

1. Introduction

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Protection of intellectual property rights (IPRs) serves a dual role in economic development. While it promotes innovation by providing legal protection of inventions, it may retard catch-up and learning by restricting the diffusion of innovations. Does stronger IPR protection in a developing country encourage technology development in or technology transfer to that country? This book aims to address the issue, covering diverse forms of IPRs, diverse actors in innovation, and diverse cases from Asia and Latin America.

Limited term patent rights are a simple and practical compromise between these two conflicting implications of IPR protection. History has also witnessed a pendulum between more or less strong protection of IPRs, seeking a balance between incentive provision for knowledge production and providing access to knowledge (Reichman 2009). Since the 1980s, a pro-protection bias has driven the agenda of the WTO and global harmonization of IP regime via TRIPs (Agreement on Trade Related Aspects of Intellectual Property Rights). Recent decades, however, have seen a revived concern for the possible anti-competitive and anti-development effects of IP protection (Lee et al. 2013).

Recent research, such as Odagiri et al. (2010), now tends to acknowledge the possibility that there is variation in the impact of IPRs across countries that are at different stages of economic development, and that different types of IPR may be appropriate at different times. There has been both theoretical and empirical research that explicitly considers the stage of economic development in determining the impact of IPR protection.

The theoretical literature includes Eicher and Penalosa (2008), who develop a theoretical model in which the size of the market must reach a certain minimum level for stronger IPRs to stimulate innovation and economic growth. The idea is that the value of innovation should be sufficiently high to make it economically worthwhile to create and invest in IPR institutions. In contrast, it is also possible for IPR to have a negative effect on innovation for a country below critical market size: Grossman

and Lai (2004) show that the smaller the size of the market and the weaker the innovative capacity, the lower the optimal strength of IPRs should be. As developing countries have both smaller markets and lower innovative capacity, the balancing of marginal costs and marginal benefits of IPR occurs at a lower level of IPRs than in the North. Hence, obliging the South to adopt Northern standards of IPR would entail Southern economies to have a level of intellectual property protection that exceeds their optimal level. Innovation can therefore be adversely affected in developing countries if their IPRs are raised above a level suitable for their environment of adaptive, incremental R&D and smaller market size.

There is empirical evidence on the differential impact of IPR on both economic growth and innovation at different income levels. Falvey et al. (2006) find that the response of economic growth to IPR varies at different threshold levels of income. Schneider (2005) finds that stronger patent rights have positive effects on US patent filings for developed countries, while for developing countries patent protection has either a negative or an insignificant influence on other variables such as infrastructure and foreign direct investments. Most recently, a country-panel study of Kim et al. (2012) finds that stronger protection of patent rights contributes to economic growth in developed countries, but not in developing countries. They also show that in developing economies, a weaker type of patent rights – utility models – is more conducive to innovation and growth. This generalizes a finding by Maskus and McDaniel (1999), using Japanese data, that such protection has a positive impact on the growth of Japanese total factor productivity on balance. The World Bank (2002) documents case studies in the farm machinery sector in Brazil and the rice sector in the Philippines where utility models allow domestic producers to adapt foreign innovations to local needs and conditions.

Thus, in general, it seems reasonable to say that the impact of IPRs on economic growth depends on many other factors including the stage of development, and varies over time from country to country and from sector to sector (Fink and Maskus 2005). Furthermore, an increasing recognition is that IP is one of the several factors that affect economic growth, and that developing countries, in particular, have more critical or binding factors than IPRs for economic growth (Odagiri et al. 2010). Regardless of which view one takes on the role of IP protection and its level, there seems to be a consensus that the value of IP assets is growing and that it is becoming more important to recognize patents, trademarks, and other IP rights not only as legal protection tools but as value-creating assets as well. While an industrial product used to be conceived as a collection of constituting parts and components, now a product is increasingly conceived as a collection of IPs (Lee et al. 2013). Moreover, while in the

past IP used to be regarded as a by-product of R&D and other investments, today firms are obliged to consider both R&D and the related IP portfolio strategically.

In sum, the impact of IPR on economic development still remains an incompletely understood area that invites further research, especially research focusing on more diverse and specific dimensions and contexts. IPRs do not operate in a vacuum, and there are complementary factors that specifically affect innovation and technology diffusion, such as the quality of knowledge institutions (e.g. academia, public research institutes or industrial research centres such as science parks), availability of trained human capital, and networks for research collaboration or interaction (e.g. university-industry research collaboration or international collaboration). IP rights and their interaction of these other factors in a development context is the subject of this book.

First, a natural extension of the subject is to consider more diverse forms of IPRs such as utility models, trademarks, copyrights, and geographical indications along with the channels of knowledge flows, trade and FDI (foreign direct investment). Second, we can consider more diverse actors involved in the innovation process, not only firms but also universities, as well as both domestic and international collaborations among the various actors. Third, there are still many new things to be learned from diverse country-specific experiences.

This book has three parts that correspond with the above-identified three areas of extension and contribution. Part I is a collection of four chapters that consider the diverse forms of IPRs and technology transfer and their implications for economic development. Part II presents chapters that analyze the role of inventors in different contexts including those in universities and in domestic and international mobility and collaborations. Part III presents in-depth analyses of specific issues involving IPRs in the context of countries at different levels of development, including Mexico, China and Korea. Here, a contrast will be made between East Asia and Latin America.

In the following we provide a brief introduction to each chapter in this book. Part I contains the following four chapters. In the first, Bronwyn Hall surveys the theoretical and empirical evidence on the relationship between the strength of patent protection in a country and technology transfer of various kinds to that country. She focuses on two questions: whether stronger patent protection in a host country encourages technology transfer to that country, and whether stronger patent protection encourages technology development in the country itself. She finds in general that stronger patent protection encourages FDI and technology transfer to mid-level developing countries, but that there is little clear

evidence that stronger patent protection encourages indigenous innovation in developing countries, except possibly in the chemicals sector.

Walter Park and Douglas Lippoldt in Chapter 3 provide some more information on this issue, focusing on various measures of technology transfer and a set of indexes that quantify the strength of IPRs based on statutory and case laws. They first find that the index for patent rights tends to be positively associated with inward FDI, merchandise imports and service imports, with the strongest linkage found in developed countries, whereas the indexes for copyrights and trademark rights are less strongly associated with technology transfer than the patent rights index. Further, merchandise imports are found to be significantly and positively related to R&D expenditure in the receiving country, which implies that the inflows of goods, services and capital are a source of knowledge spillovers and inputs to conduct innovation (such as laboratory equipment).

While Park and Lippoldt addresses different channels of technology transfer, Keun Lee and Yee Kyoung Kim in Chapter 4 focus on two forms of IPR protection, patents and utility models, to examine their different impacts at different stages of economic development in Korean industries. They find that utility models are better indicators of firm performance at the early stage of economic development, while their impact tends to decrease over time as the country develops economically and they are replaced by patent applications. This firm-level finding is consistent with their time-series finding that conventional patent protection measured by the patent rights index did not lead to more generation of patents at an earlier stage of development in Korea (1970s and 1980s) but did so only at a later stage of development, since the late 1980s. The findings imply that the design and strength of IPR systems should be tailored to the level of the local technological capabilities of a country to provide appropriate incentives for incremental or adaptive innovation.

In the final chapter (5) of Part I, Suparna Karmakar deals with a unique situation in India after removal of the quantitative restrictions on trade of textiles and apparel (T&A) following the expiration of the Multi-Fibre Agreement (MFA) in January 2005, which has brought in significant structural adjustments. In this new regime of a volatile and rapidly transforming global industry, the use and efficacy of exclusivity-according tools such as IPRs gains new relevance. The chapter evaluates and analyzes the role, limitations, and opportunities for use of Geographical Indications (or GIs) in maintaining/boosting the global T&A trade, and finds that the efficacy of higher protection of GIs, given that GIs are essentially a national right, is critically dependent on the simultaneous and concerted use of other IP rights, in particular the trademark and the copyright laws, which assist rights holders in brand building and establishing credibility of firms/brands.

Part II contains three chapters. In Chapter 6, Jinyoung Kim, Sangjoon Lee and Gerald Marschke study the impact of university research on industry innovations, given a steady increase in industry's employment of inventors with university research experience. They find that in the 1990s the productivity (in terms of patenting rates and patent quality) of inventors with university backgrounds begins to exceed the productivity of the inventors without such experience. More interestingly they find that inventors with university experience cite mostly university patents not invented by them, implying that they are instrumental in transferring general knowledge created throughout the university community.

In Chapter 7, Sadao Nagaoka and Tsukada Naotoshi analyze how international research collaborations affect the invention process, an important topic given recent trends in the importance of international co-inventions, especially in high tech sectors with strong science linkage. They find that international inter-firm alliances facilitate the undertaking of larger and more complex R&D, and that international co-inventions are strongly associated with more science linkage per patent.

In Chapter 8, Joonghae Suh pursues the question of whether Korean university patents granted by the USPTO (United States Patent and Trademark Office) have different characteristics from other Korean patents, given that Korean universities show very rapid increases in both patents and R&D expenditures. Previous studies with US and European patent data show that corporate patents are more directed towards appropriability of invention returns, whereas university patents tend to be more basic (e.g., Trajtenberg et al. 1997). In the case of Korea, the paper confirmed the appropriability characteristic of corporate patents; however, the Korean university patents are not distinguishable in terms of basicness.

Finally, Part III contrasts countries in Latin American and East Asia. First, Fabio Montobbio and Valerio Sterzi in Chapter 9 analyze the nature of patenting activity in a selected number of Latin American countries to find that patenting activity is characterized by a growing but still small number of patents, with a big role of foreign companies and foreign collaborations and a big share of the patents from individuals that – possibly – are the result of occasional activities. Aside from the pharmaceutical and medical instrument area, Latin American countries display a low share of world patents, in particular in technologies with a high level of technological opportunities, in contrast to the situation in most Asian countries. The weak role played by domestic companies in patenting activity suggests that policy interventions should be designed to reinforce the local knowledge base.

A study of the Mexican auto industry by Clemente Ruiz Durán in Chapter 10 is more or less consistent with the overall picture of Latin

America presented by Montobbio and Sterzi. Ruiz Durán explores the ways in which Mexican auto producers have taken advantage of their relationship with transnational corporations (TNCs) to patent and how this process has evolved since the beginning of the nineties up to the first decade of this century. He found that the auto parts patents and utility models registered have been scarce and spread over time, reflecting the lack of a systematic innovation process. In addition, most of the IP registration is for accessories rather than for the core engineering processes. Although the learning process has been stimulated by TNCs' operation via the supplier network developed, patenting has not increased as expected. Supplier firms need to strengthen their bargaining position, and this can only be accomplished if they diversify their production and rely less on TNCs.

In contrast to the situation in Latin American, Chapter 11 by Albert Hu deals with the case of China which saw substantial patenting catch-up by residents with non-residents, as documented in Lee et al. (2011). As domestic Chinese firms' ability to imitate foreign technology gains strength and competition between foreign firms intensifies in the Chinese market, such a competitive threat creates urgency for foreigners to protect their intellectual property. The rise of local inventors and firms has intensified competition between indigenous and foreign firms in China, which has in turn led to a further increase of foreign patenting in China. Hu finds strong support for this competitive threat hypothesis in explaining the surge of foreign patenting in China.

Compared to China, the situation in Korea reflects an even higher level of technological capabilities of indigenous firms. In Chapter 12, Kyoo-Ho Park deals with the question of how more advanced latecomer firms, such as Korean firms, perceive and utilize patenting in their strategies to cope with competition in world markets in the mid 2000s. As is well-known, the large Korean conglomerates have risen as important players in the world market, holding large numbers of patents in the US and the EU. Park's analysis using the Korean Innovation Survey data in the early to mid 2000s shows that those large businesses in Korea that are active in product innovation, as opposed to process innovation, and are focusing more on exports than the domestic market, relied on patenting as a means of appropriating their innovations. This finding reflects the growing capabilities of Korean firms – earlier studies, such as Lee et al. (2003) using a survey in the late 1990s, found that Korean firms' innovation activities were more oriented toward process innovation, rather than product innovation. This changed motivation for patenting and modes of innovation is consistent with dynamic capability building that the Korean firms have gone through, as explained in Lee (2005).

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