005)) and the problems of the patent system (Jaffe and Lerner (2004), Scotchmer (2004)), very little work has focused on IP intermediaries, which are the focus of this paper.

There are four exceptions. First, there is a body of work on patent pools (Shapiro (2001), Lerner and Tirole (2004), Lerner, Strojwas and Tirole (2007), Choi (2010)), which are a very specific form of IP intermediary. This literature is mostly concerned with the efficiency trade-offs and institutional design issues associated with pools. Our paper can be viewed as broadening the discussion to IP intermediaries beyond patent pools.

[3] Adam Liptak, "Microsoft Loses Appeal in i4i Patent Case," *The New York Times*, June 9, 2011.
[4] Peg Brickley, "Nortel $4.5-Billion Patent Sale to Apple, Microsoft, Others Approved," *The Wall Street Journal*, July 11, 2011.
[5] Jessica Guynn, "Google Buys More Than 1,000 Patents from IBM," *Los Angeles Times*, July 30, 2011.
[6] Amir Efrati and Spencer E. Ante, "Google's $12.5 Billion Gamble," *The Wall Street Journal*, August 16, 2011.

Second, Dushnitsky and Klueter (2010) focus on online knowledge marketplaces (which include two of the intermediaries we discuss below – Yet2.com and Tynax) and analyse the mechanisms they use to mitigate adverse selection. Again, we adopt a broader perspective by analysing both IP platforms (online marketplaces being a specific category) and IP merchants, who acquire and monetize IP.

Third, Gans and Stern (2010) start with a premise that is similar to ours, namely it is puzzling that there are few intermediaries and large-scale platforms in the market for ideas. Instead, bilateral transactions tend to be the norm. They use the lens of market design analysis to discuss the potential for creating a generic market for ideas. We go further by looking at specific intermediation business models that attempt to solve the problems characteristic of trading patents. We should also note that we do not share Gans and Stern's optimism for the "development of formalized IP exchanges suggesting that effective market design may be possible for some innovation markets." The barriers to formalized exchanges for patents remain extremely high.

Fourth, Besen Ford and Meurer (2011) offer a first attempt to empirically estimate the costs imposed by non-practicing entities (NPEs) on their targets – technology companies. The costs are reflected in lost stock market value due to patent litigation and amount to roughly $500 billion in the period 1990 to 2010. The authors also argue that the bulk of these losses are not transferred to individual inventors, so that their increased innovation incentives do not compensate for the decreased innovation incentives of operating companies. We broaden the dynamic efficiency discussion to intermediaries beyond NPEs and argue that their effects on innovation incentives on both sides are less clear.

Our paper is organized into six sections. Following this introduction section, we explore the fundamental economic issues responsible for the low liquidity in the market for patents. Section 3 then provides a cursory overview of patent intermediaries. In section 4, we focus on platform-type intermediaries (i.e. who enable search and transactions without ever taking possession of IP assets) and discuss the reasons for their lack of traction to date. Section 5 turns to merchant-like intermediaries (i.e. who take possession of IP assets) and the factors which have made them comparably more successful/influential than platforms. In section 6 we discuss several efficiency questions raised by patent intermediaries and conclude.

Source of IP market failures

The market for patents has long lacked liquidity and transparency. It has consisted mainly of cross-licensing deals between large companies and has not spawned well-established intermediaries such as Amazon or eBay or NYSE to facilitate transactions. Individual inventors and small companies have traditionally had a hard time finding buyers or licensees for the patents they own. Meanwhile, a large share of the IP created in and owned by large companies has traditionally sat unused in their research departments.

There are several fundamental factors that have prevented the patent market from becoming more liquid. First, the value of patents is much more difficult to ascertain than most other assets, which leads to high transaction costs and high probabilities of disagreement between parties to potential transactions. This is not simply because IP is an intangible asset: other intangibles such as brand equity are routinely valued. What sets IP apart is that every patent is by definition unique: it therefore lacks comparables, which are used in many markets to estimate a given asset's value.

More importantly, patent value is subject to strong complementarities and portfolio effects (cf. Parchomovsky and Polk Wagner (2005)). In many industries, the value of an *individual* patent is heavily discounted. This is because modern technology products are covered by dozens or even hundreds of related patents (e.g. semiconductors, smart phones): it is relatively easy to invent around or defend against allegations of infringement on a single patent. One needs instead a portfolio of patents related to a specific product or technology in order to be able to assert them or operate without fear of potentially crippling litigation. Consequently, potential buyers or licensees are unlikely to place much value on a given patent sold by itself unless it complements a portfolio that they already own. This greatly reduces the number of potential buyers for any given patent and thereby its liquidity as an asset.

Furthermore, the illiquidity of individual patents is self-reinforcing. Scale and portfolio effects have incentivized operating companies to file for as many patents as possible. In turn, the race to accumulate large numbers of patents has created a valuation system for patent portfolios based on quantity rather than quality. The value of any individual patent is obscured by cross-licensing deals that are prevalent among large companies (either bilateral or through patent

pools) and that rely on comparing the relative sizes of their patent portfolios.[7] While such deals ensure that no party will sue the other(s) and reduce double marginalization and transaction costs, they also have the effect of "commoditizing" patent value, in the sense that it is hard for individual patents to stand out. Needless to say, this has contributed to the abundance of low-quality patents (i.e. not novel, overly broad or overlapping with existing patents),[8] which exacerbate the difficulty of assigning meaningful value to individual patents.

These portfolio effects also create significant asymmetries between large operating firms on one side and individual inventors and small companies on the other side. Patents owned or created by the latter have a lower probability of being monetized because they are part of smaller portfolios and because their owners typically have limited financial resources and legal expertise, which severely undermines their ability to bargain effectively. This can lead to high rates of IP infringement.[9]

Second, there are high search costs on both sides of the patent market. For patent owners it is prohibitively costly to find all *current* users (infringers) and *potential* applications of their patents. For patent buyers or users it is very costly to find all prior art and patents that "read" on their products, especially when these products are complex and rely on fast-changing technologies. Indeed, although patent offices around the world as well as private databases provide comprehensive and searchable lists of all patents issued, the individual claims that constitute each patent are usually generic and opaque. This makes it very difficult to figure out the relationship with other patents and prior art, particularly with millions of patents in circulation.

Third, patent transactions always happen in the shadow of litigation. The ubiquity of litigation exacerbates all the issues listed above. It introduces significant uncertainty and biases in patent valuation. Indeed, as pointed out by Lemley and Shapiro (2005), patents are best

[7] A key reason for which large companies prefer privately negotiated, cross-licensing deals to market-based patent transactions is signaling effects. They wish to avoid sending public signals regarding their intention to buy or sell a particular set of patents, which can convey sensitive information (e.g. exit from or entry into a competitive area).

[8] This problem has also been attributed to the severe shortages in staffing and expertise of the US Patent Office (cf. Jaffe and Lerner (2004)).

[9] A well-known example is that of engineer Robert Kearns, who in 1964 applied for a patent for an intermittent windshield wiper system for automobiles. Manufacturers refused Kearns' requests to sign licensing agreements and began producing cars featuring the wiper system in 1969. Kearns spent decades battling 26 car companies in court for infringement; he eventually earned $30 million in settlements from Ford and Chrysler, but in the process sacrificed his job and marriage and suffered multiple nervous breakdowns. In 2008, director Marc Abraham released *Flash of Genius*, a biographical film on Kearns' tireless quest for the credit he felt he deserved. (See Matt Schudel, "Accomplished, Frustrated Inventor Dies," *The Washington Post*, February 26, 2005.)

viewed as "probabilistic property rights" or "lottery tickets": approximately 50 per cent of patents that are litigated end up being invalidated. Given this risk, many IP owners prefer to settle out of court for amounts that have more to do with their opportunity costs of going to trial and attitude towards risk than with the "true" economic value of their IP. Conversely, patent users (potential buyers) are more or less likely to stand their ground in IP litigation depending on considerations that should in principle be irrelevant for determining patent value. Is the plaintiff a small company or individual with limited resources who will eventually prefer to settle for a small amount rather than face the possibility of years of litigation? What about a competitor who can be counter-sued and brought to accept a cross-licensing agreement? Or a non-practising entity against which injunctions will not work and that is more willing to go to trial? Also, with multiple defendants, there is a form of coordination failure due to a "public good" problem: each defendant may find it individually less costly to settle, while it might be in the collective interest of all defendants for one firm to challenge the validity of the patent being asserted by the plaintiff (Farrell and Merges (2004)).

Finally, courts and juries involved in IP litigation generally have a limited understanding of patents, which creates further uncertainty regarding the enforcement of the "property rights" conferred by patents. Some courts have a reputation for bias in favour of small players and against large companies, which makes them attractive patent litigation forums for small players and non-practicing entities.[10] This increases the amount of (inefficient) litigation. Litigation also magnifies search and transaction costs, by giving both buyers and sellers an additional reason to be leery of each other. For instance, an operating company may be reluctant to express interest in some patents because it fears that doing so may signal to owners of related IP that it perceives risk related to their patents.

As in most markets, inefficiencies create – at least in principle – economic opportunities for intermediaries to create and extract value by solving market failures. Indeed, over the past 5-10 years, the patent market has attracted an increasing number of intermediaries. While they have very different business models as we will see, all of these intermediaries seem to share the view that the market for patents *can* be made more efficient and liquid.

[10] For example, in the Eastern District Court of Marshall, Texas, patent owners win 78% of the roughly 5% of cases that make it to trial, compared to a nation-wide average of 59%. Largely due to Marshall's reputation for plaintiff-friendly juries and quick trials, the number of patent lawsuits filed in the Eastern District has grown rapidly in recent years, from 32 in 2002 to 234 in 2006. See Julie Creswell, "So Small a Town, So Many Patent Suits," *The New York Times*, September 24, 2006.

Overview of IP intermediaries

Historically, patent pools[11] were the first solution that emerged to solve some of the problems identified in the previous section, in particular the double marginalization issue (also known as "royalty-stacking"), which arises when owners of complementary patents attempt to license or sell their IP to the same downstream buyers or users independently.

Patent pools are the only IP intermediary that has received some attention in the economics literature. While pools do indeed create social value by reducing royalty stacking, they raise several concerns. First, if patents included in a pool are substitutes rather than complements, the pool may turn out to have anticompetitive effects in the form of higher prices (cf. (Shapiro (2001), Lerner and Tirole (2004)). Second, pools create barriers to entry (innovation) favouring large companies with sizeable patent portfolios and discriminating against small companies or individual inventors. Third, the applicability of patent pools is limited to a small number of markets, where the essential IP to producing a specific product or service is more or less evenly distributed among several large, identifiable players. Indeed, if a specific firm owns a disproportionate amount of the essential IP in a given sector, it is unlikely to derive much value from joining a patent pool since it can extract more surplus on its own. This is the case of Qualcomm in the wireless communications industry: the company has always refused to join patent pools related to its CDMA technology.

Consequently, patent pools are far from solving most market inefficiencies. This explains the emergence of various types of other patent intermediaries that have set out to solve some of those market failures, in particular the problem of small inventors and companies not finding commercialization opportunities. As we will see, some of these intermediaries have familiar business models that can be found in many other industries, while others are specific to the IP industry.

Throughout this paper, our notion of 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. We restrict attention to intermediaries who *directly* facilitate transactions in order to keep the paper focused. Thus, we do not include pure patent rating, valuation and search

[11] Lerner Strojwas and Tirole (2007) define patent pools as formal or informal organizations in which for-profit firms come together in order to license patents to each other (closed pools) or to third-parties (open pools). Well-known examples include the original sewing machines and radio patents pools as well as Bluetooth, RFID, and MPEG-2 and MPEG-4 patent pools.

services[12] that aim to create liquidity indirectly by providing useful patent information. We also focus on intermediaries for patented IP, as opposed to intermediaries for pre-patent "ideas." This excludes, for example, companies like InnoCentive and NineSigma, which connect companies with science and/or technology problems with individuals or institutions that can create solutions.

Patent brokers

As with brokers in many markets, there is a large number of patent brokers that tend to be small companies with fewer than 10 employees.[13] Brokers help patent owners sell or license their technologies in exchange for a fee contingent on successful transfer. The fact that these fees are in the "double digits" and sometimes reach 20-30%[14] confirms the inefficiencies that prevail in the patent market. Oftentimes brokers facilitate not just the sale or licensing of patents, but broader technology transfers, which include patents and know-how. They also offer consulting services helping patent owners market and sell their assets. Thus, the role played by brokers in the patent market is very similar to the one they play in most other markets: they create value by reducing patent owners' search costs and accumulating expertise (learning effects) in structuring patent sale and licensing deals.

The difference with other markets (e.g. stocks, real-estate), however, is that the existence of many brokers in the patent market does not create sufficient liquidity on its own. Indeed, given their small scale, patent brokers tend to focus on facilitating high-end licensing transactions that carry large price tags: a large proportion of these transactions originate or conclude with other intermediaries, such as NPEs, defensive patent aggregators and Intellectual Ventures (cf. below).

Non-practicing entities (NPEs)

The most controversial IP intermediaries today are non-practicing entities (NPEs). The primary business model for NPEs is to acquire patents and then seek licensing revenues from

[12] Examples include ArticleOne Partners (http://www.articleonepartners.com/) and Prior IP (http://www.prior-ip.com/)
[13] Some examples are Thinkfire (http://www.thinkfire.com/), iPotential (http://ipotential.com/), IPValue (http://www.ipvalue.com/), Pluritas (http://www.pluritas.com/), Competitive Technologies (http://www.competitivetech.net/)
[14] Eric Young, "Patent Marketeers," *San Francisco Business Times*, March 23, 2008.

operating companies through litigation or the threat of litigation. In a sense, NPEs act as dealers or market makers seeking to capitalize on arbitrage opportunities created by patent market inefficiencies.

Most NPEs focus on acquiring and enforcing a small number of patents that they deem sufficiently strong to withstand validity challenges in the course of litigation. Out of more than 380 active non-practicing entities (NPEs) in the U.S. as of early 2011, only 35 own more than 100 patents: Table 1 contains a list of the top NPEs in terms of patent holdings and Table 2 in terms of litigation activity. Both NPE-driven litigation activity and the number of operating companies targeted have increased significantly during the last decade. In 2000, NPEs had brought nearly 100 lawsuits targeting just over 500 operating companies, while in 2010 the numbers had increased to more than 400 and more than 2,500 respectively.[15]

NPEs are pejoratively known as "patent trolls." The originator of the patent troll model is generally agreed to be the company TechSearch and its lawyer Raymond Niro. Beginning in the late 1990s, TechSearch originated the practice of buying up patents and suing companies for infringement to demand payments.[16] In 2001, Intel's in-house lawyer Peter Detkin referred to Niro as a "patent troll" and popularized the term. (Perhaps ironically, Detkin went on to co-found Intellectual Ventures, the largest NPE today – cf. below). Due to its widespread use, however, the meaning of the term "patent troll" has evolved over time and today there is no commonly agreed-on definition. Still, most experts view trolls as combining the following characteristics: i) they acquire intellectual property assets (patents) solely for the purpose of extracting payments from alleged infringers; ii) they do not do research or develop any technology or products related to their patents; iii) they behave opportunistically by waiting until industry participants have made irreversible investments before asserting their claims (cf. Lemley (2008) and Schmalensee (2009)).

Defensive patent aggregators

Defensive patent aggregators have emerged as a consequence of the increasing threat posed to operating companies by NPEs. These intermediaries propose to lower patent litigation risks and costs by acquiring potentially "toxic" patents on behalf of their clients (typically large

[15] Patent Freedom research, https://www.patentfreedom.com/research-lot.html
[16] David Bario, "'Original Patent Troll' Is Back After long Hiatus, with a New Name and New Patents," *The Am Law Litigation Daily*, August 17, 2011.

practicing corporations) and providing them with a license. As of mid-2011 there are only two noteworthy defensive aggregators: RPX and AST.

RPX charges its clients an annual subscription fee, in exchange for which it identifies patents that might be threatening to subscribers, acquires them (or the right to grant sublicenses) in the open market from individual or corporate inventors or NPEs and provides all of its subscribers with licenses to those patents. The patents owned by RPX are also made available for use in counter-lawsuits against non-members who initiate litigation against members. Importantly, RPX itself has explicitly committed never to assert or litigate patents in its portfolio.[17]

Allied Security Trust (AST) offers a variation of the RPX model with several key differences. First, while RPX is a for-profit firm, AST is a non-profit entity governed by its members, which overlap with RPX's clients. Second, RPX decides unilaterally which patents to buy and uses its own capital to do so, while AST identifies patents or portfolios of patents and then solicits acquisition bids from its subscribers.[18] If the sum of the bids for a particular set of patents is sufficient to close the transaction, then only the bidding members for that particular acquisition receive a license to the relevant IP.[19] (In the case of RPX, all members receive a license to all patents acquired by RPX). AST's licenses are perpetual from the outset, unlike RPX, which introduces vesting periods in its licenses. Members who do not bid in the initial acquisition can still subsequently purchase a license to the patents involved, at a price equal to the highest bid. Third and finally, after acquiring a set of patents and licensing its bidding members, AST looks to sell them. It starts by offering each of the original bidders, starting with the highest one, the opportunity to buy out the entire portfolio by reimbursing the other bidders and AST's related expenses. If none of the bidders is interested, AST places the portfolio for sale with a broker.[20]

[17] Saul Hansell, "Trolling for Patents to Fight Patent Trolls," *The New York Times*, March 30, 2009.
[18] The bids and the identity of the bidders are kept secret from one another and each member is required to have sufficient funds in an escrow account in order to support every bid it makes. "Acquisition Model," *Allied Security Trust*, http://www.alliedsecuritytrust.com/Services/AcquisitionModel.aspx.
[19] "Licensing Model," *Allied Security Trust*, http://www.alliedsecuritytrust.com/Services/LicensingModel.aspx.
[20] "Divestiture Process," *Allied Security Trust*, http://www.alliedsecuritytrust.com/Services/DivestitureProcess.aspx.

Intellectual Ventures

Intellectual Ventures (IV) is technically a hybrid between a NPE and a defensive patent aggregator. Because of its size, prominence and unique status among IP intermediaries it deserves separate consideration.

IV is a NPE (according to some critics, "the world's largest patent troll"[21]) because it acquires, creates and seeks to license patents without directly making any products or services itself. Founded in 2000 by former Microsoft CTO Nathan Myrhvold, the company has raised more than $5 billion from a variety of investors and as of mid-2011 it has spent approximately $2 billion building the world's third largest patent portfolio – roughly 35,000 patents (mostly covering software, semi-conductors, communications, e-commerce). Similarly to a venture capital or private equity firm, IV is structured as a series of funds. Its two largest funds are dedicated to acquiring existing patents from all possible sources (individual inventors, small and large companies). Its third fund focuses on developing IV's own inventions in partnership with scientists, while a fourth fund is targeted at developing and acquiring pre-filing inventions, mostly from universities in Asia, through a variety of technology transfer deals. The last two funds distinguish IV from typical patent trolls, which do not invent. Two examples of inventions having emerged from IV's invention laboratory are a new type of nuclear reactor and a laser-based weapon for fighting malaria mosquitos. During its first 10 years, IV also differed from a typical patent troll in that it had not brought a single lawsuit, attempting instead to monetize its patent portfolios through "friendly" licensing deals. This changed in December 2010, when IV started filing patent infringement lawsuits against a variety of operating companies in semiconductors, software and electronics.[22]

The fundamental feature that sets IV apart from other NPEs is that many of its investors are strategic and include prominent technology companies such as Amazon, American Express, Apple, Cisco, eBay, Google, Intel, Microsoft (which was the lead investor), Nokia, SAP, Sony, Samsung, and Verizon.[23] Thus, IV also functions as a defensive patent aggregator, at least for its strategic investors. Indeed, the latter automatically receive licenses for subsets of the patents

[21] "Inside Nathan Myhrvold's Mysterious New Idea Machine," *BusinessWeek*, July 3, 2006.
[22] In its first lawsuits, IV filed three patent infringement suits against nine companies, including McAfee, Symantec, and Hynix Semiconductor. In July 2011 IV filed its fourth suit against a group of 12 companies, including HP, Dell, Wal-Mart, and Best Buy.
[23] The list of IV investors has been revealed in the filings for a lawsuit initiated by IV against Xilinx (*XILINX, Inc. v. Intellectual Ventures LLC* (N.D. Cal. 2011)).

acquired by IV (earlier investors receive wider coverage), which serves to shield them against lawsuits from trolls or competitors.

Online IP platforms

During the past decade, a number of companies have created online portals designed to match potential buyers and sellers of patents. Two representative examples are Yet2.com and Tynax. Tynax was founded in 2003 as a patent and technology brokerage firm. Its online IP marketplace (www.tynax.com) is designed to match buyer patent requirements with sellers' offerings. Sellers post detailed information about the patents they want to sell along with any special conditions (e.g., a license must be granted back to the seller), without revealing their identity. Buyers can find information about patents that are in the market for sale, search by keywords and patent classes (in July 2010 Tynax listed over 10,000 patents for sale), and post descriptions of specific IP assets they might be looking for (also without revealing their identity).

Yet2 was founded in 1999, and like Tynax, it lists thousands of technologies either for sale or sought after on its website (www.yet2.com). Both Tynax and Yet2 work with Fortune 500 companies, and for both, confidentiality is a key part of the value proposition: the identities of buyers and sellers in specific transactions are almost never made public. The main difference is that Tynax focuses mainly on patent-driven transactions (i.e., situations in which buyers are looking for and sellers are trying to sell specific patents), while Yet2's specialty is technology transfers—i.e., transactions that involve a broader range of skills and knowledge than just pure IP assets.

Live auctions

Chicago-based Ocean Tomo was established in 2003 as a diversified provider of IP-related services, including advisory, research, expert testimony, valuation, risk management, and transactions. The company is best-known for having pioneered IP live auctions in 2006. These auctions functioned like any other live auctions (e.g., art at Sotheby's and Christie's), with an auctioneer taking bids for each lot, which could be a single IP asset (patent, copyright, trademark, or domain name right) or a bundle of such assets. The lots were sold to the highest bidder on condition that the highest bid exceeded the seller's reserve price. Ocean Tomo collected fees from both sellers and buyers: sellers paid a listing fee, bidders paid registration

fees, and, in some auctions, Ocean Tomo also received a 10% buyer's premium and a 15% seller's premium when transactions were successfully closed.[24]

Ocean Tomo is also behind the conception of the first global exchange focused on intellectual property, a sort of New York Stock Exchange for trading derivative financial products built around IP portfolios IP. Since this particular IP intermediary has not materialized yet (it is expected to open sometime in 2012), we do not discuss it further.

The Failure of IP Platforms

Some of the intermediaries described in the previous section function as platforms – facilitating transactions without ever taking title to the patents involved – whereas others function as "merchants" – taking ownership of patents from sellers/inventors, and then trying to resell or license them.

While the idea of creating platforms for matching and facilitating transactions between patent buyers and sellers is in principle quite appealing, so far none of these platforms has been able to gain significant traction. None is close to delivering on the vision of an eBay for IP. One might argue that Tynax and Yet2.com are creating the economic equivalent of Craiglist for patents, but little more. Let us consider the challenges that have beset these platforms.

Online IP platforms

Replicating what eBay has done for collectibles in the market for patents has proven much more difficult than what the founders of the many online IP platforms that have appeared over the past 10 years expected. Some of the online portals dedicated to facilitating patent search and transactions have been shut down or renamed and re-directed towards other services.[25]

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[24] "Going…Going…Gone?: The Rises and Falls of Patent Auctions," *Inside IP*, June 14, 2010, http://www.vennershipley.co.uk/show-news-id-249&p=2.html, accessed September 2011.

[25] For instance, Patent License and Exchange (pl-x) was created in 1998 as an online IP property and licensing marketplace. By 2006 it had been renamed PLX Systems and completely dropped the marketplace idea; instead, it provided software solutions for business and financial management of IP for the music and entertainment industry. Other online platforms for matching patent sellers or licensors with buyers or licensees that have disappeared include Open-IP.org, TechEx, PricewaterhouseCoopers' IPEX, Ocean Tomo's The Dean List.

The ones that are still independent have limited scale and function more as brokerage or consulting companies. Thus, despite its online IP marketplace, Tynax remains essentially a patent and technology brokerage firm. No transactions are completed online: instead, once a buyer or a seller express clear and credible interest in a posting, Tynax manages and facilitates the buyer–seller interaction offline through one of its deal makers. Tynax's revenues come exclusively from commissions on completed transactions, which range from $100,000 to $10 million. Similarly, while Yet2 was started as an online exchange for IP, it has evolved into a technology consulting company. It helps buyers fill specific technology needs and helps sellers value, package, and market their IP assets. This is reflected in its pricing structure: it charges registration fees for companies to list on its website, with consulting fees and commissions contingent on successful transactions (approximately 15% of licensing fees for licensing deals).

Live IP auctions

Auctions seemed like the quintessential mechanism for eliciting market valuations for IP in general and patents in particular. The fact that Ocean Tomo managed to organize 10 live IP auctions between April 2006 and June 2009 generated a lot of industry buzz and even some academic optimism (cf. Gans and Stern (2010)) regarding the potential for bringing liquidity to the IP market via platforms. A closer look reveals a less optimistic picture. The total value of transactions through Ocean Tomo's 10 IP auctions was only $114.6 million.[26] The average sales-to-listings ratio over all 10 auctions was reportedly 38% and the Spring 2009 auction only sold 6 out of 85 lots listed.[27]

Part of the reason for the lack of activity on the last one was the financial crisis but all auctions had been characterized by low participation and little bidding.[28] More importantly, it has been reported that Intellectual Ventures had been the single largest buyer at all OT auctions, accounting for over 70% of transactions.[29] IV's decision to withdraw from Ocean Tomo auctions was a big factor in the drop in activity. As a consequence, in June 2009 Ocean Tomo sold its transactions line of business (including auctions and the now closed The Dean List online

[26] John Jarosz, et al, "Patent Auctions: How Far Have We Come?" *les Nouvelles* (March 2010), p. 17.
[27] "Going…Going…Gone?: The Rises and Falls of Patent Auctions," *Inside IP*, June 14, 2010, http://www.vennershipley.co.uk/show-news-id-249&p=2.html, accessed September 2011.
[28] John Jarosz, et al, "Patent Auctions: How Far Have We Come?" *les Nouvelles* (March 2010), p. 20-22.
[29] "Publicly Auctioned Patent Buyers: Intellectual Ventures & Others," *Avancept LLC* (March 2010), http://www.avancept.com/iv-report-auction.html, accessed October 2011.

platform) to ICAP, an inter-dealer broker, for $10 million.[30] The live IP auctions have been revived in March 2010 under the joint brand ICAP-Ocean Tomo. The Spring 2010 auction (the 11th overall) was reported to have generated $14.3 million in transaction value (including buyers' premiums).[31]

Why have IP platforms struggled?

To become a successful intermediary in almost any context, firms must overcome the chicken-and-egg problem inherent in attracting both buyers and sellers – neither side will show up if the other doesn't. This is the primary reason that most online IP platforms have been discontinued: they failed to attract significant interest on either side of the market. It also proved to be a major issue with Ocean Tomo's live auctions: they never achieved sufficient scale to convince buyers and sellers that they would become an important marketplace for trading IP (in contrast with, say Christie's and Sotheby's, which have built a reputation with art sellers that they will attract a critical mass of buyers at every auction and vice versa). Not only did Ocean Tomo's auctions end up depending on a very small number of buyers, but the buyers had to worry about adverse selection. If patents were truly valuable, inventors could raise VC funding to create a company around their IP, create licensing deals with manufacturing companies, directly incorporate the IP in a product, or assert it directly. Hence many buyers would assume that patents found at auctions were of modest value or uncertain quality.[32]

Second, while online IP platforms like Tynax and Yet2.com have generated some search cost reductions through their thousands of listings, they have been unable to create any significant reductions in transaction costs. The sensitivity of IP information and the need for "close-touch" (oftentimes in-person) due diligence make potential buyers and sellers very reluctant to reveal much information and to conduct IP transactions online. This is why Tynax and Yet2.com still function as offline brokers for the actual transactions. This further hampers

[30] "ICAP Reaches Agreement to Acquire Patent Brokerage Business of Ocean Tomo LLC," *ICAP*, June 16, 2009, http://www.icap.com/news-events/in-the-news/news/2009/icap-reaches-agreement-to-acquite-patent-brokerage-business-of-ocean-tomo-llc.aspx, accessed June 2011.
[31] "ICAP Ocean Tomo Auction Sees Record Bidding," *ICAP*, March 26, 2010, http://www.icap.com/news-events/in-the-news/news/2010/icap-ocean-tomo-auction-sees-record-biding.aspx, accessed June 2011.
[32] This point is confirmed by the following report, which analyzes historical data of Ocean Tomo auctions: Marcus Malek, "R.I.P. Ocean Tomo: Complete Auction Analysis," Presentation slides, June 23, 2009, http://www.slideshare.net/marcusmalek/complete-ocean-tomo-auction-analysis-marcus-malek-intangitopia accessed September 2011.

their ability to create scalable platforms in two ways: i) the model cannot scale to thousands of transactions if deal makers have to be directly involved in each of them; ii) the final transaction prices are private information and therefore cannot be leveraged to create more valuation transparency and liquidity in the IP market. Thus, the valuation problem is not solved. Tynax and Yet2.com may gain experience and knowledge regarding IP pricing (like any broker), but they do not buy and resell IP (like NPEs and defensive aggregators), and they do not publish prices.

Given the lack of traction that has hampered patent platforms to date, it is natural to wonder: will they always remain limited in scope and scale? Our view is that platforms are unlikely to ever solve the liquidity problems that plague the market for patents in a major way. Given the heterogeneity and strategic sensitivity of IP transactions, it is hard to see how one could create the equivalent of an eBay for IP. That does not rule out the emergence (or growth) of platforms specializing simply in reducing search costs – the way Tynax and Yet2.com do today. There is value in being able to browse through thousands of patents, bundles of patents and technologies wanted or for sale in one place and in a unified format. This is because the official Patent Office listings – patents granted or under review and ability to search abstracts – leave significant scope for quasi-brokers to further reduce search costs with better listings and search functionality. Indeed, the original patent abstracts are written in such a way as to protect against infringement, which oftentimes makes it hard to identify potential applications. In this context, Yet2 for example creates its own abstracts, written in clear language, in order to help potential buyers assess the potential benefits of the patented technology they are investigating.

The New IP Merchants

While patent platforms have struggled to date, some of the merchant-like intermediaries have been able to achieve significant scale and influence. A decade ago, the only type of patent merchant was the pure patent troll, typically an individual or a small, entrepreneurial company, which would generally own a small set of related patents (sometimes just one patent) and assert it against operating companies. Today, IP merchants have grown significantly, both in size and diversity, and their presence is impacting many markets in a major way.

Underlying drivers

There are five main factors responsible for the rise of these new IP merchants. First, the Internet has greatly reduced transaction costs for inventors to find intermediaries to which they can sell their patents. NPEs appeared in the second half of the 1990s, before the Internet became widespread. At the time, the way they found undervalued IP assets was largely serendipitous, e.g. through personal connections to inventors or sale of distressed assets containing obscure patents. Today, any inventor can use a quick online search to locate and contact NPEs directly or contact brokers who can help them do so or even help them organize auctions for their patents.[33]

Second, the value and prominence of IP assets have increased tremendously, along with the revenues and profits associated with IP-intensive businesses. This growth was fuelled in large part by the explosion of the information and communication technology sectors (software, Internet and mobile communications). Not coincidentally, most of the activity by merchant-type intermediaries in the IP market is concentrated in those same sectors. This is because the software, semiconductor and mobile phone industries produce complex products and services, which involve many inter-related processes and components. For example, manufacturing an integrated circuit requires hundreds of steps, with literally billions of transistors and thousands of complex algorithms. No firm – even the industry's largest ones – has more than 30% of the patents required to cover all aspects of semiconductor design and manufacturing. Consequently, the potential for newly issued patents to have "fuzzy boundaries" (cf. Besen and Meurer (2008)) and to overlap with prior art is very high in these sectors, exacerbating the problems of the patent system. This leads to fragmented ownership of the relevant IP and significant uncertainty regarding the relative merits of the many patents involved.[34] Historically, operating firms engaged in cross-licensing to solve this problem. But as more and more potentially "toxic" patents appeared that were not owned by operating companies, this created a favourable environment for patent arbitrageurs.

[33] Steve Lohr "Patent Auctions Offer Protections to Inventors," *New York Times*, September 21 2009.
[34] This is in contrast with the pharmaceutical industry for example, where, although patents also play a crucial role, IP boundaries are much more clearly defined. Not surprisingly then, NPEs and other patent merchants have been largely absent from the pharmaceutical sector.

Third, the emergence of the US International Trade Commission (ITC) as a new forum for patent litigation has further raised the stakes of IP litigation. Indeed, the threat of injunctive relief significantly increases the power of NPEs and makes IP litigation very risky for operating companies: there are no monetary damage awards but the threat of trade bans can be even more effective in extracting monetary settlements. The ITC also lowers the plaintiffs' costs through its fast decisions (12-15 months, relative to several years in federal courts).[35]

The fourth and final factor is not an exogenous development but rather an endogenous one. To some extent, many of the new IP merchants are the product of a defensive response by large technology companies to the early entrepreneurial trolls. This is certainly the case with defensive patent aggregators such as RPX and Intellectual Ventures. The irony is that the latter may now have become a major patent threat to those same large technology companies.

The New Patent Intermediation Models

RPX and Intellectual Ventures are fundamentally altering the structure of the IP market. While they rely on very different business models, these firms have two major traits in common. First and most obvious, they make money by taking patent inventory risk: finding undervalued IP assets and monetizing them at higher prices than they acquired them for (in other words, exploiting arbitrage opportunities). Second, the value proposition for their various stakeholders relies in large part on economies of scale resulting from buying power and experience in searching and identifying undervalued assets, as well as fixed investments in patent evaluation and legal expertise. Note that NPEs must litigate directly, whereas IV and RPX prefer not to sue (in fact RPX is committed not to assert any patents). As we will see however, not suing creates a severe free-rider problem that both RPX and IV have found creative ways to solve through *indirect* litigation, i.e. selling their patents to third-parties who are very likely to sue.

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[35] "Patent Litigation Before the International Trade Commission," *Analysis Group*, p. 2, http://www.analysisgroup.com/uploadedFiles/Practice_Areas/Patent_Litigation_Before_the_ITC.pdf accessed October, 2011.
Jeffrey Fisher, "The Pros and Cons of Patent Litigation Before the International Trade Commission," *Farella, Braun, and Matel*, November 15, 2006, http://www.fbm.com/docs/publications/381f0cc6-b7fa-4f90-a21d-3e4c72b4b22f_document.pdf accessed October, 2011.

Traditional trolls at scale

The current state of the IP market creates a favourable environment with large arbitrage opportunities for NPEs. As of 2010, the median price paid by NPEs for a patent was approximately $100,000 and the mean was $400,000.[36] On the other side of the market, most patent settlements range between $50,000 and a few million dollars.[37] In a few notable cases, however, NPEs have managed to extract hundreds of millions of dollars. The best known example is a 2006 settlement in which Research in Motion (maker of the Blackberry smartphones) agreed to pay $612.5 million to NTP, a Virginia-based NPE, which had sued RIM for infringing on eight wireless email patents.[38]

In this context, it is not surprising that NPEs have attracted financing from investors looking for novel diversification opportunities with high returns. Intellectual Ventures counts several university endowments among its investors (Brown, Cornell, Northwestern, Stanford, the University of Texas). A number of hedge funds, venture capital and private equity firms either invest in NPEs or approach small patent holders directly, offering to finance lawsuits against operating companies in exchange for a cut of any resulting payments.[39] One example is Altitude Capital Partners, a private equity firm founded in 2005 with a $250 million investment, which specifically invests in companies with valuable intellectual property assets and finances patent litigation. In August 2006 a small software company named DeepNine filed a lawsuit against anti-virus software vendor McAfee for infringing on one of its patents. In January 2007, Altitude announced that DeepNines sold an $8 million zero-coupon note to Altitude Capital Partners in order to fund the lawsuit in return for a cut of any winnings.[40]

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[36] Patent Freedom, https://www.patentfreedom.com/research-lot.html, accessed December 2010.

[37] Amol Sharma and Don Clark, "Tech Guru Riles the Industry by Seeking Huge Patent Fees," *The Wall Street Journal*, September 17, 2008.

[38] Teresa Riordan, "Contest Over BlackBerry Patent," *The New York Times*, June 7, 2004.

[39] Mike Masnick, "Patent Holder Sues McAfee, Gets $25 Million…But May End Up Losing $5 Million Due to Everyone it Has To Pay Off," *Techdirt*, November 4, 2009, http://www.techdirt.com/articles/20091103/0333046778.shtml

Keith Bergelt, "Patents, Probes and Strength in Unity: Participate in Keeping Open Source Open," Presentation, *LinuxCon* (Boston, MA), August 10, 2010, http://events.linuxfoundation.org/linuxcon2010/bergelt

Daniel P. McCurdy, "Patent Trolls Erode the Foundation of the U.S. Patent System," *Science Progress*, January 12, 2009, http://www.scienceprogress.org/2009/01/patent-trolls-erode-patent-system/)

[40] Jessie Seyfer, "Private Equity Helps Fuel IP Wars," *The Recorder*, June 28, 2007.

Altitude and other firms with similar strategies (private equity firms such as Rembrandt IP Management or funds such as NW Patent Funding) are commonly referred to as litigation finance/investment firms (cf. Nathan Vardi, "Patent Pirates," *Forbes*, May 7, 2007).

One of the best-known and litigious NPEs today is Acacia, which has filed more than 337 lawsuits since its founding in 1992.[41] Acacia has been publicly traded on the NASDAQ since 1996: it made $34 million in net income on $132 million revenues in 2010 and by mid-2011 had reached a market capitalization in excess of $1.2 billion.[42] Acacia's typical deals involve taking charge of licensing sets of patents owned by large companies or universities and monetizing them under the implicit threat of litigation. For example, in 2010 Acacia managed to extract a $37 million payment from Microsoft for licenses to a set of patents covering Internet maps and smartphone technologies. Acacia had been granted the right to license the smartphone patents from Access, a Japanese company that had acquired them through its 2005 acquisition of PalmSource, the maker of the Palm operating system for smartphones. In another example, Acacia had also reached a deal to license more than 40,000 patents owned by Renesas, the world's third-largest semiconductor company, formed by the merging of the semiconductor businesses of Hitachi, Mitsubishi, and NEC.[43]

Defensive aggregators

The value proposition of defensive aggregators like RPX and AST is essentially outsourced IP protection against "troll risk" for operating companies. In a way it is similar to insurance, except that instead of paying customers when "accidents" happen, they help reduce the probability of "accidents" happening in the first place. This can result in millions of dollars in cost savings for operating companies, which is why they are willing to pay RPX's annual subscription fees that range from $38,500 to $5.2 million, depending on operating income.[44]

In December 2010, RPX claimed to have spent over $250 million acquiring over 1,500 patents in technology fields including consumer electronics, e-commerce and software, media content and distribution, mobile communications and handsets, networking, and semiconductors.[45] At the time it had more than 70 corporate subscribers, including Barnes & Noble, Best Buy, Cisco, eBay, HTC, IBM, Intel, McAfee, Microsoft, NEC, Nokia, Panasonic,

[41] Rachel King, "Acacia: The Companies Tech Loves to Hate," *BusinessWeek*, February 1, 2010.
[42] "Acacia Reports Fourth Quarter and Record Year End Financial Results," *Business Wire*, February 24, 2011; Joff Wild, "The Billion Dollar NPE," *Intellectual Asset Management Magazine*, March 25, 2011.
[43] Joe Mullin, "Patent Litigation Weekly: Big Patent-Licensing Deals Push Acacia Earnings to a Stunning High," *Corporate Counsel*, November 1, 2010.
[44] Andrew Goldberg, "Defensive Patent Aggregator RPX Prepares for IPO," *Corporate Counsel*, April 18, 2011.
[45] "Growing Portfolio," *RPX Corp*, http://www.rpxcorp.com/index.cfm?pageid=21, accessed June 2011.

Research In Motion, Samsung, Sony, TiVo, and Verizon.[46] RPX's net income went from a $5.2 million loss on $0.8 million revenues in 2008 from its inception in July, to a $13.9 million gain on $94.9 million in revenues in 2010.[47] It went public in May 2011, less than 3 years after its founding, reaching a valuation of over $1 billion.

An intriguing feature of RPX is its public commitment never to litigate (unlike NPEs): its website states that "we will never assert or litigate patents in our portfolio."[48] The reason behind this public commitment is likely the desire to inspire confidence in its clients – large operating companies – and to differentiate itself clearly from NPEs, against which RPX claims to offer protection. At the same time, this commitment creates a severe free-rider problem for RPX. Indeed, suppose a leading company in a given industry (e.g. Nokia in smart phones) subscribes to RPX. Then the protection it obtains also covers its competitors to some extent (e.g. Samsung, Motorola): the latter have therefore little incentive to subscribe to RPX, which can in turn severely limit RPX's growth. One way in which RPX mitigates this problem is by adopting a "catch-and-release" approach: it acquires a patent, grants its subscribers a license and then re-sells the patent on the open market (preferably to a NPE), which means non-subscribers remain exposed to litigation risk.[49] Still, the problem is that reselling the patents acquired reduces the value of subscribing to RPX for *new* members (as opposed to existing members who are considering whether to renew their subscriptions or not). Suppose RPX provides existing members with a license to a patent, sells it, and in the meantime a new member signs up and is then sued by an NPE who acquired the "released" patent. That scenario could damage RPX's reputation and its perceived value in the eyes of new subscribers. This creates an interesting economic trade-off: RPX cannot release the patents it acquires too quickly if it wants to attract new subscribers; but it cannot hold on to them for too long because potential subscribers in the same industries as existing subscribers have fewer incentives to join.

There are two other issues with RPX's intermediation model. First, RPX's value proposition (reduction in the probability of being sued by NPEs) is hard to verify tangibly by subscribers. If a troll does sue one of RPX's members, the latter may (incorrectly) infer that

[46] "Membership," *RPX Corp*, http://www.rpxcorp.com/index.cfm?pageid=11, accessed June 2011.
[47] RPX Corporation, "Amendment No. 1 to Form S-1 Registration Statement," *United States Securities and Exchange Commission* (March 4, 2011).
[48] http://www.rpxcorp.com/
[49] "Trolling for Patents to Fight Patent Trolls," *The New York Times*, March 30, 2009 http://bits.blogs.nytimes.com/2009/03/30/trolling-for-patents-to-fight-patent-trolls/.

RPX is not delivering enough value and terminate its subscription. Conversely, if there are no troll lawsuits for an extended period of time, subscribers may (also incorrectly) infer that they are paying for a useless service and decide to pull back. Second, because RPX's interests are aligned with operating companies (subscribers), it never seeks to maximize the value of IP assets held by small companies or individual inventors (by asserting them). Therefore its upside is inherently limited: it has no shot at the huge payoffs that can be achieved by NPEs. In turn, this puts RPX at a disadvantage in acquiring patents relative to NPEs. The latter offer contingent payments and therefore a much large potential payoff to owners of valuable IP, whereas RPX can only offer a limited fixed payment. At the same time, RPX may face unreasonable ask prices from IP sellers if the latter interpret an approach by RPX as a sign of interest from its subscribers (large and rich operating companies).

Intellectual Ventures

IV's model is a hybrid between defensive aggregators, NPEs and IP creators (the last part is admittedly the smallest portion of its business). It creates value in a number of ways, particularly when compared with IP platforms. First, IV has brought more resources (more than $5 billion in committed capital) and has developed a larger controlling position of patents than any non-operating company in history. As a result, IV can single-handedly create the illusion of liquidity in the patent market, as illustrated by the key role it played in Ocean Tomo's IP auctions. Also, because it buys and re-sells patents or licenses, it avoids the chicken-and-egg problem that besets patent platforms.

Second, IV's sheer scale allows it to capitalize on huge portfolio and learning effects in aggregating patents. The large number of patents it has bought (more than 30,000 as of mid-2011)[50] reduces total portfolio risk and allows IV to reduce its own search and transaction costs compared with almost any other player in the market. This should provide it with large arbitrage opportunities (more so than the average NPE), similarly to successful VC or PE firms, which presumably have converged upon a reliable way of valuing companies. Furthermore, IV can internalize complementarities between related patents and even use its IP "building" capabilities to create patents that fill in gaps and strengthen existing portfolios.

[50] Matt Rosoff, "Who Does Patent-Trading Firm Intellectual Ventures Work For Anyway?" *Business Insider*, July 24, 2011.

Third, IV leverages scale economies to reduce not only its own search and transaction costs, but also those of third-party sellers and buyers of patents. IV has become a brand, which makes it a natural and attractive outlet for small patent owners, including universities, who generally do not have the necessary expertise (legal and technical), resources and credibility to monetize their IP on their own. On the other side of the market, IV provides patent buyers and users with a "one-stop shop" for their licensing needs: similar to PRX, they no longer have to search and negotiate with multiple patent owners.

There are however several important issues with IV's intermediation model. First, even after accounting for complementarities and portfolio effects, the risk and uncertainty level involved in IV's business model remains very high: many patents are of low value or poor quality or both (as many as 19 in 20 or 49 in 50 according to the company).[51] Second, the time-horizon for IV's investment funds is very long: 15-20 years. One may question whether IV will ever be able to generate sufficient returns for its investors (i.e. returns comparable to venture capital and private equity). This concern is probably what provided the impetus behind IV's recent slew of lawsuits. Yet the lawsuits raise their own problems: cost escalation and, even more seriously, the risk of having some patents invalidated by the courts, which would cast doubts on IV's broader portfolio.

Third, while acquiring and owning patents creates economies of scale, accumulating tens of thousands of patents might eventually lead to diseconomies of scale. Sorting through patents, classifying and maintaining them are activities which do not scale very well.[52] Another scalability problem arises in IV's licensing deals. While IV may be more efficient than average (cf. Hagiu and Yoffie (2010)), negotiating custom deals still consumes large amounts of time and resources. This is a much more serious problem for IV than for smaller NPEs, which have fewer patent portfolios and do not attempt to license their assets widely (for them, one or two large custom deals may be all it takes to generate huge returns from a given portfolio).

[51] Cf. Hagiu and Yoffie (2010).

[52] Recall indeed that patents are rapidly depreciating assets (their value expires after 20 years) and they require payment of maintenance fees to be kept valid (several hundred to a few thousand dollars to be paid at the end of years 3, 7 and 11 according to the USPTO, http://www.uspto.gov/patents/process/maintain.jsp).

Efficiency questions and conclusion

Due to the current state of the patent system – many low-quality, overly broad or overly vague patents – the patent market is currently in a second-best world. Starting from this basis, do patent intermediaries increase efficiency or further accentuate structural problems?

Platform-type IP intermediaries have failed to achieve meaningful scale. In contrast, some of the merchant-type IP intermediaries have become quite influential and profitable. The question is then whether they have created any meaningful, market-wide efficiencies in so doing, as opposed to having simply thrived by exploiting existing inefficiencies and imposing a tax. To understand the efficiency effects of patent merchants, it is useful to distinguish two categories of participants in the IP market.

Consider first individual inventors, universities and small companies. To the extent that they were previously undercompensated for their inventions and that intermediaries such as NPEs, IV and RPX create a capital market that channels financial rewards to them, they undoubtedly benefit.[53] And so does society as a whole through their increased innovation incentives (e.g. individual inventors and universities have larger resources to conduct new research). The only possible exception is small companies that also operate (i.e. produce). From their point of view, IP merchants (NPEs, RPX and IV) might have a "chilling effect" on innovation, due to the fear of litigation. So far, IP merchants have only asserted their IP against large operating companies, but in the longer run, small operating firms might also be targeted.

Second, let us turn to large operating (technology) companies. On the one hand, they derive some clear efficiency benefits from merchants like IV and RPX, on the condition they are either investors in IV or clients of RPX: lower search costs, transaction costs and prices to pay for acquiring patents (or licenses) than what they could achieve individually. On the other hand, the presence of IV and RPX has clear downsides for operating companies: membership and/or making an investment involves non-trivial payments (in some cases, hundreds of millions of dollars), and they raise the incidence of and costs related to IP litigation. NPEs (trolls) are even worse: they increase litigation risk and input costs by enforcing previously "silent" patents without any of the benefits offered by IV and RPX. They also compete on the acquisition side

[53] Bessen Ford and Meurer (2011) argue that there is little evidence that NPEs make transfers to inventors *after* litigation. The problem with this argument is that in many cases, NPEs make transfers to investors *before* litigating – precisely in order to acquire their patents. For instance, IV has spent $2 billion acquiring patents from various inventors *before* suing anyone – this is hardly an insignificant transfer.

for patents, which creates an additional source of rising input prices. And the most unambiguously harmful aspect of NPE behaviour is opportunistic litigation, or concealing IP assets, waiting for operating companies to infringe (oftentimes inadvertently), and then asserting patents when the targets are most vulnerable (e.g. before a new product launch) in order to extract maximum payments.

Consequently, NPEs have a negative effect on innovation by operating companies: Bessen Ford and Meurer (2011) estimate the loss of market value for technology firms sued by NPEs at $83 billion per year during the last four years. The effect of IV and RPX on operating companies is less clear-cut. It may go either way depending on how the two countervailing effects described above play out.

More broadly, it is important to take the perspective of end-consumers. Because of litigation, merchant-type IP intermediaries would seem to be at least partly responsible for the current "patent bubble," which arguably leads to higher consumer prices. There is evidence of rising patent prices since at least the early 2000s, which predates the current explosion in patent valuations, with several high-profile patent settlement and auction prices reaching billions of dollars in 2011.[54] Patent merchants have been both cause for and effect of this bubble. On the one hand, they have contributed to the price increase by creating more demand (more buyers). On the other hand, through their search cost reductions, one could argue that they have also increased supply. The problem is that they have done so without increasing price transparency. This is not all that surprising since increased transparency would greatly reduce the arbitrage opportunities upon which RPX, IV and especially NPEs thrive. Merchants have also created more litigation risks, which further exacerbates valuation and transaction cost inefficiencies, as discussed in section 2. Ironically, the failure of the more efficient price discovery mechanisms, such as IP platforms and auctions, has meant that litigation, which in itself is a pure deadweight loss, remains the prevailing price discovery mechanism for IP.

[54] "ThinkFire patent brokerage transaction database" showed that a major trend the past six years was rising patent prices (p. 61). The article also included a chart showing rising prices from 2006-8. (p. 64).
Lew Zaretzki, "Rising Prices and Changing Strategies," *Intellectual Asset Management* (February/March 2008), p. 61-65, http://www.thinkfire.com/wp-content/uploads/2009/03/risingpricesandchangingstrategies-feb-mar2008.pdf.

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Tables and figures

Table 1: NPEs with Largest Patent Holdings

Entity	US Patent Publications	Patent Families
Intellectual Ventures	10-15k (Est)	-
Round Rock Research LLC	3427	1267
Interdigital	2575	1358
Wisconsin Alumni Research Foundation (WARF)	2139	1582
IPG Healthcare 501 Limited	934	874
Rambus	780	378
Tessera Technologies Inc	776	347
Mosaid Technologies Inc	666	318
Acacia Technologies	536	332
Jerome H Lemelson	513	233
Commonwealth Scientific and Industrial Research Organisation (CSIRO)	510	434
Scenera Research LLC	443	355
Wi-Lan	332	223
Papst Licensing GmbH	271	156
Altitude Capital Partners	263	225
Intertrust Technologies Corp	246	40
Rembrandt IP	235	174
Innovative Sonic Ltd	234	165
Alliacense	224	124
IpVenture Inc	210	62
Trontech Licensing Inc	191	152
Cheetah Omni LLC	188	115
Patent Category Corp	177	70
St. Clair Intellectual Property Consultants Inc	177	138
Illinois Computer Research (and other entities owned by James Parker et al)	166	104
Innovation Management Sciences LLC	152	132
MobileMedia Ideas LLC	140	97
MicroUnity Systems Engineering Inc	130	49

Source: Data provided by Patent Freedom, https://www.patentfreedom.com/research-ml.html, January 1, 2011.

Table 2: Leading NPEs by Number of Counterparties and Litigations

	Operating Company Counterparties			Litigations		
	2005-present	2000-2004	Before 2000	2005-present	2000-2004	Before 2000
Acacia Technologies	678	229	27	209	133	17
Plutus IP	515	20	-	74	5	-
Ronald A Katz Technology Licensing	197	4	9	111	13	5
ArrivalStar	101	25	-	36	5	-
WIAV Solutions LLC	99	-	-	18	-	-
Scenera Research LLC	92	10	-	9	9	-
Jerry David Harthcock	90	2	-	1	1	-
Leon Stambler	88	6	-	6	1	-
Technology Patents LLC	82	-	-	1	-	-
Sorensen Research and Development Trust	80	5	9	64	6	4
Guardian Media Technologies Ltd	78	-	-	52	-	-
Millennium LP	68	26	4	78	28	4
Catch Curve Inc	68	4	15	37	4	14
F&G Research Inc	42	4	11	46	5	5
Rates Technology Inc	35	25	89	41	30	71
Jerome H Lemelson	-	564	146	-	13	15
Total (of entire database)	**5,946**	**2,101**	**826**	**2,162**	**765**	**348**

Source: Data provided by Patent Freedom, https://www.patentfreedom.com/research-ml.html, April 1, 2010.