

## Intellectual property rights for innovative entrepreneurship

Intellectual Property (IP) systems can be critical in helping new ventures transform their innovation potential and creativity into market value and competitiveness. Intellectual Property rights (IPR) allow innovative entrepreneurs to protect their inventions. They may also have multiple other functions, such as signaling current and prospective value to investors, competitors and partners, accessing knowledge markets and networks, and preventing rivals from patenting related inventions. However, IP systems can also create obstacles to the development of entrepreneurial ideas and hamper knowledge diffusion and innovation. Evidence at the firm level indicates a positive correlation between patenting and new ventures' growth, access to venture capital and survival. Data shows a huge upsurge in patent applications in the last decade, with a strong variation in the share of young patenting firms across countries. Effective IP systems can facilitate access to finance and the development of markets for technology, both of which help innovative entrepreneurship. Such systems also provide incentives to invest in R&D and innovation, and can encourage technology co-operation with firms, universities and PRIs. IP systems need to fully take into account the new roles played in the economy by patents and other types of IP, and in particular how they relate to innovation (e.g. the increasing use of patents in opportunistic litigation). IP systems also need to adapt and modify IPR in order to better match it with the characteristics of today's innovative world.

### What is the IP system?

#### General definition of intellectual property rights (IPR)

Intellectual Property (IP) is divided into two categories: **Industrial property**, which includes inventions (patents), trademarks, industrial designs, and geographic indications; and **Copyright**, which includes literary and artistic works. Intellectual property rights (IPR) refer to the **general term for the assignment of property rights** on these assets (see [Types of IPR](#) [1]). The rights allow the holder to exclude other agents from the commercial exploitation of their intellectual property for a predetermined period.

IPR is also designed to foster knowledge diffusion (see [Access to knowledge and inventions](#) [2]). The granting of such rights is conditional on disclosing the content of the invention, so individuals can freely access the existing stock of protected IP and use it as the basis or inspiration for new and original intellectual assets. However, applicants can act strategically and avoid disclosing relevant or complementary information, making the disclosure less effective.

#### Different forms of intellectual property protection

**Patents are the most well known form of IPR**, but several other IPR instruments have been developed in order to address the large number of different forms of intellectual assets, reflecting the multidimensional nature of innovation. In most jurisdictions, the following types of formal IPR are available: trademarks, copyright, utility models, registered designs, lay-out designs of integrated circuits, new plant varieties, geographical indications and non-original database rights (WIPO, 2004) (see [Types of IPR](#) [1]).

IPR, however, is not the only tool to protect innovations. Rather, survey evidence suggests that in most industries it is not the most important one (Cohen, Nelson and Walsh, 2000). **A number of different strategies are also employed by firms to manage their intellectual assets**, either as an alternative or complement to formal IPR. They include secrecy, confidentiality agreements, lead-time, complexity of design, building-in of specialist know-how and open source (OECD, 2011) (see [Innovation without IP](#) [3]).

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## How does the IP system affect innovative entrepreneurship?

### The IP system as an asset for innovative entrepreneurship

The acquisition and management of IPR are critical in helping firms transform their innovation potential and creativity into market value and competitiveness. This is particularly the case for new enterprises, as these rely heavily on exploiting intellectual capital in their business models.

Protecting an invention is only one of the many roles that IPR may play in innovative firms. Other functions that companies fulfill with IPR (OECD, 2011; Cohen, Nelson and Walsh, 2000) are:

- positioning in global markets, by opening up new commercial pathways or by segmenting existing markets
- signaling current and prospective value to investors, competitors and partners
- accessing knowledge markets and networks
- defending themselves from patent infringement suits
- blocking rivals from patenting related inventions
- using patents in negotiations over technology rights.

The role of IPR in accessing external finance is particularly important, especially in the risk capital market (see [IP and markets for finance](#) [4]). For knowledge-intensive start-ups, patents are often the only asset entitlement they can use to raise funding. The emergent secondary market for patents should facilitate entry by these firms by providing a salvage value for those that fail (Hall and Harhoff, 2012).

Shane (2001) also stresses that an effective IPR system allows entrepreneurs to have **more time to grow their businesses before their ideas are imitated**. For a new firm, time is crucial in order to collect funding, develop the supply chain and reach the market – all aspects in which incumbents have a competitive advantage. Furthermore, effective patent protection may allow a new firm to compete on the basis of differentiation rather than on the basis of costs. This is another a crucial asset for new ventures, since incumbent firms generally have a strong comparative advantage in producing at a lower cost.

On the other hand, Shane (2002) suggests that the **efficiency of the patent system also positively affects the probability that an invention is licensed rather than directly commercialized** by the inventor, as inventors often do not have a comparative advantage in technology commercialization. Since many licensees are incumbent businesses, patent licensing may ultimately reduce the entrepreneurship rate. However, an efficient patent system should also reduce the information asymmetry between the inventor and the licensee by expanding available information on the quality of the invention. This ultimately improves the efficiency of the licence market and increases royalties earned by the inventors. The author shows that these hypotheses hold true for a sample of academic inventors at the Massachusetts Institute of Technology during 1980-1996.

### Is the IP system an obstacle to the diffusion of knowledge?

Recently, some scholars have stressed how the IPR system in the United States has become “sand rather than lubricant in the wheels of American progress” and needs a deep reform (Jaffe and

Learner, 2004), while others go even further by arguing its gradual abolition (Boldrin and Levine, 2012). One of the main reasons for these criticisms is the **growing trend of opportunistic patent litigations** by non-practicing entities (NPEs) or large incumbent firms that have lost their innovative momentum. **This activity imposes a *de facto* barrier to entry for new businesses** that lack a large defensive patent portfolio, which in turn adds costs and uncertainty to their innovation. To the extent that there are economies of scale in the patent litigation process, opportunistic patent litigation may disproportionately affect small entrepreneurial businesses (see [IP enforcement and litigation](#) [5]).

#### Effect of patents on the performance of new firms

Helmers and Rogers (2011) analyse a sample of high- and medium-tech start-ups in the UK in order to assess the effect of the decision to patent. They attempt to carefully isolate the patent effect from other factors, to conclude that **patentees have higher asset growth than non-patentees** at an annual rate between 8% and 27%. Balasubramanian and Sidavasan (2011) explore a dataset from the US census, matched with information on US patents for the manufacturing sector during the period 1975-1997. They find that **firms that patent for the first time experience a significant increase** in employment, capital, added value and output, as opposed to similar non-patentees. Measured by any metric, patent acquisition (or application) at the time of initial investment is largely irrelevant to the firm's subsequent progress through the venture capital cycle. Wagner and Cockburn (2010) examine the effect of patenting on the survival prospects of 356 Internet-related firms that made an initial public offering on NASDAQ in the late 1990s (at the height of the tech bubble), to find that, conditional on other factors that determine a company's survival, patenting is positively associated with survival.

#### IP and access to risk finance

Mann and Sager (2007) study the linkages between patenting and the venture capital financing cycle of software start-ups. While patents at the time of initial investment are largely irrelevant to subsequent progress through the venture capital cycle, they find that **later acquisitions are significantly correlated with indicators of access to venture capital**. Haeussler et al. (2009) find that patent **applications play an important role in signaling the value of the company to VC investors** in German and British biotechnology firms. Sichelman and Graham (2010) analyse a large survey of start-ups and early stage companies in the fields of biotechnology, medical instruments and IT; these companies cited financing and improving exit opportunities as important motives for obtaining patents. Criscuolo and Menon (2012) explore a large cross-country database of funding deals in the **clean-tech sector** between 2005 and 2010, in order to understand what determines the probability of being funded; they find that **companies owning one or more patents are significantly more likely to be funded**. The same study also finds that the characteristics of the patents matter, with more radical patents being positively correlated with funding probability. This finding is consistent with a number of studies arguing that new firms are more likely to commercialize radical innovations than incumbents (Henderson, 1993; Tushman and Anderson, 1986).

#### IP and firms entry

Cockburn and MacGarvie (2011) find that **entry rates in the US software industry are smaller in markets where there are more patents**, although firms that hold a patent are more likely to enter the market relative to firms that do not have a patent. This is consistent with previous evidence supplied by Bunch and Smiley (1992), who analyse survey data to find that patenting is one of the most common adopted strategies to deter the entry of rival firms.

### What is the evidence on the IP system and innovative entrepreneurship?

## Statistics on young patentees

An indicator of the relevance of IPR for innovative entrepreneurship is the probability that such companies will patent sometime in their early years. For instance, OECD research shows that, **in many countries, companies less than five years old file a significant share of patents**. During 2007-09, 25% of all patenting firms, on average, were less than five years old, accounting for 10% of patent applications. The share of young patenting firms varies considerably across countries (OECD, 2011a).

## What other topics relate to the IP system and innovative entrepreneurship?

**R&D and other investment in innovations** (see [R&D and other investments in innovation](#) [6]). Effective IP systems help protect firms' intellectual assets and prevent other firms from using them. IP thus helps firms recoup their innovation investment and consequently provides an incentive for investing in innovation. Besides, effective IP systems facilitate access to knowledge markets, enabling firms to buy and sell intellectual assets (e.g. through licensing), which may encourage R&D investment.

**Technological co-operation between firms** (see [Technological co-operation between firms](#) [7]). Effective IP systems are essential to technology collaborations, as they protect firms from involuntary knowledge leakage and reduce concerns related to the opportunistic behaviour of the partner.

**Interface with universities and public research institutes** (see [Interface with universities and public research institutes](#) [7]). The IP system creates an incentive for researchers and universities to engage in patenting and commercialisation activities. For instance, the adoption in many countries of legislative policies similar to the Bayh-Dole Act, which grants universities ownership over intellectual property, can encourage universities to patent and license academic inventions.

**Markets for technology** (see [Markets for technology](#) [8]). Intellectual property rights and patents are critical to the operation of the technology market. Patents can facilitate the realization of market deals, especially when knowledge is codified and hence easily imitable, as in that case both the disclosure and protection of technology is possible.

**Access to finance for innovative entrepreneurship** (see [Access to finance for innovative entrepreneurship](#) [9]). To the extent that IP assets can be important signals for potential funders, the role of the IP system is strongly interconnected with **venture capital** (see [Venture capital](#) [10]). and **business angel funding** (see [Business angels](#) [11]). in particular. The development of markets where IP assets can be used as collateral strengthens its contributions to innovation.

## Figure 1. Venture capital, % of GDP

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### What policies relate to the IP system and innovative entrepreneurship?

**Patents and other types of IP are increasingly serving more functions than those for which they were initially designed.** For instance, they have become the preferential way to obtain property entitlements on intangible assets in order to gain access to external finance. They are also more frequently used in opportunistic patent litigation or to block the entrance of competitors. Reforms of the IP system should fully take into account how these new roles played by patents affect the innovation economy (see [Processes and contributions of IP systems to innovation](#) [12]).

For IP to support innovative entrepreneurs, the organization of IP systems (see [Organisation of IP systems](#) [13]) has to provide them with legal quality (see [Legal quality of IP](#) [14]). It is also critical innovative entrepreneurs can effectively access IP systems for their benefit. That requires also that enforcement costs (see [IP enforcement and litigation](#) [5]) are not forbiddingly high as well as the provision of suitable IP skills and training (see [IP skills and training](#) [15]) and relevant external advisory services for innovative entrepreneurs for IP matters.

It also depends on market conditions for IP such as the development of markets for finance and IP (see [IP and markets for finance](#) [4] and [Licensing and markets for IP](#) [16]).

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