

Strengthening the Patent Regime: Benefits for Developing Countries - A Survey

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This paper reviews theoretical and empirical literature that originated predominantly during and after TRIPS, focusing on the influence of changes in patent protection on developing countries. Previous studies identify two channels of gain for developing countries, from strong patent rights. Firstly, the promotion channel whereby, patent rights affect innovativeness of the South and concomitantly its economic growth. Theoretical studies do not give unambiguous hypotheses concerning the influence of patent protection on domestic innovation leaving it for empirical investigation. The empirical studies vary in their approach and produce mixed results. Secondly, theory suggests that the patent rights of the South facilitate the transfer of technologies from the North, by means of trade, FDI, and licensing. With reference to the technology transfer, though empirical studies yield some positive results, however, the vintage of the technology and its appropriateness still remain unexplored. The paper concludes that though patent protection has been made exogenous to economy, the impact of the same is still dependent upon the relative financial realities of an individual economy.

Keywords: TRIPS Agreement, developing countries, innovation, technology transfer

Intellectual property rights (IPRs), traditionally in the purview of domestic regulations, have been internationalized with the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). This agreement requires developing countries (the South) to devise IPR laws including patent rights as per the minimum prescribed stipulations. Consequently, the agreement enhances the strength of these rights in such economies. Developing countries face the task of economic development of their society through technical change. The patent regime of a country is a policy tool that influences innovation and technological change in an economy. The role of patent policy in the economic growth is debatable as it involves a trade-off between static losses to society in the short run and dynamic gains in the long run. Static losses occur due to the dead-weight loss generated by the monopoly of the right-holder over knowledge-sensitive goods. Dynamic gains accrue in the long run as patent rights stimulate innovative activity. With globalization, the impact of innovations in the form of dynamic gains is no longer restricted to national

boundaries, and the patent protection in different countries provides incentive to the innovators to conduct R&D.

The history of the patent system reveals that developed economies (the North) formulated their patent regimes according to the special requirements of their industry. For instance, Switzerland introduced mechanical invention patent to protect its watch industry, but initially withheld patent protection on chemical substances and processes because its infant chemical industry relied upon imitating German technology.¹ The TRIPS Agreement denies developing economies this leverage as it prescribes minimum standards of protection that are based on the legislative stipulations of developed countries. Furthermore, there is an issue regarding the appropriateness of the Agreement for the developing economies that comply with it as such countries are relatively at a different level of technological development. The level of development also varies within the developing countries because the countries that have reviewed their patent legislation to comply with TRIPS (69 in number) are spread across different income groups based on the classification by World Bank. To the extent per capita gross domestic product

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(GDP) proxies the level of technological development, *a priori* there is a reason to suppose that the impact of strong patent rights on the economic development of these countries will not be identical.

The objective of TRIPS states that the economies strengthening its property rights are likely to gain through two channels namely increase in the domestic innovation and transfer of technology from developed countries. The literature extensively debates the impact of internationalization due to differences in the technological activity undertaken not only in developed and developing countries but also within developing countries.

This paper reviews theoretical and empirical literature that analyse different aspects of this debate. The literature on the international protection of patent rights originated during and after TRIPS negotiations. The specific characteristics of developing countries necessitate a review of these studies from their perspective. The focus of the paper is the literature (theoretical and empirical) on the influence of patent protection on developing countries. This study identifies the issues pertinent for developing economies since they rely on patent policy to yield positive returns. The study helps in bringing to focus the relevant issues for further research to determine the future course of action in terms of patent policy for developing economies at a multilateral level as well as domestic level.

The review reveals that there is still ambiguity concerning the net impact of a strong patent protection on developing countries. The theoretical studies fail to give unambiguous hypotheses concerning the issue leaving it to the empirical investigations. However, the empirical studies vary in their approach producing mixed results. It seems as far as the innovation aspect is concerned developing countries have not gained much from changing their domestic legislation per the TRIPS requirement. There is a need to contextualize the empirical analysis and conduct more country or industry based studies. With reference to technology transfer, though the empirical studies yield positive results, the vintage of the technology and its appropriateness still remain to be explored.

The Concept and Background

At an international level, the protection of patent rights comprises of national treatment, reciprocity, and harmonization of legal stipulations and enforcement procedures. Among these characteristics,

national treatment and reciprocity for IPRs were introduced in the international treaties with Paris Convention. The TRIPS Agreement extends the fundamental principle of most-favoured-nation (MFN) of WTO to patent rights. MFN requires that nationals of all other Members should be treated at par with the residents with regard to the protection of intellectual property. As defined by Scotchmer, 'harmonization is a provision by which signatory states agree to a common set of protection.'² TRIPS lays down minimum substantive standards of protection for Member States to formulate their domestic legislation on seven types of intellectual property (IP).

During the nineteenth century, proponents of the free trade opposed patent provision as an institution for restricting competition which was ideologically linked with tariff protectionism.³ However, during the twentieth century, supporters of free trade argue for building strong and similar patent rights across the globe as evident from the passage of the TRIPS Agreement under the WTO. This agreement has been introduced as a part of the multilateral trade agreement for removing uncertainty in the international trade of knowledge sensitive goods. This shift in the focus of the forces of free trade from anti-patent to pro-patent protection calls for attention. Following paragraph investigates this shift by observing key economic phenomenon of the mid and late twentieth century along with the developments in economic literature.

Krugman predicted that 'the income of Northern resident depends in part on the rents from their monopoly of newly developed products. This monopoly is continually eroded by technological borrowings and must be maintained by constant innovation of new products. Like Alice and the Red Queen, the developed region must keep running to stay in the same place.'⁴ Interestingly, following economic incidents corroborate Krugman's prediction. (i) IPR sensitive goods entering international trade has increased considerably after 1970s along with a significant increase in the imitation of knowledge sensitive goods.^{5,6} (ii) The 'East Asian Miracle' has shown that the developing countries absorb substantial amount of technological learning during the early years of their development while providing very little or no protection for patent rights.⁷ In the light of these incidents, TRIPS can be perceived as a reaction of the developed countries to

the fear of losing their comparative advantage in knowledge sensitive goods. These countries need to freeze their monopoly rents by increasing the strength of patent rights in the developing countries to maintain their advantage.

Impure public good characteristic of the knowledge sensitive goods is at the core of the above discussed economic-political issues. The market ramifications due to this characteristic of the knowledge sensitive goods in an international setting are complex. Stiglitz defined knowledge as a 'global public good' with wide spread externalities that did not respect national boundaries.⁸ The subsequent market failure necessitates intervention by an international organization to provide adequate patent protection at the global level. Particularly, countries that do not undertake significant amount of R&D have strong free riding incentives. These aspects brought the issue of patent protection on the front of multilateral agreement blended with trade talks under WTO.

Case against Internationalization of Patent Rights in Developing Countries

The theoretical studies focusing on the influence of a strong patent protection in developing countries employ North-South models that postulate an innovating firm in the North and an imitating firm in the South. The innovation in the North responds positively to the strong patent protection in the South that enables appropriability of the R&D investments made by the Northern firms. However, the gains to the South from such increases depend upon its market size and the productivity of R&D expenditure.⁹ Chin and Grossman pointed out that considering the small market size of South and that R&D investments are productive only in highly innovative industries, the gains to the developing countries are limited.⁹ Deardorff suggested that inventive activity at the global level had diminishing returns; the more the countries provided patent protection, extra stimulation provided to the innovative activity became smaller. At a certain point, costs due to extending the monopoly pricing to invention came to outweigh the benefits from generating the new ones.¹⁰

Helpman used a dynamic general equilibrium model to study patent rights, growth, and welfare where an increase in protection in the South reduced imitation and shifted production to the North. This inter-regional shift improved the terms of trade of the North and deteriorated the same for South leading to welfare losses. The innovation in the North increased

as the rate of imitation reduced in the South prolonging the expected duration of monopoly of each Northern innovator. As firms produced to a larger extent in the North, the demand for labour and wages increased in turn raising the cost of innovation. In a steady state, therefore, the rate of innovation declined due to the resource competition effect. Helpman concluded 'Who benefits from tight intellectual property rights in less developed countries? My analysis suggests that if anyone benefits, it is not the South.'¹¹

Case for Internationalization of Patent Rights in Developing Countries

The results of above mentioned theoretical studies depend upon some major assumptions including (1) similar tastes and preferences of North and South for R&D, (2) no innovation in the South and (3) imitation as the only mode for transferring technology. The implications of the internationalization of patent rights on the South are discussed below after relaxation of these assumptions.

Different Preferences

Diwan and Rodrik proposed that the North and South have different technological needs. For instance, the North aims to develop drugs against cancer and heart disease whereas the South benefits more from drugs against tropical diseases.¹² Although innovation takes place only in the North, it has markets located in both North and the South. Owing to the limited R&D resources, the two regions compete with each other to encourage development of technologies appropriate to their needs. An increase in either the market size or the patent protection of the South enhance its relevance for innovators with more resources being diverted to the development of the products catering to needs of the developing countries. Empirical evidence however, suggested that patent right provisions in the South did not influence R&D in the North.¹³

Innovation in the South

Non rivalry and partial excludability render knowledge goods as impure public goods. Its producers do not invest in R&D as they face the threat of imitators leading to market failure. A good patent regime in a country not only ensures disclosure of the information by the innovator, it also partially ensures the appropriability of R&D resources. The state thus provides for these rights to enable innovators to recoup investments made in R&D and to help

researchers to access disclosed information for furthering the technological development process. This is also referred to as the 'promotion channel'. The industry specific characteristics, alternate means of appropriation, differences in the propensities to patent, and the strategic considerations of firms, all influence the empirical relationship between patent rights and innovation. In the context of developing countries, limited technological capabilities also affect the relationship between patent rights and innovation.

Chen and Puttitanun found positive impact of the patent protection of developing countries' on innovation that was measured using the patent applications made in the US by residents.¹⁴ A study by Kanwar and Evenson found that patent rights have a positive impact on R&D investment.¹⁵ In a related paper, Schneider found that innovation responded positively to patent rights protection. However, after splitting the sample, the patent rights was found to have a negative impact on the innovation in developing countries.¹⁶ A study by Allred and Park also revealed that for middle-income developing countries raising patent strength had a negative impact on domestic innovation.¹⁷ The studies used different proxies for domestic innovation including domestic patenting, R&D expenditure and the number of US patent applications made by residents of a given country. Allred and Park provided relative analysis employing both the proxies (domestic patenting and R&D expenditure by firms) for domestic innovation and the results exhibited that patent rights protection negatively affects innovation in developing countries. The authors attributed the negative coefficient to imitative, adaptive and non-drastic innovation in the developing countries.

Another strand of literature based on evolutionary theory espoused the co-evolution of the institutional infrastructure and specially of the patent policy with the technological development of an economy.¹⁸ Developing countries are not directly involved in innovating at the frontiers of knowledge.¹⁹ Their technological development process involves gaining experience through acquisition, assimilation and improvement of the technologies available in the international market according to their specific requirements. Accordingly, the impact of patent rights on innovation changed as the developing countries gained competence in innovative activity. The literature using stage theory expanded the technological development process of such countries

into three to six stages.²⁰ The theoretical construct was based on the product lifecycle hypothesis as given by Utterback and Abernathy²¹ and subsequently developed by Lee, *et al.*, (added a global perspective)²⁰, and Kim (integrated patent policy).⁷ According to the model, developing economies initiate the process of technological change by working with mature technologies which their owners transfer to gain cost advantage in such economies. After gaining experience, in terms of imitating those technologies and/or gaining mastery over their operations, developing economies move to the intermediate level of technology. This stage includes increase in R&D around the existing technologies and minor innovations (adaptive or in the form of utility models) but does not involve innovation as of a completely new product. The higher-level technologies were also transferred, as developing economies could now absorb these technologies. However, whether such transfers occurred depended upon the protection of property rights in the developing economies. The patent policy requirements and the subsequent impact on the domestic innovation and the modes of technology transfer are clearly different in these two stages. There is a difficulty in putting such stage model for empirical verification. Mostly, country or industry based case studies were employed to verify the theoretical construct. Kim studied the technological development process of Korea along with its patent policy for a three stage model. Apart from that there is not much empirical evidence for the same.

The review shows that the impact of patent rights on innovativeness in the South is negative. In cross country studies, literature review is restricted to developing countries keeping in line with the main objective of the paper. The theoretical models considered above implicitly assume that even if patent right protection is weak in a host country foreign firms still enter such an economy. Nevertheless, the strength of domestic patent rights remains a deterministic factor in the mode choice of foreign firms to serve a country. The choices encountered by foreign firms to serve other economies and the impact of patent rights on these choices are discussed subsequently.

Technology Transfer

The TRIPS Agreement advocates transfer of technology from the North as an alternative source so that the South may benefit from patent rights as a net

importer of technology. Technology transfer is a process by which commercial technology is disseminated from one industry to another, and/or among different economies.²² According to Teece, technology can be transferred through physical items such as tooling, equipments, and blueprints and/or through 'peripheral' support which is the crux of the process of technology transfer. According to Maskus, internationally technology is transferred through either market-mediated channels (direct) or non-market channels (indirect). Market-mediated channels include trade in goods and services, foreign direct investment (FDI), licensing, joint ventures, and cross-border movement of personnel. Indirect channels include departure of employees, temporary migration, data in patent applications, and test data.^{22, 23}

Market failure is an inherent problem of technology markets owing to non-rivalry and excludability characteristics of technology. Saggi noted that non-rivalry essentially did not imply zero cost of transferring technology across different agents.²⁴ The non-rival nature of the knowledge meant that if two agents were willing to pay the cost of adopting technology it could be done without affecting each other's decision. International technology transfers are not cost free as shown by Teece who found that on an average, technology transfer costs were approximately 20 per cent of the total costs of the project and in a few cases were as high as 60 per cent. Maskus argued that technology was also not fully non-excludable as limited absorption capacity of a host country, artificial barriers raised by owners, and information asymmetries impeded the flow of technology. The owner of a technology does not reveal information about technology due to the fear of creating a competitor based on such information. The lesser technological capabilities of the developing countries exacerbate this information asymmetry and consequently weaken their bargaining position *vis-à-vis* the supplier in the technology market. Consequently, the state has to mediate to deal with the market failure with interventions devised on the basis of regulatory approach, market based development approach or intra-regional technology development approach.²⁵ Among the policies of the host country, patent policy is a classical instrument that influences transfer and diffusion of technology. The role of patent rights in encouraging technology transfer has been identified as early as in the fourteenth century.²⁶

A strong patent policy increases certainty with which technology owners signal the true value and characteristics of an invention. The relationship between patent rights and different modes of technology transfers with respect to the developing countries is now studied in detail.

This section focuses on the relationship between patent rights and three modes to transfer technology namely trade, FDI, and licensing (in that order). Maskus and Penubarti conceived an ambiguous relationship between trade and patent regime of the importing country due to the trade-off between the market power and the market expansion effect. The market power effect of strong patent rights reduces elasticity of demand for a foreign firm that ordinarily induce firms to export less of its patentable product. On the contrary, market expansion effect increases demand by controlling pirated goods and attracted larger sales by a foreign firm. These contradictory aspects cause ambiguity in understanding the influence of patent rights on trade inflows.²⁷ Smith noted that the market expansion effect was dominant in large countries with highly competitive local imitative firms, while market power effect was strong in smaller countries with limited capacity for imitation.²⁸ Ivus in a general equilibrium model showed that strong patent protection increased the volume of high-technology exports to developing countries.²⁹

Multinational enterprises (MNEs) headquartered in developed countries as 'chief international investors' are a primary source to transfer technology to developing countries through FDI. According to Lai³⁰, FDI moderates the resource competition effect as the Northern firms move production to the South to take advantage of the lower wages as strong patent rights provide protection against imitators in the South. Consequently, the life expectancies of monopolies and innovation by the Northern firms increase. Further, as the returns for the Northern firms increase, more firms move to the South which eased off pressure on the North's innovation stimulating resources. It is noteworthy that R&D of the North is endogenous as not only does R&D determine FDI, an increase in FDI also raises R&D.³¹ Alternatively, as strong patent rights make imitations in the South difficult additional resources are drawn to imitations that drive away resources from production and FDI. This shifts production back to the North that put pressure on resources available for innovation.³²

Dunning provided an eclectic approach to establish relationship between trade, FDI and licensing, and patent rights.³³ According to this approach, activities of MNEs can be explained by the ownership, localization, and internalization (OLI) advantage. The eclectic paradigm established that there are numerous variables that play a critical role in determining an MNE's choice of mode. The patent regime is among the multitude of policy instruments used by a host country that influences MNEs' decision. The strength of the patent rights affected the ownership advantage that accrued due to control over better production technology and new products or processes. If patent right protection was weak, imitators swarmed market with similar products and MNEs will lose their monopoly position. The strength of a patent regime further affected the decision of MNEs to externalize or internalize their production facilities. The market for technology licences is susceptible to market failure from small number bargaining, appropriability problems, uncertainty, transaction costs, and impacted information coupled with opportunism.³⁴ A patent regime opens the market for trade in technology. As patent rights protection become strong, transaction cost of negotiating technology transfer contracts reduces considerably inducing MNEs to license their technology rather than conduct production in a host country. An inadequate patent right regime deters FDI, encouraging exports whereas a relatively strong patent rights system makes licensing more viable alternative to FDI.³⁵ These decisions of MNEs relating to trade, FDI, and licensing depend upon numerous other variables including government policies, cost and technology factors, market size and uncertainty. Yang and Maskus, in the context of licensing argued that patent protection would lead to the generation of 'economic rents' for an innovator.³⁶ Alternatively, protection may also lead to handing over the monopoly to the innovator and licensor. The theoretical ambiguity about the technology transfer and patent protection essentially leaves the issue for empirical investigation.

Ferrantino empirically examined the pattern of US exports in relation to the national membership of international patent treaties and found a weak link.³⁷ The empirical study by Maskus and Penubarti strongly suggested that exporters discriminate in their sales decision across export markets taking into account local patent laws.²³ Smith explored market power and market expansion effect of the patent

rights on trade by considering the imitative capacity of the trading country.²⁸ The results, in line with the theory, showed that exports depended on patent rights of the importing countries, while the direction (market expansion or power) of the relationship depended on the threat of imitation. Fink and Braga examined bilateral trade flow in non-fuel and high-technology goods and the results showed a significant positive impact of patent rights on bilateral flows of non-fuel trade.³⁸ However, this result was not confirmed in case of high-technology goods that authors attributed to either market power impact of patent rights or other legal means to appropriate investments in R&D. Rafiqzama found that the stronger patent protection influenced the export from Canada to high-income countries more than to the low-income countries.³⁹ The study corroborated the market power and market expansion effect of the patent protection on Canadian exports. In case of developing countries, Al-Mawali found that for the intra-industry trade of South Africa patent protection and imitation abilities were not important factors.⁴⁰ However, the study found some evidence of the interaction effect. Falvey, *et al.*, found a positive impact of protection on the exports in all countries across all the industries except textiles.⁴¹ Ivus using a difference-in-difference model showed that there was an increase in the high-technology exports from developed countries to 18 developing countries to the tune of US\$ 35 billion.⁴²

Empirical studies that explored the impact of patent rights protection on FDI have produced mixed conclusions. Ferrantino found that US MNEs moved goods to their affiliates in countries with low patent rights so as to keep the technology with them and preferred to distribute production to locations with strong patent rights.³⁷ An empirical study by Seyoum revealed that patent rights explained variations in FDI to the extent of 13 per cent, 43 per cent, and 35 per cent for least developed countries (LDCs), newly industrializing countries, and developed countries respectively.⁴³ Lesser showed that the strong patent regime increased both FDI and imports.⁴⁴ On an average, results indicated that one point increase in patent protection enhanced FDI inflows to a country by US\$ 1.5 billion and imports by US\$ 8.9 billion.

The relationship between the patent rights and FDI is contingent upon industry specific factors and on the composition of FDI. A strong patent protection influences investment decision in patent sensitive sectors like drugs, cosmetics, health care products,

chemicals, electrical equipment, and machinery and equipment.⁴⁵ Furthermore, strong rights have an impact on investment decisions regarding FDI in the production facilities rather than solely in the distribution networks. Moreover, MNEs tend to conduct R&D activities in their home countries or to concentrate in a few industrialized countries.⁷ It is, therefore, not surprising that that European Union (EU) countries account for nearly 70 per cent of R&D expenditure by the US MNEs outside their home country. For Japanese MNEs, over 90 per cent of their overseas R&D is conducted in EU or US. Country-specific characteristics also condition the relationship between patent rights and FDI, as can be seen for developed nations with stronger patent regime where a further rise in protection has a positive but smaller impact on FDI. In conclusion, the impact of patent rights on FDI inflows is ambiguous and contingent upon industry-specific characteristics, composition of the FDI, and country-specific characteristics.

Yang and Maskus found that the impact of patent protection on arm's-length licensing is conditioned by the existing level of protection.³⁶ The study used countries at different levels of technological background that influenced their imitative capabilities. Park and Lippoldt showed a positive impact of patent protection on licensing by US firms, though the influence on richer countries (with US\$ 18,000 as GDP per capita) was relatively high.⁴⁶ Branstetter, *et al.*, also found a positive impact of patent reforms on the royalty payment by affiliates of the US parents in 16 countries.⁴⁷ Nicholson on the other hand, did not find significant impact of the patent protection on FDI and licensing by the US⁴⁸ MNEs to non-OECD countries. Kanwar found a positive influence of patent protection on the licensing of technology to developing countries.⁴⁹

Smith empirically verified localization, and internalization concepts that were central to MNEs literature.⁵⁰ This analysis of localization and internalization factors helped in assessing relative magnitude of the impact of patent rights of the South on three forms of bilateral exchanges. The study revealed that ownership advantage increased with strong patent rights of a host country that in turn improved bilateral exchange on an average across all countries. Secondly, strong patent rights of the host country conferred a locational advantage that increased affiliate sales and licences relative to exports. Thirdly, relatively stronger patent rights of

the host country enhanced the internalization effect that increased licences relative to affiliate sales and exports. McCalman showed that Hollywood studios serve foreign markets through affiliates if patent right protection is either too weak or too strong. A moderate degree of patent rights protection, however, leads to more market based relations like licensing.⁵¹ Park and Lippoldt in a comprehensive study analysed the impact of patent protection on merchandise trade, FDI and service imports.⁴⁶ They found a positive impact of the strong protection on all the modes of technology transfer with the impact more pronounced for high technology industries like pharmaceutical, chemicals, aerospace, computer services, information and office and telecom equipment.

Considering the product life-cycle hypothesis, it is pertinent to enquire about the vintage of the technologies transferred. Evidently, economies with industries evolving through higher stage of technological development will facilitate transfer of intermediate or relatively newer technologies. Park and Lippoldt found evidence for the same as they argued that the modes of technology flow (trade and FDI) were positively related to foreign patenting. Thus, new technologies were transferred to developing countries.⁴⁶ Since developing countries are the net importers of technologies, new technologies arising from them may be due to market power influence. This necessitates a study to analyse the impact of patent protection on the types of technologies.

It is evident from the review that the relationship between patent rights and different modes of technology transfer (trade, FDI, and licensing) is complex. This complexity enhances as the degree of strength of patent rights shifts the choice of decision of MNEs from trade to FDI and finally to licensing. The MNEs choice of decision and patent rights of a country are further affected by the country's industry, and firm specific characteristics. Most importantly, patent rights regime of a country is among the multitude of policies offered by a host country to attract MNEs.

Foreign Patenting

The information contained in the patent applications filed by foreign firms is a major source of technology diffusion to local firms. The local firms may study the applications to learn the underlying technology and invent new processes and products around the patents without infringing them. However,

apart from the patent regime, various factors affect an MNE's decision to patent in a foreign country. Eaton and Kortum stated that the decision of where to patent provided information regarding the geographical applicability of the innovators ideas considering the territorial nature of the patent rights and the costs involved.⁵² Parks showed that patent rights regime of the receiving country had a positive and significant impact on the international patenting.⁵³ Xu and Chiang illustrated that for middle (16) and low income countries (17) for the period 1980-2000, foreign patents depended upon market openness, patent regime, and the technology gap.⁵⁴

Internationalization of Patent Rights and Economic Growth of the South

The relationship between the patent regime of a country and its economic growth is intricate. The technological development of an economy affects the patent protection granted by the state, which in turn determines the economic growth of a country by stimulating technological progress. The study of history of patent laws in developed nations shows that they chose a patent rights regime according to the requirements of their industries.² Ginarte and Park showed that more developed countries provided stronger protection. This protection did not depend upon the level of economic development *per se* but varied with R&D, market freedom, and the openness of an economy.⁵⁵ Maskus demonstrated that market size has no significant impact on patent rights and there was an inverted U shape relationship between patent rights strength and real per capita income.⁵⁶ Likewise, Chen and Puttitanun have shown that country's patent rights depend upon the level of development (technological ability) in a non monotonic way, initially declining and then increasing.¹⁴ Grossman and Lai studied incentives of the governments to protect patent rights in a trading world economy that increased with its relative research capabilities and large domestic market size.⁵⁷ Lai and Yan empirically verified Grossman and Lai's model of international patent protection. Incidentally, TRIPS has made the determination of patent policy for the developing countries exogenous.

A strong patent regime stimulates technical change in an economy to foster its economic growth. Deolalikar and Roller showed that despite limited protection of patent rights in India, patenting is positively and significantly associated with total factor productivity growth at the firm level.⁵⁸ Thompson and Rushing on the other hand, showed that in developing

countries patent rights did not have a significant impact on the total factor productivity.⁵⁹ An empirical study by Parks corroborated the premise that patent rights did not directly affect output growth.⁵³

The productivity gains through strong patent rights translate into the economic growth of a country. Gould and Gruben examined the importance of patent rights in determining growth for 95 countries with data averaged over the period 1960-1988 (ref. 60). The study found marginally significant positive impact of patent rights on the economic growth. Falvey, *et al.*, also showed that countries with high per capita incomes grow more rapidly with strong patent right protection as these countries conduct majority of world's R&D.⁶¹ By allowing for more than one income threshold, however, the study revealed that among lower-income countries there were differences in the relationship between patent protection and growth. Strong patent protection had a significant positive impact on growth in very poor countries but for middle-income countries no significant relationship was found. Researchers contended that either the negative or insignificant impact of patent rights on economic growth was due to imitative or adaptive research conducted in developing countries.

An alternative source for the growth that has been suggested is the increase in exports of the developing countries.⁶² Liu and Lin conducted an empirical study on the exports of Taiwan and found that the patent protection had a positive impact on the exports if the importing country had a stronger R&D ability than Taiwan.⁶³ The study found evidence for the hypothesis that if an importing country exhibited a strong (weak) threat of imitation, the patent protection in that country increased (decreased) Taiwan's exports through market expansion (market power) effect. Yew, *et al.*, showed that China's export to five ASEAN countries was negatively affected by patent protection, thus confirming the market power effect.⁶⁴

Conclusion

Theoretical literature reviewed in this paper analyses in general as well as partial equilibrium models, the impact of strong patent rights on the South. This literature identifies two channels of gain for developing countries from strong patent rights. Firstly, the promotion channel whereby, patent rights affect innovativeness of the South and concomitantly its economic growth. The empirical studies show that the impact of strong patent rights on innovation as

well as economic growth of developing countries is, however, predominantly negative. These studies conclude that primarily developing countries are dependent on imitation of foreign technologies for their economic growth and strong patent rights negatively affect such innovations. A few studies, however, conclude that innovativeness of developing countries has reached a stage where it is positively affected by strong patent rights. It appears from the results that not all developing countries' domestic innovation responds to patent rights in a similar way. Secondly, theory suggests that the patent rights of the South facilitate market transactions for technology and new technologies, generated in the North, transferred by means of trade, FDI, and licensing to developing countries. The empirical studies also show the positive impact of patent rights on bilateral trade flows unlike on FDI. The studies argue that the patent rights regime is among the multitude of policy variables that affect FDI inflows which is why there are variations in the results of the empirical studies. This aspect requires further investigation to clarify the relationship between patent rights and FDI.

The contradictions in drawing an inference about the influence of patent protection on developing countries are obvious. The theoretical studies have not given any unambiguous propositions about the impact of the strong patent protection on developing countries leaving the issue for the empirical investigation. The empirical results show that the net impact of the protection is conditioned by various factors and there is a no straight forward answer to the question: What have developing countries gained from strengthening their patent protection? Clearly, there is need for more research on the issues specific to developing countries requirements.

There is a need to explore the process of technological change of developing economies beyond the existing two-stage process inclusive of imitation and innovation. From the point of view of innovation in developing countries, the measures used also need to be more appropriate as patent applications in US may not be relevant. The technological activities of the developing countries are essentially local in nature, involving imitation, assimilation, and adaptation of foreign innovations that may not be significant at the international level.⁶⁵

Most of the studies have explored the two conduits of gains (domestic innovation and technology transfers) independently. A few studies bring

domestic innovation and technology diffusion together to study the impact of patent rights while hinting at the potential conflict that developing countries may face regarding the future of their patent rights regime. Such an approach to consider different channels of gains simultaneously needs to be further expanded to include trade, FDI, and licensing. It is evident that there are various issues that must be resolved before finalizing the net impact of TRIPS on developing countries. Though patent protection has been made exogenous to an economy, the impact of the same is still dependent upon the relative economic realities of an individual economy. The heterogeneity of developing economies is a probable reason behind the mixed results found in the literature. Most of the studies reviewed in this paper pool together developed and developing countries. Such a grouping may produce misleading conclusions and consequently inappropriate policy recommendations.¹⁹ These aspects necessitate country level studies to draw the relevant conclusions and policy suggestions regarding the future direction of patent protection in the developing countries.

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