

# TECHNOLOGY TRANSFER THROUGH FOREIGN DIRECT INVESTMENT

## THE IMPLICATIONS OF IPR PROTECTION IN THE ASIA-PACIFIC REGION

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### Abstract

This article explores the issue of technology transfer focusing on foreign direct investment and the possible relationship with the intellectual property rights (IPRs) policy. The article highlights the issue from the perspective of IPR reform suggested within the WTO-TRIPS agreements. The need to reform the policy is nothing less than to facilitate trade and technology transfer. While greater protection or higher patent protection may increase foreign technology to be adopted in the growth process, the argument that IPRs protection may restrict trade and strengthen the monopoly power from the developed countries remain ambiguous.

### Introduction

The Asia-Pacific region is a geographically diverse region stretching from the border of China-Mongolia to the north, to Australia and New Zealand in the south. This region covers the spectrum of climate zones of northern temperature and tropical and sub-tropical in the southern hemisphere. Akin to the diverse geographical region, the economic and socio-economic dimensions are also diverse. The emergence of new economic powers such as China, India, the Republic of Korea, Taiwan province of China and Hong Kong SAR of China have made this region offer one of the biggest technological and consumer goods market in the world. Accordingly, the emergence of these new economic powers has attracted more technology transfer in terms of new investment projects from world class multinational companies compared to other regions in the world.

In this article, we will explore various sources or mode of technology transfer and base our discussion on the role of foreign direct investment as one of the methods to achieve such purpose. We include the role of IPR protection into the discussion. The important role of IPRs protection in luring foreign investment from the developed into the developing countries has become a major topic discussed in a number of important literature. Good IPR policy is perceived to improve innovation and at the same time help to secure the *know-how* from being copied freely by unauthorised person or entity. As the new technology is derived through the creation of the mind originating from the developed region, proper IPR protection to secure the intellectual idea become important and crucial in the developing economies.

In the modern era of trade on new technological products, debate on the

adequacy of IPRs protection among the developing countries is one that interests developed countries<sup>1</sup>. The term technology basically refers to a new solution to an existing technical problem. IPR protection is the term commonly used to refer to protection of an idea or innovation under a patent. Accordingly, there are three inter-related elements for an invention to be patented, i.e., (i) novelty (newness), (ii) involve inventive steps and, (iii) industrial applicability (useful in a certain industry in which the patent is targeted to produce or manufacture and market a product).

Technology transfer is considered as one of the crucially needed factors for developing countries to achieve higher growth. A large volume of literature acknowledge the role of foreign direct investment, bilateral trade either import or export of capital and intermediate goods, licensing, national income, infrastructure development and other institutional factors such as IPR to directly affect the transfer of technology.

In this article, we discuss the role played by foreign direct investment as one of the sources of technology transfer and explore this relationship within the setup of IPR protection. There are a number of empirical research in the past offered in the literature exploring this relationship<sup>2</sup> either at the group of developing region for example the Asian region, single country such as China or for a group from emerging economies. Details are discussed in the next section.

<sup>1</sup>Reader are encourage to read articles written by Maskus and Penubarti (1995), Smith (1999, 2001, 2002), Rafiqzaman (2002), Catherine (2004), Awokuse and Yin (2010). One specific debate which is most interesting is on how the stringent of IPRs protection affect the import of China. The author (Awokuse and Yin (2010) argue that, China is the best available real example because according to them, while the stringent of IPRs protection has been improved in the country, the recorded incidence of IPRs infringement and counterfeiting cases are also high. The effect of IPRs protection on bilateral trade are ambiguous in the sense that it may induce the *market power* or *market expansion* effect as a results of higher IPRs protection offered by the trading partners. The *market power* and *market expansion* effect refer to the penetration level impact on bilateral trade i.e., reduces bilateral trade if the *market power* effect exist and increases otherwise.

## IPRs in the Asia-Pacific region: An overview

Intellectual property rights have become a major issue in trade negotiations in GATT (General Agreement on Tariffs and Trade) under the Uruguay Round of 1986-1994. The success of the negotiations is then enforced under the TRIPS<sup>3</sup> agreements, an annex agreement enforced within the establishment of the WTO (World Trade Organisation) in January 1995.

The IPRs consist of several protected components i.e., patent, trademark, industrial design, layout design of integrated circuits, geographical indication (with special protection on product based appellation of origin) and copyrights and related rights<sup>4</sup>. Across all field of IPR protection, patent rights protection has acquired an important role in the new knowledge-based global economy. Patent regime regulates the creation and international transfer of new products and processes and changes in the patent rights protection can have profound effects on global economy efficiency and income distribution between innovating and imitating countries.

The current IPR reform enforced in 1995 negotiated under TRIPS require current and future WTO members to adopt and enforce strong non-discriminatory minimum standards of IPRs protection in each of the protected components mentioned above. The institutional revamp of the IPRs legislation generally do reflect this significance. In contrast to developed nations, developing countries have estab-

lished a weaker form of IPRs protection favouring technological imitation instead of technological diffusion through innovation. Therefore to promote the idea of stronger IPR protection across the globe, the incentive to improve the efforts to innovate needs to be first secured, because for the developed countries, incentives to innovate is important as a majority of new technology and discovery originate from them<sup>5</sup>.

Therefore in order to secure a greater return from innovation efforts, securing the harmonisation of patent systems across the globe is crucial and this translates into one of the negotiated terms in many bilateral, regional and international trade agreements between the North and the South afterwards. Developing countries are less enthusiastic on the negotiated terms at the beginning because for them an increase of IPRs protection may raise the prices and royalties payment of acquiring new technology. However, due to the fact that majority of the developing nations rely on imports of new technology from abroad, such concerns have urged them to adopt the standards<sup>6</sup>.

For the past three decades, the nature and linkages between patent rights and international trade has been a source of controversy and debate as to whether stronger patent rights protection promotes or discourages foreign investment or trade. However, as the status of patent protection is seen as a form of trade barrier, it becomes an issue of greater global concern since trade in knowledge-based capital is an important source of innova-

tion for developing nations. The issue now is centered on the need for greater protection. While greater protection or higher patent protection may increase foreign technology to be adopted in the growth process, the argument that IPRs protection may restrict trade and strengthen the monopoly power from the developed countries remain ambiguous. The ambiguity effect on trade, investment and growth as a results of higher IPR protection can be observed in many studies<sup>7</sup>. The ambiguity effect of IPR protection may in some aspect benefits countries in the Asia-Pacific region due to developments in the recent free trade agreements. Recent free trade agreements either bilateral or multilateral with the recent example of the Trans Pacific Partnership (TPP) agreement have put a greater emphasis on the IPRs protection into one of the sections. Across the Asia-Pacific region, the improvement on IPRs policy can be observed in two significant periods, i.e., before and after the establishment of the WTO in 1995<sup>8</sup>. In this review, we refer to the index developed by Ginarte and Park (1997) and Park (2008) (GP&P) which cover the development of patent rights index for 120 plus countries starting in 1960. The index of IPRs protection derived by GP&P provides a comprehensive index of both developed and developing countries derived from five standardised components related to patent protection described in the *patent law* enforced in each country<sup>9</sup>.

According to Table 1, with the exception of Australia, Japan and New Zealand, the index of patent rights for the remain-

<sup>2</sup>Readers are welcomed to read the article written by Lee and Mansfield (1996). This article is the first empirical research discussing the role of IPRs protection towards foreign direct investment for 14 developing countries. The author argue that the chosen country may shed some light on the controversial issue of weak IPRs protection. The author uses a random sample of 100 major U.S. firms in six manufacturing industries in 1990 for 14 developing countries. The 14 developing countries are Argentina, Brazil, Chile, Hong Kong, India, Indonesia, Mexico, Nigeria, Philippines, Singapore, South Korea, Taiwan, Thailand, and Venezuela.

<sup>3</sup>Trade related aspect of intellectual property rights.

<sup>4</sup>Trade secret is also considered as one of the component.

<sup>5</sup>For a comprehensive discussion reader are encourage to read article written by Eaton and Kortum (1996, 2001).

<sup>6</sup>There are many empirical evidence highlighted in the literature on how imported capital from the developed nation benefited developing nations in terms of achieving higher growth and productivity. See discussion from Coe et al. (1997) and Henry et al. (2009). Both articles serve as examples of many other written evidence showing that imported capital generated from advanced countries are perceived as imported R&D and is important in improving growth and productivity.

<sup>7</sup>For example, ambiguity on bilateral trade can be found in a series of studies from Maskus and Penubarti (1995), Smith (1999, 2001, 2002), Rafiqzaman (2002), Co (2004) and latest by Awokuse and Yin (2010a). Generally, the ambiguity effect of IPRs protection on trade is described as *market power* and *market expansion* effect and these two effects are found to off-set to each other. The ambiguity effect on growth is highlighted by Gould and Gruben (1996, 1997) and Falvey et al. (2006).

<sup>8</sup>In this discussion, we use the IPR index developed by Ginarte and Park (1997) and updated by Park (2008) because the authors adopt changes on IPRs directly from the law governing the IPRs across the globe. The issue of whether a country offer *de jure* or *de facto* protection once the current IPRs law is adopted is not the issue.

**Table 1: Selected Asia-Pacific country and level of patent rights index, 1990-2010**

Id	Code	Country	1990	1995	2000	2005	2010
1	AUS	Australia	3.28	4.33	4.33	4.33	4.33
2	BGD	Bangladesh	1.30	1.70	1.70	1.70	1.58
3	CHN	China	1.33	2.12	3.09	4.08	4.21
4	FJI	Fiji	2.20	2.20	2.40	2.40	2.40
5	HKG	Hong Kong (China)	2.70	2.90	3.81	3.81	3.81
6	IND	India	1.03	1.23	2.27	3.76	3.76
7	IDN	Indonesia	0.20	1.56	2.47	2.77	2.77
8	JPN	Japan	3.88	4.42	4.67	4.67	4.67
9	KOR	South Korea	3.69	3.89	4.13	4.33	4.33
10	MYS	Malaysia	2.05	2.70	3.03	3.48	3.68
11	NZL	New Zealand	2.37	3.68	3.68	3.68	3.68
12	NPL	Nepal	1.79	1.79	1.79	2.19	2.19
13	PNG	Papua New Guinea	0.00	0.00	2.57	2.77	2.77
14	PHL	Philippines	2.36	2.56	3.68	3.88	3.88
15	SGP	Singapore	2.04	3.88	4.01	4.21	4.21
16	TWN	Taiwan (China)	1.26	3.17	3.29	3.74	4.74
17	THA	Thailand	1.21	2.24	2.37	2.49	3.23
18	VNM	Viet Nam	1.13	2.65	2.65	2.78	3.43

Note: Data adopted from Ginarte and Park (1997) and Park (2008)

ing Asia-Pacific country is recorded low before the reform of global IPR policy in 1995<sup>9</sup>. The lowest patent rights index in 1990 is shown by Indonesia with no protection covered in Papua New Guinea.

The improvement on the IPRs index can be observed in 1995 with the exception for Fiji, Nepal and Papua New Guinea. Taking China for example, the index increased from 1.33 in 1990 to 2.12 in 1995, 3.09 in 2000, 4.08 in 2005 and 4.21 in 2010. The improvement of the index signifies the importance of IPR policy to its economy. China has its own history in the protection of intellectual property rights. China joins as a member of the WTO in late 2001 and as a developing country China's reform on the IPR protection is surprisingly significant to attract investment and trade<sup>11</sup>.

As highlighted by Awokuse and Yin (2010b), China received a significant amount of foreign investment as a result

of harmonising the IPR policy. The authors (Awokuse and Yin, 2010a) also highlight the effective role of China's IPRs in explaining bilateral trade activity. These two channels are only examples among many other factors on how IPR policy may improve or speed-up the process to attract transfer of technology into the developing countries and China is one of the many of the 'real' examples in this respect.

The amended IPRs policy at the international level as enforced in TRIPS is to make the policy more aligned with the standards of developed countries. As highlighted by Co (2004), the agreement will balance two conflicting but legitimate concerns, i.e., the advocates of the agreement (i.e., the developed nations) and the opponents. The supporters concern is that the issue of knowledge creation incentives can only be realised if strong IPR regimes are in place. How-

ever those who oppose it are concerned with the speed by which knowledge can be disseminated given strict IPR regimes i.e., a concern over the technology gap. Since developing nations have limited capabilities in closing the (technology) gap, increases in the transfer of technology into the economy perhaps can be done by strengthening the IPR policy. Empirical evidences have highlighted on how the adoption of up-to-date technology positively affects output, productivity, investment and trade.

### How IPRs protection relate to technology transfer?

One may ask how IPR protection relates to the transfer of technology into the developing countries and how IPR protection may speed-up the process of such transfer? The relationship between IPR protection and technology transfer is generally known to be positive, i.e., IPR protection will trigger the research and development sector before it fires-up the growth process. The IPRs protection may improve innovation efforts, investment climate and bilateral trade which lay a foundation for a supportive environment on transfer of technology. However, the controversies of stringent IPRs protection may provide the explanation of why *optimal* form of IPR protection is indeed crucial. The issue of *optimal* level of IPR protection is one of the many elements brought in to be implemented within the ambit of the WTO.

A lack of IPRs protection among the developing nations is one that developed nations have great concern. There are a number of articles that discussed this issue in the past. The alarming level of weak protection of IPR and highest level of imitation among the developing countries has called for this reform. The developed countries fight for the IPRs protection reform by proposing and imposing the *standard minimum protection of IPRs* among the signatory members is simply or clearly understood. It has been

<sup>9</sup>There are other studies that measure the IPRs index, see Rapp and Rozek (1990).

<sup>10</sup>Table 1 only cover 18 countries in the region. This is due to unavailable and unobserved patent rights index data. We include the patent rights index beginning in 1990 and this is sufficient to show the discrepancies of patent rights protection before the implementation of TRIPS in 1995.

<sup>11</sup>China has its first patent law in 1985 and has undergone a gradual reform with substantial revision in 1992 and 2000.

argued that a lack of protection on IPRs may delay the development, trade and investment process if developing countries opt for the weak form of its IPR policy. The reason why developed nations ask for the reform is simply related to the request and concern of their multinational corporations. The willingness of big technology players or providers to serve their affiliates in the developing nations depend on the level of the IPR protection provided by the host country Smith (2001).

The role of IPR protection on technology transfer is found to be ambiguous in developing countries as discussed in various theoretical and empirical research on trade and growth. The ambiguity of IPR protection on foreign direct investment is related to the theoretical relationship of IPR protection on protecting technical knowledge or know-how. Without proper protection of IPRs, the process of creating new knowledge or technical know-how may be in jeopardy.

Various empirical studies document this issue in the past. The first empirical study was written by Lee and Mansfield (1996) which finds that IPR protection strength plays a positive role in attracting FDI from the developed countries. The authors investigate the relationship between a developing country's system of IPR and the volume and composition of U.S FDI. The author gathered the information from 300 U.S major listed firms but only managed to compile a random sample of 100 firms regarding the perceptions of how IPR protection in various developing countries might affect their FDI decision into six industries, i.e., chemical, transport equipment, electrical equipment, food, metal and machinery<sup>12</sup>. Only 14 developing countries are reported in their analysis, i.e., Argentina, Brazil, Chile, Hong Kong (China), India, Indonesia, Mexico, Nigeria, Philippines, Singapore, Republic of Korea, Taiwan province of China, Thailand and Venezuela. The authors choose these countries because of their market size and

importance in connection with controversies over IPR protection over the past decades.

The controversy of IPR protection and level of imitation activity is also a subject of discussion in an article written by Awokuse and Yin (2010b) when they wrote about the role of IPR protection and foreign investment in China. Awokuse and Yin (2010b) argue that, China is one of the best 'real' examples of this aspect because over the past two decades, China has emerged as one of the biggest recipients of foreign investment among the developing countries and the most popular destination for multinational firms in the world, second after the U.S. Additionally, foreign investment flow into China is highest compared to the entire African continent and just behind all Latin America combined.

The uniqueness of China is that, while China has significant policy reform of their IPR laws since 1992 (the improvement can be seen from Table 1), China also holds the reputation of having strong imitation capability. The finding from Awokuse and Yin (2010b) shows that the strengthening of IPR protection in China has a positive and significant effect in attracting foreign investment. They added that, while other factors such as market size, regional integration, transportation and trade cost are important, the role of IPR to promote technology transfer into China's economy is undeniably significant.

## Conclusion

The article explores the connection of IPRs protection to transfer of technology. While technology transfer may be triggered by factors on the international demand side and supportive domestic institutional factors, the effective role of IPRs protection is no doubt significant, as in the case of China. Technology transfer has been and will continue to be one of the main mechanisms to advance the industrialisation process. As for the case of

the Asia-Pacific region, the implementation of stringent IPRs policy need to be balanced with other supportive factors. While many empirical studies indicate that IPRs protection has a positive effect on host country's foreign investment inflows, other factors such as economic performance, level of own research and development (R&D), degree of openness (or trade liberalisation) and country risk are also important factors in mediating transfer of technology.

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<sup>12</sup>Lee and Mansfield (1996) asked three questions related to the perception regarding transfer of technology into their own subsidiary, possibility of transferring technology through joint venture or transfer of technology through licensing if the country in question has weak IPRs protection to allow them to transfer their technology. Based on their results, there is a consistent proposition that a country's system of IPRs protection influences the volume and composition of U.S. FDI.

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### World Intellectual Property Report 2015: Breakthrough Innovation and Economic Growth

The WIPO report underlines the elements of successful innovation ecosystems: government funding for scientific research and support in moving promising technology from the laboratory to the production stage; competitive market forces that encourage firms to innovate, supported by vibrant financial markets and sound regulation; and fluid linkages between public and private innovation actors. The report also documents how innovation is increasingly linked to research at universities and public research organizations. The 3D printing, nanotechnology, and robotics fields show higher shares of academic patenting compared to the three historical cases of airplanes, antibiotics and semiconductors. Nanotechnology stands out, with academic applicants accounting for around a quarter of patenting worldwide.

The case studies document how innovation flourished as a result of knowledge sharing mechanisms – from the first clubs of amateur airplane inventors to modern open innovation models found in 3D printing and robotics research. The patent mappings carried out for the six case studies show that innovators have overwhelmingly sought patent protection for their inventions in high-income countries plus China, reflecting the large size of these countries' markets, as well as the presence of competitors with frontier technological capabilities.

The World Intellectual Property Report is published every two years, with each edition focusing on specific trends in an area of IP. Previous reports have explored the role that brands play in a global marketplace and the changing face of innovation.

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