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ENQUIRIES INTO INTELLECTUAL PROPERTY'S ECONOMIC IMPACT

CHAPTER 9. IP-BASED FINANCING OF INNOVATIVE FIRMS

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CHAPTER 9. IP-BASED FINANCING OF INNOVATIVE FIRMS

This short chapter explains why IP-based financing for innovating firms is an important topic in need of further research. It summarises recent developments and efforts to improve IP-based financing in several countries, including policy options for making IP-based financing markets function better, building trust and awareness, and reducing the risk associated with IP-based financing instruments. The chapter also briefly surveys some of the relevant literature.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

It should be noted that statistical data on Israeli patents and trademarks are supplied by the patent and trademark offices of the relevant countries.

Introduction

Intellectual property rights serve to codify and protect the knowledge assets that result from research and development (R&D), branding, and creative or artistic work (OECD, 2013b). Like other intangible assets (e.g. databases, software, know-how and organisational competencies), these assets do not have a physical embodiment in plants, machinery or inventories. In the last decades, knowledge assets have become key resources through which firms raise productive efficiency, differentiate from competitors or develop new products and services (OECD, 2013b).

Empirical research has shown that investments in knowledge-based capital (KBC), i.e. intangible assets, have become key drivers of economic growth across OECD economies. Crucial actors in this process are the small and medium-sized enterprises (SMEs), especially the young ones, who develop new knowledge assets and exploit their increasing returns to scale, thus disproportionately contributing to growth. Nonetheless, young SMEs may face a number of difficulties in raising the capital necessary to grow, essentially because they are subject to high risks of failure and sometimes lack tangible capital. More generally, imperfections in the capital markets can lead to less-than-optimal investments in KBC, thus slowing the pace of economic growth.

In this context, intellectual property (IP) assets have two attractive features that may help firms to unlock new investment or obtain more favourable financing conditions. First, IPRs help to reveal to investors the quality of the firm's management and of its technological capabilities. Second, as legally protected economic resources, IPRs can raise the projected profitability of a firm, and can be separated from the business and sold in case of financial distress. Notwithstanding these properties, IP-based finance appears to be under-exploited across OECD economies, especially with respect to those young SMEs who need to open new financing channels. To stimulate a more efficient use of IP-based finance, the governments of many countries are making increasing efforts to understand why IP-based finance is not well developed and are experimenting with new policy actions and initiatives.

This chapter discusses the role of IP-based finance and the logic behind the main policy options that have been proposed or tried so far. It is structured as follows: section 2 reviews the logic and evidence supporting IP-based finance's potential role for growth; section 3 provides an overview of the main financing models connected to IP and presents the obstacles that seem to be impeding their use, with a focus on the IP markets, which are examined in Box 1; section 4 examines the policy options. Some final remarks conclude the chapter.

Innovation financing and intellectual property

This section sets out the economics background of IP-based finance. Section 2.1 focuses on the potential role of IP-based finance for SMEs and economic growth, while Section 2.2 and 2.3 introduce the concept of financing constraint on innovative firms and explains the function of IP in relaxing these constraints.

Knowledge-based growth, SMEs and IP-backed finance

Investments in KBC are crucial drivers of aggregate productivity and living standards across OECD economies (OECD, 2013b). According to recent estimates, between 1997 and 2005 KBC may have contributed to around 23 percent of labour productivity growth in the European Union and 32 percent in the United States (Corrado et al., 2013). This growth potential stems from the capability of knowledge to be combined with other inputs without re-incurring the initial development costs, thus giving rise to strong returns to scale in the production of goods and services (OECD, 2013b).

Recent research has also emphasised that reaping the potential of knowledge for growth depends on how capital and labour markets reallocate resources towards the firms that want to implement and commercialise new ideas (OECD, 2013b). As further explained in Section 2.2, the capital markets are subject to imperfections that may lead to sub-optimal investments in knowledge-intensive start-ups and young SMEs, thus slowing the pace of knowledge-driven growth (OECD, 2013b). Crucially, extensive empirical evidence has suggested that these firms disproportionately contribute to growth. For example, recent OECD work drawing on firm-level data suggests that between 2000 and 2011 young firms (3-5 years) – normally with fewer than 250 employees – have contributed 42 percent of job creation across 18 OECD and non-OECD countries on average, while accounting for only 17 percent of employment (Criscuolo et al., 2014).

As a consequence, relaxing financing constraints on young SMEs has the potential to boost knowledge-driven growth. In this context, IP assets can be leveraged by some cash-constrained SMEs to open new funding channels, either by attracting investors or through licensing. Indeed, the prospect of accessing new funding does induce some SMEs to apply for or register their IP. For example, in a study based on a 2005 survey of the applicants at the European Patenting Office (EPO), de Rassenfosse (2011) shows that 40% of the surveyed SMEs had strong 'monetary motivations' to apply, i.e. attracting investors or licensing. By contrast, this proportion is as low as 15% for large applicant firms. Interestingly, the findings of his econometric analysis suggest that among the firms that apply in view of attracting investors, the larger ones have higher rates of patent exploitation, meaning that some SMEs may find it relatively hard to acquire the resources necessary to exploit their inventions.

Another issue is that SMEs may not apply for or register their IP in the first place, making it more difficult to use for financing purposes. Rather, as found in recent observational studies, young and innovative firms may prefer to protect their intangible outputs through confidentiality agreements or secrecy (OECD, 2011b; Brassell and King, 2013)[1].

Market imperfections in innovation financing

Investment in innovation depends on the relationship between managers/entrepreneurs and financiers, which is affected by two well-known market imperfections: asymmetric information and moral hazard (see Hall, 2010 and Harhoff, 2009 for extensive reviews on the topic).

Information can be asymmetric because the manager/entrepreneur is better informed on the quality and expected returns of her projects than the investor or the lender.[2] As a result, the market has the characteristics of a 'lemons market', where the prospective investor or lender cannot distinguish between good and bad projects and thus requires a premium to compensate for the possibility that he/she picks a bad project. Another possible consequence is a situation in which lenders limit the loans supplied at a certain interest rate, even if other innovative firms would borrow at a higher rate.[3]

The relationship is further aggravated by moral hazard, which occurs because firms' managers and owners/financiers tend to carry conflicting interests (when the two are actually separated). In particular, managers in established companies tend to be more risk-averse than shareholders with respect to innovative projects, for instance where the manager expects to receive lower compensation in case of failure. The reverse problem takes place where the manager/entrepreneur of a start-up firm wishes to continue a project that financiers would like to terminate, because for the manager/entrepreneur the ultimate benefits in case of success would outstrip the costs. The result is the likely delay of investment decisions and the rise of costly practices aimed at aligning the two parties' interests, e.g. monitoring or incentive schemes.

Such market imperfections are deemed to be particularly severe for the financing of innovation, for at least three reasons.

First, the output of innovation investment mostly takes the form of KBC that needs to be sustained with continuous efforts and that is difficult for the financier to appropriate in case of distress. A significant fraction of the expenditures for innovation – like research and development (R&D), design and marketing of new products and workers' training – goes to the salaries of scientists, engineers, consultants and other highly skilled labour. The output is an intangible asset, which, unless codified, is only embedded in the human capital of the firm's employees.

On top of that, the output of innovation investment is often an idiosyncratic technology or knowledge that the innovating firm is uniquely capable of exploiting. The same applies to the intermediate results of innovation. As a consequence, KBC is hard to trade, so that financiers may find it hard to recover the investment in case of distress. The problem is more acute for the young firms, as they also lack a track record of successful investments.

Finally, innovative projects tend to be very risky at their inception. Very few projects result in high returns; most turn out to have little or no value. Also, the riskiness of the project is subject to change over time. Outcomes with such a high variance not only require bigger premiums on the investment but also mean that the financier may need to re-assess the investment decision during the project lifetime.

In summary, asymmetric information and moral hazard coupled with the specific features of innovation lead to higher interest rates, inefficiently low (external) funding and limited options to use KBC as collateral. Empirical research has shown that innovative firms are subject to these financing constraints (see Hall, 2010, for a recent review).[4] Knowledge-intensive start-ups and young SMEs are probably the most financially constrained, essentially because they lack tangible capital and track records (Harhoff, 2009). At the macro level, SMEs suffered disproportionately when interest rates rose and banks demanded more collateral as a result of the financial crisis in 2008 and subsequent years (OECD, 2014).

The literature has also emphasised that equity financing may be more suitable for innovation than debt financing. The reason is that banks and other credit suppliers prefer investments where the assets are more redeployable in case of distress. Moreover, in the early stage of financing, an innovative project is generally expected to bring revenues only in the long term, while debt arrangements often require predictable cash flows to repay the loan. One implication, which has been confirmed by empirical research, is that innovative firms tend to have lower debt to equity ratios (Hall, 2010). Nonetheless, as it will be further explained below, debt financing is important for the innovative firms that want to expand their operations. This is where IP can play a crucial role.

The role of IP in innovation financing

Using IP to attract finance for innovation is a recent trend in a number of OECD economies, especially the United States and the United Kingdom. According to Harhoff (2009), IP can serve two roles in financing innovative firms.[5] First, to an external investor, IP can be a signal of a company's quality and potential, thus reducing information asymmetries. Second, as codified and tradable KBC, IPRs provide the investor the prospect of a salvage value if the company fails, while protecting firms' revenues or increasing it through licensing in case of success.

IPRs as signals. According to information theory, to be highly informative as indicators of a company's high quality and potential, signals need to be observable by external stakeholders and overly expensive for low quality companies to obtain (Hoenen et al., 2014). Patents appear to meet both conditions. First, they are described in a codified language and are relatively easy for investors to observe.

Second developing and applying for patents can require too much effort and too many resources from companies with low technological capabilities. Thus, the companies with strong innovative potential can signal their superior capabilities by developing and applying for a patent. Crucially, the patent does not need to be financially evaluated to carry a signal. In fact, even just the application for a patent can reveal the potential of the company. Other kinds of IPRs like copyrights and trademarks appear to be less informative since their registration is cheaper and easier to obtain.

IPRs as economic resources. IPRs provide a temporary exclusive right to use an intellectual creation, thus partially protecting the company from competition and enhancing the possibility that it might earn a profit. The company can also extract value from IPRs by licensing them. Thus, the possession of an IPR can raise profitability during the protection period. In addition, if a company fails, its IPR can be separated from the other assets and legally sold.

These two functions can improve financing conditions for innovative firms in both equity and debt markets. In equity financing, IP's typical role is in attracting venture capital (VC), a form of private equity for privately held companies (Harhoff, 2009). In the face of very uncertain investment opportunities, VC firms assess quality signals, including IP, of the start-ups seeking capital.[6]

In debt financing, IP is most valuable as collateral because innovative firms typically lack other eligible assets like plants and equipment. Collateralising IP can improve the lending conditions, like loan size or interest rate, or even unlock credit that would otherwise be denied. In the literature, the potential of patent-backed lending for innovation and growth has been analysed by Amable et al. (2011). They introduce lenders limiting credit on the available collaterals in an endogenous growth model with innovators that may or may not invest in R&D depending on whether they face financing constraints. In this model, increasing the value that creditors can recover from patents relaxes the financing constraint on innovators and facilitates their entry, thus raising innovation and the growth rate of the economy.

IP-based finance: developments and barriers

While firms have been investing in intellectual capital and applying for or registering IP rights for a long time, IP-based finance has developed only in recent years. Several financial instruments involving IP appear to be increasingly used in OECD countries, especially the United States and the United Kingdom, although the extent and the features of these developments are not always easy to understand given the lack of comprehensive statistics. Evidence on IP-based finance is mostly drawn from surveys and expert reports or from empirical studies gathering data in innovative ways. Interestingly, this literature shows an increasing interest on the topic, while emphasising that the exploitation of IP-based deals appears to be impeded by a number of factors. In order to provide a background to the policy analysis, this section presents an overview of the main IP-based financing models and the barriers impeding their exploitation, with a special focus on SMEs.

IP and equity finance

Young and innovative firms typically seek to attract external funding through equity financing, but doing so might be difficult. The presence of IP – or of an IP strategy – can signal the quality of the company to the investors, particularly business angels and venture capitalists. The crucial difference with respect to debt finance is that these equity investors take a stake on the whole company and do not focus exclusively on IP. For this reason, they usually assess the expected profitability of the company without attaching a particular financial valuation to IP.

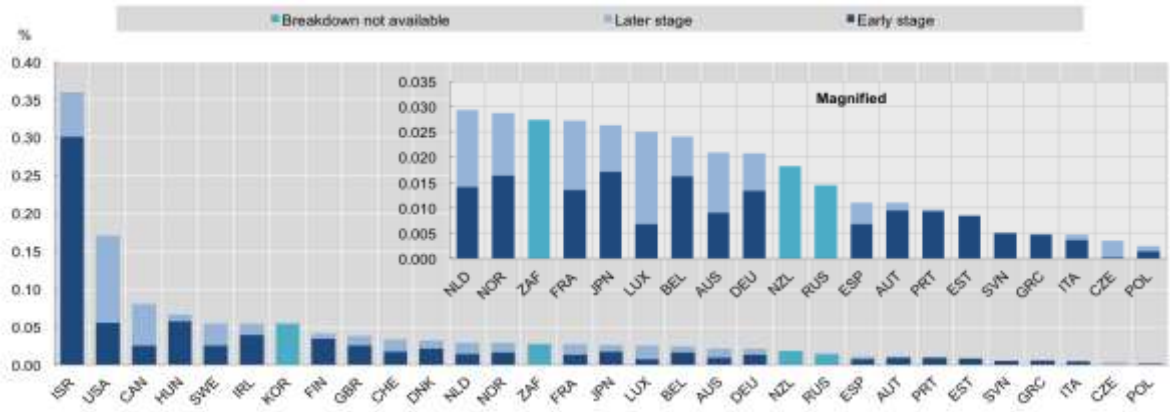
Angel investment

Angel investors, usually organised in networks, fund the early development of firms in the start-up or seed life phase, providing amounts that are usually smaller than what would be invested by a VC firm (OECD, 2011a). One major challenge faced by angel investors is the screening and selection of potential targets. The presence of an IPR can be a strong signal of the firm's potential: angel investors are typically interested in the protection of the technology and the barriers to entry granted by patents or copyrights. Also, the firms that angel investors look for are normally very small, and IP could well be the only asset such firms have that can be evaluated objectively (Brassell and King, 2013). Angel investment is particularly important in the United Kingdom and the United States.

Venture capital

As described above, venture capitalists take equity participations in young and high-growth firms to finance their expansion and possibly lead them towards listing on the stock exchanges, where the VC's investment is monetized. The segment is characterised by high risks of failure and asymmetric information. IP assets can signal to the VC firm the superior technological capabilities of the management as well as raise the prospect of future profits stemming from barriers to entry and first-mover advantage (Harhoff, 2009; Brassell and King, 2013). The VC market is most developed in Israel and the United States (see Figure 9.1).

Figure 9.1. Venture Capital Investment, 2012, as a Percentage of GDP



Source: OECD (2013a).

Several empirical studies have investigated the IP-VC nexus in the US market and found that patents can prompt VCs to invest faster and increase the funded amounts, providing evidence that patents act as a signal to investors (see Hsu and Zieonidis, 2008 as an example). One recent article by Honen et al. (2014) investigates the expected decline of the signalling power of patents over different rounds of VC financing: based on longitudinal data from more than 580 US biotechnology firms, the study suggests that the signalling effect might be strong in the first round while it tends to vanish in the second round. According to the authors, this result stems from the fact that between financing rounds the venture capitalists get to know the start-up better, thus reducing the information asymmetries. An interesting finding of this study is that pending patent applications can increase the funded amount by USD 630,000, largely offsetting the costs sustained by small biotech firms in the patent application process.

IP and debt finance

While young and innovative SMEs tend to finance themselves mostly through equity or internal funding, debt financing becomes an attractive source of capital when a firm matures enough to exploit its intangible assets' returns to scale or needs to finance steady operations. The main reason is that debt financing does not dilute existing shareholders (Harhoff, 2009). However, as we have seen above, debt financing may be very expensive or even inaccessible for young SMEs. Large firms, in contrast, can leverage portfolios of already commercialised IPRs to unlock debt financing. Firms in patent-dependent industries, e.g. pharmaceuticals, seem to be the most active in using IP-based debt financing. The significance of IP is most evident in four categories of debt finance: mainstream and IP-backed lending, IP-backed securitisation, IP sale and lease back, and venture debt.

Mainstream and IP-backed lending

IP-backed lending allows firms to exploit the economic value of their IP to obtain loans from banks or other financial institutions. IP can directly be pledged as collateral in a loan agreement so that the lender can seize it if the firm becomes insolvent. Alternatively, the rights to future IP-generated income can be transferred against an upfront loan. A simple and frequently used instrument from this category is a loan secured by the stream of revenues deriving from licensing or royalty agreements, which typically involve portfolios of copyrights or patents (Brassell and King, 2013; European Commission, 2014). This royalty financing is estimated to have totalled USD 3.3 bn in 2007-2008 in the United States (OECD, 2013b).[7]

Recent evidence suggests that the market for IP-backed loans is increasingly important in the United States and the United Kingdom, and that specialised non-bank institutions dominate the segment (Brassell and King, 2013, Munari et al, 2011; Loumioti, 2011). These financial intermediaries have an advantage with respect to (commercial) banks, as they do not need to value intangible asset collateral for the purpose of complying with capital adequacy requirements.

The size of the overall market for IP-backed loans cannot easily be gauged through statistical data because non-bank institutions are not subject to disclosure requirements. However, Loumioti (2011) infers that the share of loans backed by intangible assets (most notably IP) in a sample of 1,415 US-originated syndicated loans grew from 11% in 1996 to 24% in 2005. Moreover, her econometric evidence suggests that increasing intangible collateralisation was not the result of lax credit standards but of thorough economic considerations: lenders accurately selected borrowers with a good reputation and more liquid and redeployable intangibles, and required higher interest rates. While positive in the sense that they show intangibles-based financing is growing, these results nevertheless suggest that the credit standards applied to the collateralisation of IP are strict. That supports the view that IP-backed loans are mostly a viable option for large and established firms. In fact, the SMEs involved in IP-based debt transactions might be a very small fraction of the total. For example, based on a survey of 4,300 German SMEs, a study by KfW (2007) shows that only 2.2% of the firms reported having used intangibles as collateral.

The growth in IP collateralisation in the US market is further backed up by a recent analysis of USPTO trademark assignment data (Graham, Marco and Myers, 2014). This dataset contains the security interests on US-registered trademarks recorded by creditors who wish to defend their interests against third parties in case of default by the debtors. According to the study, in the last 30 years new registrations of security interests have increased in absolute terms as well as in relation to the number of live trademarks (from 2 percent in 1996 to slightly below 3 percent in 2008). Interestingly, the top creditors among the recorded transactions are primarily domestic commercial banks.

Notwithstanding these limits, IP can still represent a value for SMEs – and large firms alike – in mainstream lending: according to Brassell and King (2013), IP can play a risk-mitigating role even if it is

not used as stand-alone collateral, thus positively contributing to the lending decision.[8] Overall, the US market for (private) bank and non-bank loans to start-ups is estimated to be worth USD 5 bn annually (Ibrahim, 2010). As a benchmark, VC investment in the United States averaged USD 27 bn annually over the 2007-2012 period (OECD, 2014).

IP-backed securitisation

The securitisation of IP-backed assets consists in placing an IP asset or the rights to its projected revenues (e.g. royalties) in a special purpose vehicle (SPV), which in turn issues securities in the capital markets. This way, lending institutions can eliminate the risk of holding IP assets while the originating firm can obtain more favourable funding conditions. This is because the securities issued by the SPV are in theory separated from the firm's risk and therefore can receive more favourable credit ratings (Munari et al, 2011). At present, securitisation might be an option only for large corporations.

The David Bowie bonds provide a famous example of IP-backed securitisation: the bonds, issued in 1997 for USD 55 million, were backed by the rights to the revenues from future sales of the artist's old musical albums (OECD, 2013b).

IP sale and lease back

In the "IP sale and lease back" a firm sells its IP to a specialised investor in exchange for immediate funding, while purchasing the license for its IP-protected operations and products. At the end of a specified term, the firm normally retains the option to buy back the IP asset at a predefined price. The advantage of this model is that the firm can increase its liquidity for short-term operations while maintaining the use of its IP (Munari et al, 2011). As with securitisation, large corporations are the most frequent users of the sale and lease back.

Venture debt

Venture debt is a finance model that features both debt and equity characteristics. Formally, in this model the firm seeking funding accesses capital in the form of a loan on which it agrees to pay interest. Simultaneously, the firm issues warrants for equity in the company, which are acquired by the lender. When efficiently deployed, such a structure blends the 'patient capital' role of equity financing with the risk assessment and valuation capabilities of a lending institution (Brassell and King, 2013; European Commission, 2014). IP represents a key asset to facilitate these deals, but it should be noted that the loan is typically backed by a blanket lien, i.e. a claim on all the assets of the firm in case of default.

Barriers to IP finance

Despite its potential for innovation financing, IP-based finance is widely believed to be under-exploited, especially by those young SMEs that would need it most (see for instance Brassell and King, 2013). Based on several recent surveys and expert reports, this section identifies the market-related barriers that are impeding IP-based financing. The identified obstacles affect both debt and equity finance, but it is probably the former that is at present most constrained.

It is important to notice in advance that some of these barriers arise naturally with IP and innovation financing, meaning that, while they can certainly be mitigated, they cannot be entirely removed through new business practices or policy action.[9]

IP may be hard to redeploy

Highly innovative firms sometimes create a business environment in which IP is combined with other complementary tangible and intangible assets, especially know-how, dedicated employees, other IP etc. The value of the IP may be contingent on the presence of those other assets. As a consequence, in case of financial distress, disposing IP in isolation from the business could imply the loss of most of its value, or it might simply be impossible.[10]

IP exit markets are immature

The secondary markets for IP are allegedly too underdeveloped to guarantee a quick and low-cost resale of the asset for the creditor that needs to realise a value from it (Brassell and King, 2013; European Commission, 2014). For banks, this represents a major barrier because they do not usually have the knowledge to assess IP risks or sell it in illiquid and non-formalised markets. As this topic tends to show up as a major obstacle here, a brief description of the state of play in IP markets and their significance for finance is separately provided in Box 1.

Transactions costs for IP as collateral are high

Lending to SMEs is subject to high transactions costs for a number reasons. First of all, severe asymmetric information drives up the costs necessary to gather compelling evidence on the firm's creditworthiness. In addition, operating at small-scale increases the weight of the fixed risk-assessment costs. In the context of IP-intensive SMEs, the presence of IP can represent a value but can also be perceived as a further source of uncertainty about the expected returns of the firm's projects and about the value of IP, which is subject to frequent changes (European Commission, 2014).

SMEs do not register enough IP nor manage it well

The low participation of SMEs in IP-based finance may partly be due to SMEs' management of their intellectual assets. As reported in an OECD review of SMEs' management practices, most innovative SMEs do not use IPRs to protect their intellectual assets, and, when they do, they rely more on forms of protection that are less practical to attract investors, e.g. trade secrets (OECD, 2011b). The Australian case is illustrative: 45% of the innovative SMEs surveyed in the country possess formal IP rights, while within this group 28% rely on secrecy or confidentiality agreements, 23% on copyrights and trademarks, and 8.2% on patents. This pattern is observed in other countries surveyed in OECD (2011b) (see also Brassell and King (2013) for the United Kingdom). Moreover, the OECD review highlights that innovative SMEs acquire IPRs in response to short term needs rather than as a deliberate strategic action (OECD, 2011b). While applying for or registering IP carries costs and may not be optimal for all firms, it is possible that many innovative SMEs still fail to understand the potential of IP for financing purposes.

Corporate reporting of IP assets is insufficient

One reason that prevents financial institutions to evaluate IP as collateral is that the IP may not be reported as an asset on the balance sheet. Generally, in-house IP investments are expensed as they occur, while purchased IP assets are valued in the transaction and can feature on the balance sheet (Brassell and King, 2013). Inadequate corporate reporting of IP and other intangible assets results both from strict accounting rules – which largely leave out intangible assets from the balance sheet – and insufficient efforts to produce information on all assets outside financial statements (Brassell and King, 2013; OECD, 2006a, 2006b, 2013b).

Banks do not sufficiently understand IP assets

To collateralise an IP asset, financial institutions need to understand its function, its relationship with cash flows and its potential value if disposed in isolation from the company. Clearly, the factors described above make this understanding hard to gain. Most financial institutions – especially banks – have not developed the necessary methods to streamline the assessment of IP assets. For example, while IP assets qualify as securities and potentially contribute to raise capital adequacy in order to meet regulatory standards, banks usually lack the experience to provide regulators the necessary assessment of the risks (Brassell and King, 2013; European Commission, 2014). Notably, though, according to the expert group on IP valuation for the European Commission, the available valuation methods for IP assets are valid, consistent, and accepted within different professional categories. The problem rests on the limited knowledge of their existence and the reciprocal lack of confidence in the results from the professional categories (European Commission, 2014).

Policies for IP-based finance

In the past few years, increasing awareness of the potential role of IP-based finance for innovative SMEs and of the bottlenecks to its development have underpinned the emergence of national policies, and proposed policies, in many countries. This section describes the key policy options proposed or implemented in recent times, grouped according to three goals: supporting the market for IP, sharing the risk of IP-based financial instruments, and building awareness and trust in IP financing. The policy options described below are to some extent complementary to each other and can be considered elements of a common strategy. The implementation of most measures is too recent to allow for fact-based evaluations.

Supporting the market for IP

Recent expert reports and empirical studies have emphasised that immature markets for IP can act as a major barrier to IP-based finance, especially bank lending (see section 3.3 and Box 1). Policy actions aimed at improving how IP markets function have recently been implemented in several countries. They follow three approaches: enhancing transparency and reliability in the market mechanism, creating new market infrastructures, or creating sovereign patent funds.

Enhancing transparency and reliability of IP markets

Transparency and reliability in IP markets are currently undermined by insufficient information regarding the ownership of IP and its transfers and by uncertainty over the legal protection and technological breadth of IP rights (Harhoff, 2009; Brassell and King, 2013; Terroir, 2014). To promote transparency in ownership and transfers information, new disclosure requirements could be introduced, for example through reporting regimes managed by IP offices.

Uncertainty is a multifaceted issue that affects the patents market in particular. In brief, the uncertainty surrounding each patent has mainly to do with the technological boundaries described in the patent claims[11]. Technological boundaries that are are too broad or not detailed enough can increase the likelihood of overlapping with other patents and can create doubts regarding the real applications of the invention. In other words, patents may cover inventions that are not truly original or may not be sufficiently detailed. Measures aimed at raising the ‘quality’ of patents can reduce these uncertainties and, as a consequence, enhance the reliability of the patents market (Harhoff, 2009 is particularly supportive of this approach).

Promoting transparency and reliability is the route taken in recent times by the US government.[12] Under a proposal for new rules and a new reporting regime, patent owners and patent applicants will be required to report and update ownership information. However, progress on this proposal may await

further legislative action[13]. Moreover, as examiners may find it difficult to determine whether an invention is truly novel and non-obvious, the USPTO is seeking to introduce the crowdsourcing of prior art, i.e. a way to source up-to-date knowledge on each technical field directly from the relevant experts[14].

Other relevant initiatives have been undertaken since 2013 by the government of Singapore as part of a wide-ranging program to make the country a 'Global Hub for IP'[15]. In particular, the government is working to encourage IP rights holders to disclose ownership, transfer and licensing information. On top of that, the government is also working to strengthen its IP regime, for example by building a world-class 'search and examination' team in its patent system.

Creating new IP market infrastructures

The apparent underuse of IP markets has led to the idea that governments should build new open market infrastructures. Terroir (2014) proposes a patent market with the following characteristics:

1. The market should allow and facilitate transparent and secure trading and licensing of patents to all economic entities.
2. The market should be composed of a segment for standardised contracts and of a segment for transactions over the counter, both subject to the same transparency and security.
3. The segment for standardised contracts should include a large volume of licensable patents from the onset and offer the possibility to bundle different IP into tradable packages.
4. A market operator should provide thorough information on the listed patents as well as evaluate their legal validity, verify their actual ownership and report on any restriction to use.

The market should then include a number of dedicated tools, like patent rating systems and know-how libraries, and be sustained by strong IP brokers and lawyers. An infrastructure characterised by openness and security would provide SMEs the opportunity to monetise their IP or purchase licences to attain freedom of operation.

Private marketplaces with similar characteristics exist (see Box 1), but may not have gained enough attention because they did not offer a sufficient volume and variety of IPRs listed. For this reason, Terroir (2014) suggests that public marketplaces should operate with a large base of IP assets available for trade from the outset. In response to this situation, some governments are working to back existing platforms or create new ones. Some noteworthy initiatives follow:

- In the United Kingdom, the government-sponsored online platform Copyright Hub (www.copyrighthub.co.uk) enables users to access simple licensing via web and offers copyright education tailored to a wide audience.

- The government of Singapore wants to support a number of diverse initiatives as part of the 2013 'Global IP Hub' plan, i.e., auctions of IP assets, an IP trading platform and a digital copyright licensing exchange, which is similar in spirit to the United Kingdom one.[16]

- In Denmark, the Danish Patent and Trademark Office created the "IP Marketplace" (www.ip-marketplace.org) in 2007 as an 'online display window' where IPR holders can freely list their asset for sale or out-licensing.

- The government of India is currently experimenting with its own online IP market (Brassell and King, 2013).

- In Chile, the National IP Institute created a platform that enables SMEs, researchers and universities to trade their IP, while learning of ways to protect their inventions and creations [17].

Creating sovereign patent funds

In response to the IP marketplace challenge, governments can create sovereign patent funds with a view toward providing aggregation and defensive services – which are especially needed by universities and SMEs. However, sovereign patent funds also encounter some objections. First, IP assertion strategies can be hard to define and implement when they are pursued by publicly funded entities. Second, the effect on inventive activities is not necessarily positive, especially where the intervention is perceived as transitory. Third, if a fund pools many patents from the same technology domain, which might be positive from the point of view of providing services, it could end up over-protecting inventions that constitute – or make up the biggest part of – a stand-alone technology and unintentionally provoke a lock-in. Fourth, there is the risk that the patent fund is used to protect national champions' innovations from global competition, with the ensuing possibility of triggering a response from other sovereign patent funds and starting a "patent war" at the sovereign level. Recent examples of sovereign patent funds can be found in Korea, Japan, and France (OECD, 2013b).

Sharing risk of IP-based financial instruments

The high risks associated with the collateralisation of IP are seen as a major contributor to the costs incurred by companies that use IP to acquire financing. To bring down the costs of IP-based lending, government agencies and development banks can share the risk with the lender or investor by adopting IP-friendly risk-sharing mechanisms or providing support for IP risk insurance.

Creating IP-friendly risk-sharing mechanisms

Risk sharing schemes are in place in many countries to provide an interest rate subsidy or a guarantee to eligible firms seeking bank lending. To favour the collateralisation of IP, when exploiting these schemes banks should account for IP as a credit-scoring enhancement for attractive IP-intensive firms lacking tangible collateral. Efforts to foster dedicated risk sharing tools or improve the existing ones are currently on-going in Italy, Malaysia, Singapore, South Korea, and the United Kingdom (Brassell and King, 2013; UKIPO, 2014)[18].

Another way to improve financing conditions for IP-rich firms is for development banks to formally accept IP as collateral for loans. This practice has been introduced in many development banks, like the Brazilian Development Bank, the Beijing branch of the Chinese Bank of Communications, the Development Bank of Japan, and the Thais SME Bank (Munari et al, 2011; Brassell and King, 2013; Mateos-Garcia, 2014).

In both cases, the public agency delivering the scheme should not accept IP as collateral without a substantial assessment, because otherwise the firms would register or apply for low-quality IP with the sole purpose of attracting funding.

Supporting IP risk insurance

IP insurance is appealing to lenders to IP-rich firms. It traditionally covers the potential costs of infringement litigations. However, the market for IP insurance is very limited and its costs can be very high. To reduce the litigation risks for SMEs and lenders, the South Korean government has a scheme through which it shares up to 70% of the insurance premium with SMEs. In the European Union, how to support patent litigation insurance has been discussed since the 1997 "Green Paper on the Community

patent and the patent system in Europe" of the European Commission[19]. In the 2000's, two expert reports found evidence that patentees – especially SMEs – would be willing to insure themselves against litigation risk at reasonable premiums, but that insurers had a small appetite to enter this market (CJA Consultants, 2003, 2006). The reports also highlighted that government-backed voluntary insurance would not be capable of dealing with adverse selection, i.e. a situation in which patentees demand insurance only for the most risky patents. In response to this challenge, mandatory insurance for all patents granted by the European Patent Office – with the exemption of patents held by "global oriented companies" – was primarily considered. However, the proposal was opposed by all stakeholders mainly on the grounds that it would push the balance towards litigating rather than settling an infringement dispute, and was not implemented[20].

Besides this role, IP insurance could become increasingly important for traditional banks that seek to insure themselves against the risk deriving from IP-backed lending. Currently, traditional banks lack the experience and the knowledge to count IP assets (and other intangibles) for their capital adequacy requirement. United States banks are seeking IP insurance for this purpose (Masters, 2012). Despite the past debate on litigation insurance, the potential role of governments in the development of the IP insurance market is unclear at present and deserves further analysis.

Building awareness and trust in IP financing

A key challenge consistently identified in recent expert reports is the lack of understanding of IP as an asset with potential cash flow and risks, both among innovative firms and financiers (European Commission, 2014; Brassell and King, 2013). Part of the problem stems from the fact that the prevailing asset valuation methods, corporate financial reporting, and bank and securities regulation are purposely designed for an era in which tangible assets were the most valuable capital in all companies. This has fundamentally changed: today investment in intangible assets is a primary source of firms' competitiveness and makes a relevant share of total private investments in many countries, possibly exceeding investments in tangibles in a few advanced economies, like the United Kingdom and the United States (OECD, 2013b). It is therefore natural that business practices and regulations ought to be upgraded to allow the rise of a full-fledged IP asset class. Indeed, the recognition of IP as an asset needs to grow within the community of innovative firms' and the financial sector alike. This process should largely be driven by market needs, but in some areas there is scope for policy intervention[21].

Disseminating information and providing assistance with innovative firms and financial institutions

To promote better management of IP by innovative firms (especially SMEs), governments can provide training tools, educational resources or seminars for IP management. In practice, awareness campaigns are delivered through IP right offices (e.g., in the United Kingdom, the United States, Chile and at the European Patent Office), industry and business ministries (e.g., in Australia) or partnerships between the government and private stakeholders (e.g., in Germany) (OECD, 2011a; Brassell and King, 2013; Mateos-Garcia, 2014)[22,23]. In Germany and the United Kingdom, these tools have purposely been augmented to facilitate the SMEs' practical evaluation of IP (Brassell and King, 2013).

The goal of awareness campaigns in the financial sector is to encourage financial institutions to incorporate IP in their credit assessment process through public-private collaboration on dedicated guidelines and employees training. Such campaigns need to bring together ministries or IP offices and financial services associations, as currently done in Germany and the United Kingdom (Munari et al., 2011; Brassell and King, 2013).

Increasing confidence in IP valuation methods

An important factor undermining trust in IP financing is the lack of confidence in IP valuation methods. Notably, different professional categories offering valuation services (accountants, lawyers, technology transfer experts) each have their own accepted methods, giving rise to mistrust between the professions (European Commission, 2014). To solve these issues, the European Commission's expert group on IP valuation proposes to set up a register of experts tested by a set of universities in the EU or by a centralised organisation dependent on the EU institutions. In a similar fashion, the government of Singapore has recently decided to set up a Centre of Excellence for IP valuation with an accreditation system for valuers[24]. Another option is to create an official guideline to standardised IP valuation models, as recently experimented in Germany, Italy and Malaysia (Brassell and King, 2013; Mateos-Garcia, 2014)[25].

Improving corporate reporting of IP assets

Under the prevailing accounting frameworks, the conditions for reporting assets in corporate financial statements appear disconnected from the characteristics of KBC, so that firms can find it hard to do so (OECD, 2013b). Although no obligation to report on KBC exists (except in certain cases), the firm's management can voluntarily disclose the existence, features, and in some cases, valuation of their intangible assets to produce a more complete image of the company for external stakeholders, especially lenders. This is usually done through so-called narrative reporting, which goes with the financial statements. Despite an intense debate on the issue and the rise of a variety of disclosure approaches in the last few years, the reporting of intangible assets – including IP – remains problematic (see OECD, 2013b for a discussion).

The role of the government can also be a thorny issue, considering the complexity of regulating accounting standards and the great information advantage of industries and companies on the specific nature of KBC. Keeping this in mind, some sensible options can be considered (OECD, 2013b): first, the reliability of voluntary reporting could be strengthened with the creation of official guidelines; second, young firms could be coached on how to introduce intangibles reporting; third, governments could engage in stronger international co-operation, possibly through organisations like the World Intellectual Capital Initiative (WICI) or the International Integrated Reporting Committee (IIRC); fourth, governments could push for the introduction of specific expenditure classes for intangibles within the Generally Accepted Accounting Principles (GAAP), which would facilitate comparability and data collections.

Conclusions

This chapter has discussed the role of IP assets in financing innovative firms, the barriers that might impede that function, and policy options for mitigating those barriers. A growing body of empirical evidence suggests that IP-based finance is underused by young SMEs across OECD economies. However, understanding of that phenomenon is constrained by the lack of data and information affecting many key elements, like the ownership of IP assets or the size of IP-backed loans disbursed and their recipients. As a consequence, it is hard to assess the relevance of the barriers and evaluate the policy options with solid statistical methods.

That being said, the analysis has identified the following key points:

- KBC is an increasingly important source of economic growth across OECD economies. However, capital market imperfections may slow the pace of knowledge-driven growth, especially because the young and innovative firms, who disproportionately contribute to growth, tend to be the most financially constrained.

- Asymmetric information and moral hazard coupled with the specific features of innovation cause interest rates for financing innovation to be higher than for other types of financing, lead to inefficiently low (external) funding, and limit options for using KBC as collateral. Knowledge-intensive start-ups and young small and medium-sized enterprises (SMEs) are probably the most financially constrained, essentially because they lack tangible capital and track records.

- The literature has emphasised that equity financing may be more suitable for innovation than debt financing. The main reason is that banks and other financial institutions prefer investments where the assets are more redeployable in case of distress. One implication is that innovative firms tend to operate with lower debt-to-equity ratios (Hall, 2010). Nonetheless, debt financing is important for the innovative firms that want to expand their operations.

- IP assets can serve two functions that facilitate financing, especially for SMEs. First, IP assets contribute to reveal the quality of a firm, thus reducing information asymmetries. Second, the exclusive right to use of an invention or creation that is conferred by IPRs can raise a firm's profitability, while giving the owner the possibility to separate it from the firm and sell it in case of distress. The latter function allows firms to use IP assets as collateral in debt financing.

- The main debt financing models connected to the exploitation of IP are: mainstream and IP-backed lending, IP-backed securitisation, IP sale and lease back, and venture debt. Expert reports and empirical studies agree on the fact that IP is increasingly used in debt financing, but the lack of comprehensive statistics makes it hard to understand its actual size and features. Due to the complexity of the transactions, large firms in IP-intensive sectors likely use more of these instruments than smaller firms.

- In equity finance, the value of IP assets is recognised in the angel investment and venture capital spaces. The latter has attracted a substantial body of empirical work investigating its effects and finding that young and high-growth firms with IP assets receive more funding.

- Overall, expert reports and empirical research have identified a significant gap in the use of IP-based finance, especially by SMEs. This outcome is due to a number of obstacles. One major barrier is presented by the lack of opportunities to sell the IP in the market for technology, which is both due to uncertain redeployability and to an immature market for IP.

- Supporting IP markets is an objective of policymakers in several countries. Three routes can be taken: first, the government can support transparency and reliability in the market mechanism, through the introduction of disclosure requirements or measures to foster clarity in patent claims; second, the government can create new IP market infrastructures; third, the government can support or participate in sovereign patent funds.

- The high risks associated with the collateralisation of IP can be managed by government agencies and development banks through risk-sharing mechanisms. Crucially, the schemes must allow IP to count as a credit-scoring enhancement after a substantial assessment of the collateral. Alternatively, the government can support the rise of IP insurance companies, although how to do so is still unclear.

- Building awareness and trust within both SMEs and financial sectors is crucial to facilitate the rise of IP assets as a full-fledged asset class. This process should be largely driven by the market, but policymakers can design and deliver awareness campaigns and contribute to increase reliability in valuation standards and corporate reporting of IP assets.

To conclude, the analysis has identified a growing interest in IP-based finance, its limits and the possible solutions, but more data and more research seem necessary to understand the developments in this sector and to better design the policy initiatives. Also, policymakers need to realise that IP-based finance interacts with IP systems, increasing their relevance and complexity (Harhoff, 2009; Hall, 2010; Terroir, 2014). Therefore, taking a broad perspective on the IP ecosystem is necessary to account for policy interactions (Mateos-Garcia, 2014). In this respect, markets for the transfer of IP assets probably deserve even more attention.

Finally, bringing about more functional IP-based finance is relevant for growth because it can foster a better relationship between credit institutions and the young SMEs who need to open new funding channels. This nexus is often considered less important than the nexus between equity investors and young and high-growth firms. Yet, financing constraints evolve over time, both because of changes in framework conditions and because of positive developments in the markets[26].

NOTES

1 The use of IPRs by SMEs may vary across IP categories and across countries.

2 This subsection presents the main arguments from Hall (2010) and Harhoff (2009).

3 This situation is known as credit rationing.

4 A way to test for the financing-constraint hypothesis is to estimate the reaction of investments to positive liquidity shocks (Hall, 2010). The majority of the studies agree that, while all investments can be sensitive to cash flows, innovation investments respond disproportionately. This result suggests that internal funding for innovation is less expensive than external funding and that an untapped potential for innovative investments tends to persist in OECD economies. Nonetheless, it remains hard to determine the size of the funding gap in any given situation, that is, how much additional financing would be needed to reach efficient investments levels.

5 Harhoff (2009) makes the case for patents only, but the same arguments can apply to other forms of IP.

6 Arguably, venture capitalists recognize the role of IP as a signal of both the quality of the management and of the technology, in addition to viewing it as a means of protecting revenues.

7 This figure includes royalty financing deriving from securitization (see below).

8 IP and other intangibles written on the balance sheet have always been included in the all-comprehensive blanket lien securing loans (European Commission, 2014).

9 This chapter does not focus on institutional and framework conditions affecting IP exploitation or innovation financing, like for instance the enforcement of IPRs and bankruptcy laws (see OECD, 2013b for a discussion).

10 By contrast, sometimes the potential applications of an IPR go beyond what was originally conceived by the originating firm. In these cases, the value of the IP may even grow if it needs to be transferred.

11 Other aspects of uncertainty related to patents include the novelty of the innovation, the inventive step and the adequacy of the disclosure.

12 See the White House press release from 20th February 2014 (accessed in October 2014) http://www.whitehouse.gov/the-press-office/2014/02/20/fact-sheet-executive-actions-answering-president-s-call-strengthen-our-p and the USPTO initiatives page (accessed in October 2014) http://www.uspto.gov/patents/init_events/executive_actions.jsp.

13 The head of the USPTO has said that the agency is giving up plans to establish rules requiring greater transparency about patent ownership and is instead leaving the issue to Congress. See Davis, 2014.

14 See the USPTO initiatives page (accessed in October 2014) http://www.uspto.gov/patents/init_events/executive_actions.jsp

15 See the "Intellectual Property Hub Master Plan" for Singapore, released on April 2013 by the IP Steering Committee (accessed in October 2014) http://www.ipos.gov.sg/Portals/0/Press%20Release/IP%20HUB%20MASTER%20PLAN%20REPORT%202%20APR%202013.pdf.

16 See the "Intellectual Property Hub Master Plan" for Singapore, released on April 2013 by the IP Steering Committee (accessed in October 2014) http://www.ipos.gov.sg/Portals/0/Press%20Release/IP%20HUB%20MASTER%20PLAN%20REPORT%202%20APR%202013.pdf

17 See the project website http://www.inapiproyecta.cl/605/w3-channel.html (accessed in October 2014).

18 For Italy, see the project presentation (accessed on October 2014) http://www.uibm.gov.it/attachments/article/2005713/presentazione_fondo.pdf

19 The Green paper can be found at http://ec.europa.eu/internal_market/indprop/docs/patent/docs/pat_en.pdf (accessed in October 2014).

20 See the Summary report of replies to the public consultation on the follow-up study on patent litigation insurance, carried out by CJA Consultants, at http://ec.europa.eu/internal_market/indprop/docs/patent/studies/consultation/summary_report_en.pdf (accessed in October 2014).

21 Possible changes to bank and security regulations are not discussed here. As we have seen above, unregulated financial institutions are the most active actors in IP-backed lending, probably because they are not subject to capital adequacy requirements. However, the main issue with bank lending is the understanding of IP as an asset and the assessment of IP risks, and not the regulation itself. Nonetheless, it is possible that bank and security regulations could be redesigned to incentivise IP-backed lending (Mateos-Garcia, 2014). To this end, a preliminary review of bank and security regulations would be warranted.

22 For the United States, see the White House press release from 20th February 2014 (accessed in October 2014) http://www.whitehouse.gov/the-press-office/2014/02/20/fact-sheet-executive-actions-answering-president-s-call-strengthen-our-p
and the USPTO initiatives page (accessed in October 2014) http://www.uspto.gov/patents/init_events/executive_actions.jsp.

23 For Chile, see the project website (accessed in October 2014) http://www.inapiproyecta.cl/605/w3-channel.html

24 See the "Intellectual Property Hub Master Plan" for Singapore, released on April 2013 by the IP Steering Committee (accessed in October 2014) http://www.ipos.gov.sg/Portals/0/Press%20Release/IP%20HUB%20MASTER%20PLAN%20REPORT%202%20APR%202013.pdf

25 For Italy, see the evaluation grid website (accessed in October 2014) http://www.uibm.gov.it/index.php/brevetti/utilita-brevetti/griglia-di-valutazione-economica

26 See the Bruegel blog "Are capital markets the only friend of innovation?" from March 2014, by Carlo Altomonte and Marco Antonielli on this topic http://www.bruegel.org/nc/blog/detail/article/1273-are-capital-markets-the-only-friend-of-innovation (accessed in October 2014).

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