Economic and Trade Impacts of Intellectual Property Rights

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I hereby declare that I am the sole author of this Major Research Paper (MRP). This is a true copy of the MRP, including any required final revisions, as accepted by my examiners.

Abstract

Intellectual Property - related products have gained prominence in international trade volume during the last couple of decades. Concurrently, the international legal regime on Intellectual Property Rights is also expanding; as a result, the debate on intellectual property has intensified in many forums including in the economic, trade, legal, political, and public realms. The main question at these forums is the debate centered on whether Intellectual Property Rights create positive trade and economic impacts as is assumed by policy makers.

The objective of this paper is to examine the relationship between Intellectual Property Rights and economic and trade indicators. To that end, this paper provides an academic review of the legal documentation on Intellectual Property Rights and related empirical evidence from previous academic research. In addition to trade impacts, economic impacts on Intellectual Property Rights are borne through five main channels: innovation, technology transfer, Foreign Direct Investment, economic growth, and welfare. There is a significant relationship between Intellectual Property Rights and economic indicators; nevertheless, the significance of this relationship in terms of the level and nature of the impact is contingent on several factors. These contributory factors include: the nature of the industry of traded goods; the level of development of the receiving country; and the presence of other dimensions –such as administrative, social, political, and cultural elements. While Intellectual Property Rights and economic indicators in developed countries illustrate a significant and positive relationship, the same relationship is less significant, and in some cases negative for developing/less developed countries. This premise also holds true with respect to the relationship between Intellectual Property Rights and international trade volumes.

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Table of Contents

List of Tables

List of Figures

Acronyms

BIRPI	Bureaux Internationaux Reunis pour la protection de la Propriete Intellectuelle
DSU	Dispute Settlement Understanding
DVD	Digital Versatile Disks
FDIs	Foreign Direct Investments
FTAs	Free Trade Agreements
GATT	General Agreement on Trade and Tariffs
GDP	Gross Domestic Product
GI	Geographical Indications
GPI	Ginarte-Park Index
IP	Intellectual Property
IPIC	Intellectual Property in respect of Integrated Circuits
IPRs	Intellectual Property Rights
LDCs	Least Developed Countries
NAFTA	North American Free Trade Agreement
OECD	Organisation for Economic Co-operation and Development
OLI	Ownership-Location-Internalization
R & D	Research and Development
TNCs	Transnational Corporations
TRIPS	Trade-Related Intellectual Property Rights
UN	United Nations
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

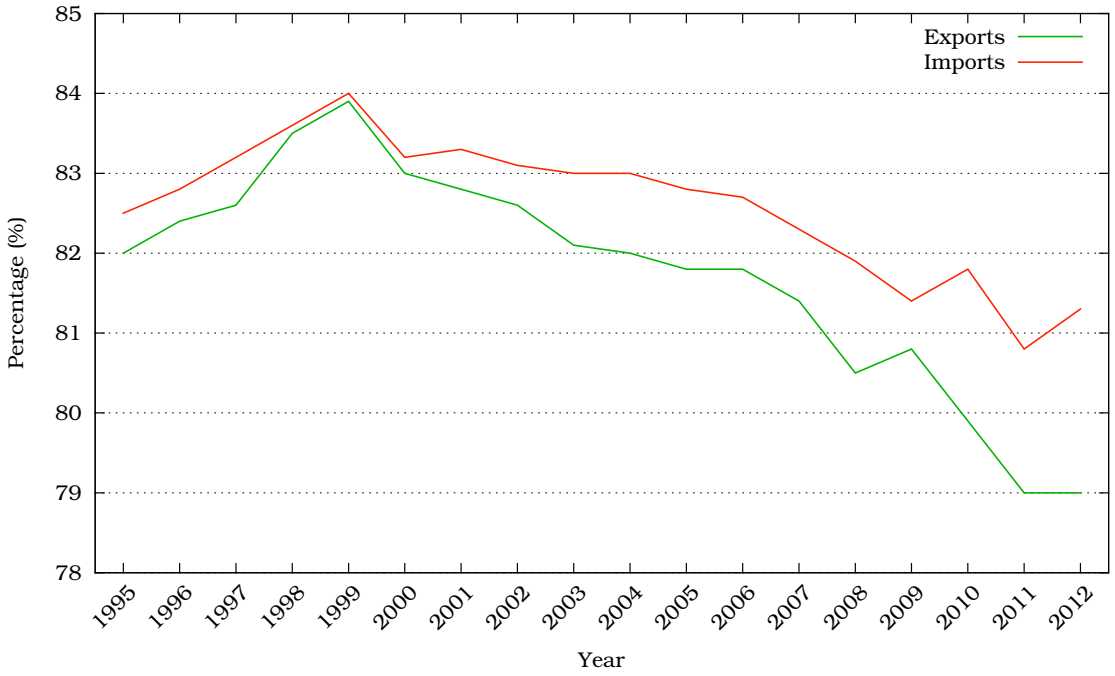
Introduction

Intellectual Property (IP) -related products have been gaining an increased share of international trade volume since the late 1970s. There are two main contributory factors for this growth; first, the technological development encouraged innovations, which caused the growth of the number of IP-related products, and second, the rapid process of globalization increased the demand for IP-related goods. Consequently, as Fink and Braga estimated, the total share of knowledge-intensive or high-technology products –perceived as IP-related products or IP-intensive products– in world trade doubled from 12 percent in 1980 to 24 percent in 1994 (Fink & Braga, 1999, p. 2). Furthermore, according to a recent study by Folfas and Kuźnar, IP-intensive goods accounted for approximately 80 percent of world exports and imports of commodities during the period from 1995 to 2012 (Folfas & Kuźnar, 2013). This trend is illustrated by Figure 1 that shows the share of IP-intensive goods in world trade of commodities from 1995 to 2012.

Simultaneously, the international legal mechanism on Intellectual Property Rights (IPRs) is tightening rapidly at bilateral, plurilateral and multilateral forums. This takes place with the premise that IPRs deliver positive impacts on international trade and the economic wellbeing of the world. Nevertheless, there are divergent views about the nature of the relationship between IPRs and key economic indicators. This paper argues that the relationship between IPRs and key economic sectors is contingent on several contributory factors, albeit empirical evidence suggests a significant relationship between the variables. These factors include, but are not limited to: the nature of the industry, and the level of

development of the country, as well as the presence of various other administrative, social, political and cultural dimensions. This argument is also valid with respect to IPRs and trade volume. In order to support this main thesis, this paper reviews legal documentation and empirical evidence on economic and trade impacts of IPRs. The findings of the legal documentation review and empirical survey suggest that the current global trend towards a stronger IPR legal regime creates a lopsided outcome that leads to system imbalances and provides less favourable treatment to developing countries.

Figure 1: The Share of IP- Intensive Goods in Total World Trade of Commodities



Source: Calculations by Folfas and Kuźnar (2013) based on UN Comtrade data

The organization of this paper is as follows. The first chapter discusses the historical evolution of the IPR regime while laying the groundwork for understanding the current international legal regime with respect to IPRs. In the following chapter, the paper illuminates different categories of IPRs. The implications of IPRs on key economic indicators such as innovation, technology transfer, Foreign Direct Investments (FDIs), economic growth, and welfare are discussed in chapter three; this chapter also reviews the findings of empirical

studies pertaining to the relationship between IPRs and economic indicators. The main focus of chapter four is to study the relationship between IPRs and trade. Finally, the key findings and considerations for the future of IPRs form the conclusion of the paper.

Chapter 1

The Evolution of International Legal Regime for IPR Protection

First, this chapter explains the historical development of the international legal regime of IPRs up to the Agreement on Trade-Related Intellectual Property Rights (the TRIPS Agreement), while exploring the answers to the questions of what, why and how the international IPR regime developed. It then provides an overview of the existing IPR regime.

1.1 Historical Development of IPRs

Human intelligence was the key determinant of the evolution of human civilization. Although the intellectual work of human beings was protected to some extent in early human civilizations, systematic protections of IPRs, came into effect in medieval society after the European Renaissance Period. With the evolution of industrial society and the expansion of international relations between European nations, the necessity to establish a legal framework for the protection of IPRs gained increased recognition. The Venetian Statute adopted by Italy in 1474 is widely considered as the first domestic attempt to protect IPRs; it granted ten years of privileges to inventors of 'new arts and machines'. The first attempts

to protect IPRs were largely related to printed works, as can be seen in eighteenth century laws in England that targeted protecting printed works (Curtis, 2012). The protection system started first for patents, and subsequently grew to include copyrights and trademarks; however, these first attempts were limited to domestic legislation.

The late nineteenth century marked the beginning of the international collective approach towards building a strong and comprehensive IPR regime. The year 1883 gave birth to the first international IPR agreement: the Paris Convention on the Protection of Industrial Property. This convention was signed by 11 countries: Belgium, Brazil, France, Guatemala, Italy, the Netherlands, Portugal, El Salvador, Serbia, Spain and Switzerland. Several other countries became parties to the Paris Convention, and it is still active in 2014 under the administration of the World Intellectual Property Organization (WIPO). The next international IPR legislation was the Berne Convention for the Protection of Literary and Artistic works, which was adopted in 1886. This agreement aimed to regulate the circulation of printed materials. The Madrid Agreement Concerning the International Registration of Marks was established five years later, in 1891. The main objective of this agreement was to repress false or deceptive indications of sources on goods. In order to administer these three agreements, the Bureaux Internationaux Reunis pour la Protection de la Propriete Intellectuelle (BIRPI) was established in 1893 (Curtis, 2012).

Consequently, by the dawn of the twentieth century, the groundwork for an international IPR protection mechanism had been established. The international IPR regime continued to grow. In 1958, the Lisbon Agreement for the Protection of Appellations of Origin and their International Registration was adopted. Next, the Rome Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations was accepted by members of BIRPI in 1961. For the first time in history, the Rome Convention granted copyright protection to the creators and owners of particular physical manifestations of intellectual property, such as audiocassettes or Digital Versatile Disks (DVDs).

BIRPI became the World Intellectual Property Organization (WIPO) in 1967 in order

to cope with the evolving IPR international legal regime. Since 1974, after being formally incorporated into the United Nations (UN) system, WIPO functions as the United Nations agency dedicated to the use of intellectual property. The mission of WIPO is to promote innovation and creativity for the economic, social and cultural development of all countries, through a balanced and effective international intellectual property system. Only states are eligible to become members of WIPO, and by 2014, it has 187 member countries (*World Intellectual Property Organization (WIPO)*, 2013).

1.2 The Agreement on Trade-Related Intellectual Property Rights

International attempts to streamline the rapidly increasing international trade relations took place simultaneously with the developments in the international IPR regime. The General Agreement on Trade and Tariffs (the GATT) was established in 1947 with the aim of facilitating international trade by reducing barriers to trade, and tariffs in particular. The early focus of the GATT was mainly to create a more secure and predictable arena for international trade by reducing and streamlining tariff applications between countries. Until the Uruguay round of negotiations, which took place from 1986 to 1994, IPRs were not considered at the trade negotiation table. As the most comprehensive and fruitful round of negotiations, the Uruguay round extended the GATT's multilateral trade agenda into new horizons by establishing the World Trade Organization (WTO) in 1995 (*World Trade Organizaton (WTO)*, 2013). The introduction of legal regimes to new areas of trade relations, such as trade in services (the GATS), and IPRs (the TRIPS), is considered a milestone in the multilateral trading system. The TRIPS Agreement was adopted as Annex 1C of the single undertaking that established the WTO. By 2013, the membership of the TRIPS Agreement consists of 159 countries[1], and a list of these countries is found in Appendix A.

[1] All WTO members have signed and ratified the TRIPS Agreement.

What were the motivations for establishing a legal agreement on IPRs at the multilateral level? The reasons were varied. First, the growing importance of Intellectual Property Rights and the increased share of international trade necessitated the inclusion of a dedicated chapter for trade-related intellectual property rights into the multilateral trading system. In addition, strong pressure from industrialized countries, including the United States of America (USA) and the European Union (EU), was influential in this decision (Correa, 2000). Moreover, Guzman and Pauwelyn (2012) state that the TRIPS negotiators were equipped with the following objectives:

i. Expand minimum IP standards to a broader universe of markets to include, in particular, emerging economies;

ii. Add to existing WIPO conventions by strengthening the domestic enforcement of IP rights; and

iii. Facilitate the international settlement of IP disputes in the face of moribund WIPO mechanisms that, in practice, were or could not be relied on (p. 638).

By serving the interests of WTO members, the TRIPS consolidated the entire legal framework for IPRs, which stemmed from the following previous conventions: Paris, Berne, Rome and Washington[2] (Correa, 2000). The TRIPS Agreement therefore has a dual character: establishing a new legal regime for international trade law; and consolidating the heritage of the IPRs legal regime, which was built upon under the auspices of the WIPO (World Trade Organization, 2012).

1.2.1 Goals and Objectives of the TRIPS Agreement

The Preamble to the TRIPS Agreement stipulates three main goals: reducing distortions and impediments to international trade; promoting effective and adequate protection

[2]The Washington convention on the Protection of layout designs of integrated circuits (1989) never came into effect, albeit its provisions were included in the TRIPS and came to effect accordingly.

of IPRs; and ensuring that measures and procedures to enforce IPRs do not become in and of themselves barriers to legitimate trade.

Article 7 of the TRIPS Agreement stipulates the objectives of the TRIPS Agreement. Accordingly:

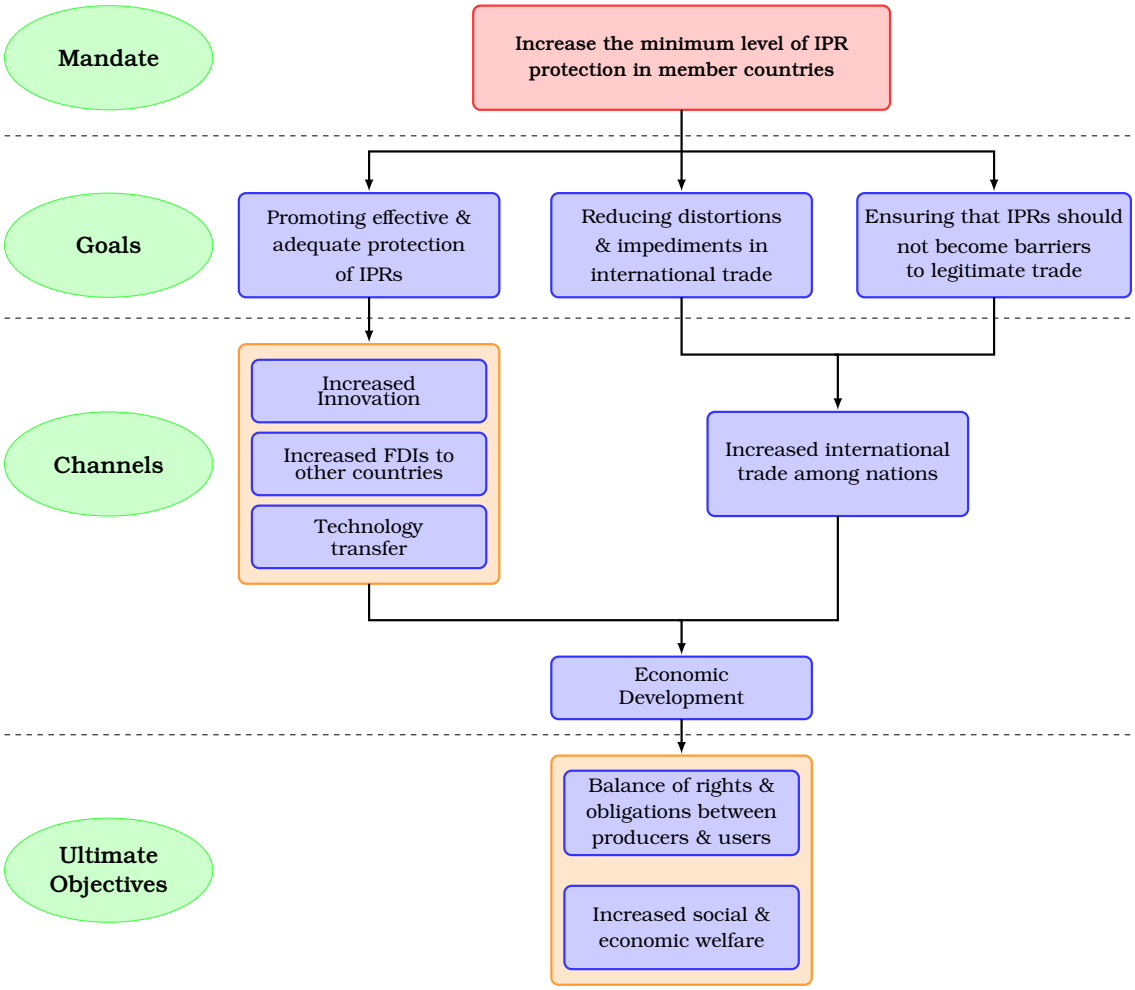
> The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.

Figure 2 demonstrates the sequential course of achieving two ultimate objectives of the TRIPS Agreement as discussed above. Accordingly, three goals of increasing the minimum level of IPR protection create several economic and trade channels: increased innovation; increased FDIs; technology transfer; and Increased trade among nations. These channels collectively result in economic development that leads to ultimate objectives of the TRIPS Agreement: firstly, creating a balance of rights and obligations between producers and users of IPR-related products; and secondly, achieving social and economic welfare.

1.2.2 What is Unique about the TRIPS Agreement?

The TRIPS Agreement is unique because it provides a more powerful form of IPR protection than the preexisting international legal instruments in three ways. First, the TRIPS Agreement provides a standard for a minimum level of protection for Intellectual Property Rights. As specified in the Preamble, the TRIPS Agreement provides the provision of adequate standards and principles concerning the availability, scope and use of trade-related intellectual property rights. WTO members are accordingly bound to restructure their domestic IPR legal framework to meet the minimum standards stipulated in the

Figure 2: Goals and Objectives of the TRIPS Agreement



TRIPS Agreement. It is important to mention that pursuant to Article 1, member countries are not obliged to implement in their law more extensive protection than is required by the TRIPS Agreement; however, they cannot provide a level of protection on IPRs that is less than the provisions of the TRIPS Agreement demands.

Second, the TRIPS agreement contains a detailed and comprehensive enforcement mechanism that stipulates precise obligations with respect to administrative and judicial procedures such as provisions on evidence, injunctions, damages, and measures at border against counterfeiting, and penalties in case of infringement (Correa, 2000).

Third, non-compliance issues with respect to Intellectual Property Rights can now

be resolved under the most effective international dispute settlement system to date: the WTO Dispute Settlement Understanding (DSU). The protection of the DSU is the only multilateral accord on IPRs that "could be enforced through legal action and trade sanction" (Maskus, 2012). Therefore, the TRIPS Agreement is considered the most significant victory in the twentieth century with respect to IPRs.

1.2.3 Transitional Arrangements

The TRIPs Agreement provided for transitional periods for all countries depending on their level of development. During this period, the member countries were expected to enact new rules, amend or abolish repressive laws and make structural adjustments in order to make their domestic laws consistent with the TRIPS provisions. Developed countries were given a one-year transition period and, accordingly, they had to restructure their domestic legal frameworks to be consistent with all the provisions of the TRIPS Agreement by January 1, 1996.

Developing countries were granted an additional four years to ensure their legislation corresponded to TRIPS requirements, and accordingly, they were accorded with a five-year period (until January 1, 2000) to make transitional arrangements. The Least Developed Countries (LDCs) were initially allowed until January 1, 2006 as a transitional period, and it was subsequently extended to July 1, 2013. The request of the LDCs to extend the transitional period for another eight years until 2021 was approved this year (Saez, 2013, para. 1). Furthermore, in 2002, the TRIPS Council decided to extend the transition period for LDCs for certain obligations with respect to pharmaceutical products until January 1, 2016.

1.2.4 The Current International Legal Regime for IPRs

The TRIPS Agreement is not the only legal instrument with respect to IPR protection today. The existing international legal regime for IPRs consists of several international treaties and conventions, including the TRIPS Agreement. These agreements, according to the WIPO, are listed in Appendix B.

On the other hand, only WTO members are bound by the TRIPS provisions while there are other nations that have not become members of the WTO. Therefore, it is important to understand the other sources of international intellectual property law that encompasses non-WTO members as well. As Curtis recognizes, national laws, pre-TRIPS conventions (Paris, Berne, Rome, Washington, etc.), the Organisation for Economic Co-operation and Development (OECD) Codes of Conduct or Guidelines, and widely accepted norms of expected behavior and private contract law are also part of the international legal regime in relation to IPRs (Curtis, 2012).

The additional element in this framework is the IPR chapters included in Free Trade Agreements (FTAs), which are increasingly coming to light. For instance, FTAs such as the North American Free Trade Agreement (NAFTA) (*North American Free Trade Agreement (NAFTA)*, 1994), the Canada-European Union Comprehensive Economic and Trade Agreement (CETA), and the EU free-trade agreement with South Korea also include chapters on intellectual property. It is no exaggeration to say that the IPR provisions found in these FTAs are more comprehensive and stronger than those listed in the TRIPS provisions.

At present, WIPO shares the responsibility of protecting Intellectual Property Rights with the WTO and national governments.

Chapter 2

Intellectual Property Rights: an Overview

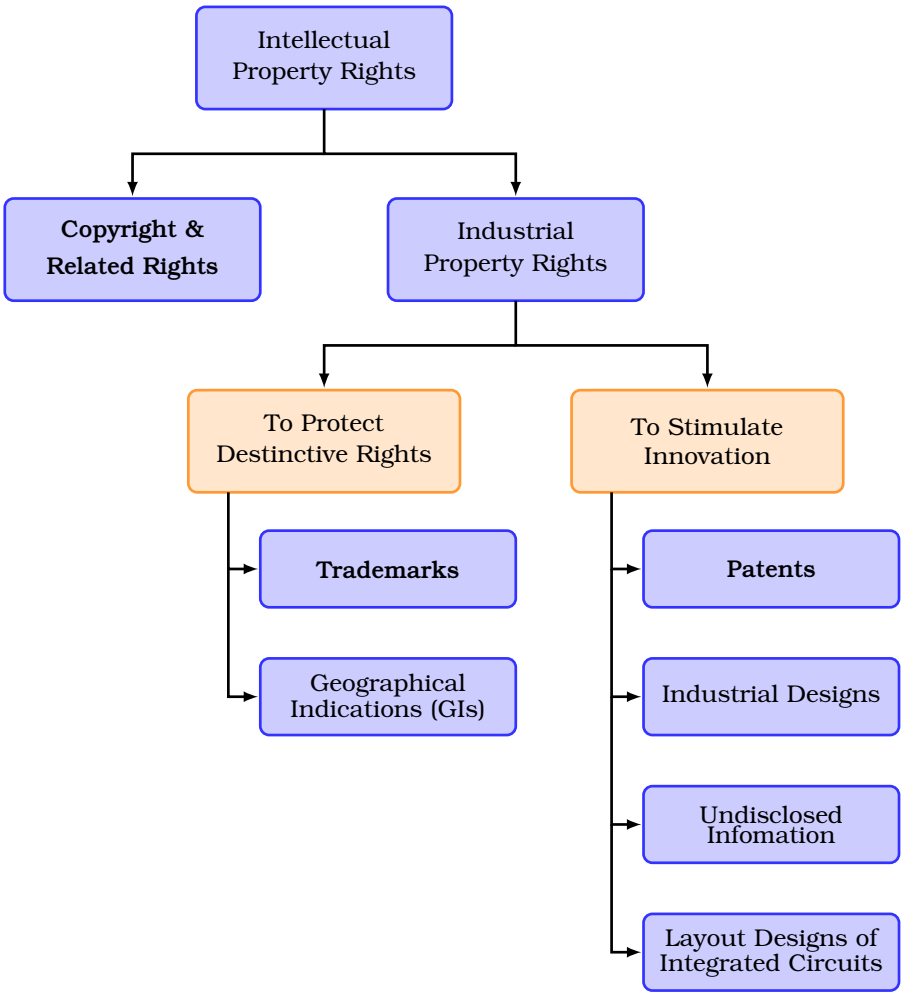
IPRs are generally defined as the rights people enjoy over the creations of their minds. Guzman and Pauwelyn (2012) define IPRs as, "legal and institutional devices to protect creations of minds such as inventions, works of art, literature and designs" (p. 632). IPRs provide an *exclusive* right over the creation to the creator under the national law for a specific period of time. The creator can exclude others from benefiting from his or her creation while extracting an economic value from the IPR by directly using it, or authorizing a third party to use it in exchange for monetary value (World Trade Organization, 2012). For example, when a writer has an *exclusive* right (which is called a copyright) for a book that he or she authors, an economic value can be extracted in two ways; first, by selling the book on his or her own, or second, by authorizing a publisher to publish it for an agreed monetary sum.

In general, all IPRs share common characteristics, albeit there are several sub-categories of Intellectual Property Rights. These collective characteristics include intangibility, exclusivity, legality and territoriality (Yang, 2013). IPRs are intangible because they do not have a physical nature. Exclusivity in this context occurs as the original IP owner is entitled to exclude others from exploiting his or her creativity without proper authorization (Yang,

2013). IPRs have a legal characteristic because they are protected by the national laws of a particular state. Also, IPRs are considered territorial because IP rights are limited to the basic boundary of the state where the IPR was granted or registered.

Intellectual Property Rights are traditionally categorized into two parts: copyrights and industrial property rights. Industrial property rights are further categorized into two subsections based on their purpose: either to protect distinctive signs (trademarks and Geographical Indications), or to stimulate innovation, design and the creation of technology (patents, industrial designs and trade secrets). Figure 3 presents a graphical explanation of these IPR categorizations.

Figure 3: Categories of IPRs



Copyrights, patents and trademarks are considered the most significant IPRs due to their economic importance, and historical role in the industrialization of Europe and North America. Moreover, their present standing is that they are considered to be "... the major pillars of the international law on intellectual property rights" (Guzman & Pauwelyn, 2012, p. 632). Nevertheless, the current IPRs regime recognizes more sub-categories and they continue to multiply as more innovations take place. The following section illustrates the main categories of IPRs that are covered under the TRIPS Agreement.

2.1 Copyrights & Related Rights

The term *copyright* in general is defined as, "the rights of authors in their literary and artistic works" (World Trade Organization, 2012, p. 36). These rights include books and other writings, musical compositions, paintings, sculptures, computer programs and films. The Berne convention was the predecessor of the TRIPS Agreement with respect to copyrights. Article 9 through 14 of the TRIPS Agreement provides copyright protection for a minimum period of fifty years after the death of the author. In addition, copyright also includes *related rights*, which are alternatively called *neighbouring rights*. In view of Article 14 of the TRIPS Agreement, related rights extend to three categories of holders: performers (e.g. actors, singers and musicians), producers of phonograms (sound recordings), and broadcasting organizations. The basis of these TRIPS provisions stems from the Rome Convention. Moreover, copyright protection has also been granted to computer programs and databases because of their increasing importance in knowledge-based economies. According to World Trade Organization (2012):

> The main social purpose of protection of copyright is to encourage and reward creative work. The income generated by copyright may allow authors to dedicate themselves to creative work and can help to justify the consider-

able upfront investment often entailed in the creation of certain types of work (p. 37).

The TRIPS Agreement provides four categories of *exclusive* economic rights to copyright holders: reproduction right; rental right; right of public performance, broadcasting and communication to the public; and translation and adaptation right.

2.2 Trademarks

In general, trademarks are signs or a combination of signs that are used to differentiate the goods or services of one producer from those of another. In view of Article 15 of the TRIPS Agreement, any sign, or any combination of signs, capable of distinguishing the goods or services of one undertaking from those of other undertakings, shall be capable of constituting a trademark. Accordingly, signs with words including personal names, letters, numerals, figurative elements and combinations of colours or any combination of such signs are eligible for registration as trademarks.

Article 16.1 of the TRIPS Agreement grants an *exclusive* right to the owner of a registered trademark to prevent third parties from using identical or similar signs for goods or services for commercial purposes without the owner's consent. The objective of trademark protection is to safeguard producers "against unfair competition from other producers seeking to free ride on the goodwill and positive reputation" of the trademark owner (World Trade Organization, 2012, p. 55). Trademarks not only provide protection for producers, but also guarantee certainty for consumers, who rely on trademarks as a guidance to make the correct decision in their purchases. Put differently, consumers may prefer to buy certain products or services from a producer that is reputed for making quality products or services. Trademarks therefore provide accurate information that consumers can use to make the right purchasing decision.

2.3 Geographical Indications

The use of geographical indications (GI) as an IPR dates back to several centuries. As such, "signs indicating the geographical origins of goods were the earliest types of trademark" and were present even before the industrial revolution in Europe (Blakeney, 2006, p. 295). The Paris Convention was the first international attempt to regulate trade with respect to GIs. The TRIPS Agreement, adopted over a century later, validates some key provisions of the Paris Convention with respect to GIs.

Article 22 of the TRIPS Agreement defines GIs as "indications which identify a good as originating in the territory of a Member, or a region or locality in that territory, where a given quality, reputation or other characteristic of the good is essentially attributable to its geographical origin". For instance, Champagne is a product originally produced in the province of Champagne in France, and therefore, is protected as a GI; the French cheese Roquefort, Mexican Tequila, and Café de Colombia are other examples. Legal protection under the TRIPS Agreement is stronger for Wines and Spirits than for other goods.

Similar to trademarks protections, GIs protect both producers' *exclusive* economic rights and, consumers' rights by acting "as a source of information which links the particular qualities of a product with its area of geographical origin" (Blakeney, 2006, p. 297). GIs have been contributing to intense debates at multilateral trade negotiations since their inception. A discussion about GI debate is provided in Appendix C together with a brief review of key IPR issues.

2.4 Patents

A patent is the title given to a specific IPR that is geared toward protecting new inventions. The first international convention with respect to patents was the Paris Convention. Nevertheless, the Paris Convention is "silent on some important issues relating to what

subject matter has to be patentable, the scope of patent rights and their duration" (World Trade Organization, 2012, p. 96).

While introducing the missing provisions of the Paris Convention, Section 5 of the TRIPS Agreement provides a more comprehensive legal protection for patents, subject to several exceptions. According to the TRIPS Agreement, a patent is granted by the authorities in a specified jurisdiction, and the patent owner is given an "*exclusive* right to prevent others from exploiting the patented invention in that jurisdiction for a limited period of time" (World Trade Organization, 2012, p. 96). The patented owner is accorded the *exclusive* right to prevent others from the acts of: making, using, offering for sale, selling, or importing a patented product. In purview of Article 33 of the TRIPS Agreement, the term of protection for a patent is twenty years. The basic test of patentability, in view of Article 27.1 of the TRIPS Agreement, includes three substantive conditions: novelty, inventive step and industrial applicability. Accordingly, any new invention that is capable of industrial application could conceivably be registered as a patent.

The social purpose of patents is to provide protection for the results of investment in the development of new technology, thus providing the incentive and means to finance research and development activities.

2.5 Industrial Designs

There is no interpretation provision for the term "industrial design" in the TRIPS Agreement. Nevertheless, industrial designs are generally agreed to constitute "the ornamental or aesthetic aspect of an article rather than its technical features" (World Trade Organization, 2012, p. 117). Industrial designs are seen as "three-dimensional features, such as the shape of an article, or two-dimensional features, such as patterns, lines or colours" (World Trade Organization, 2012, p. 117). Pursuant to Article 25 of the TRIPS Agreement, legal protection is granted for new or original industrial designs that are created

independently. Article 26 ensures the right of the owner of a protected industrial design to prevent third parties from making, selling or importing articles bearing or embodying a design which is a copy, or substantially a copy, of the protected design without the owner's consent, when such acts are undertaken for commercial means. This right is protected for a minimum of ten years.

The difference between industrial designs and trademarks is based on the test of infringement; the former "concerns the act of copying" while the latter concerns "deception or confusion of consumers" when using signs similar to trademarked signs (World Trade Organization, 2012, p. 119).

2.6 Layout-designs (Topographies) of Integrated Circuits

An integrated circuit/chip is defined as "an electronic device that incorporates individual electronic components within a single 'integrated' platform of semi-conductor material, typically silicon, configured so as to perform a complex electronic function" (World Trade Organization, 2012, p. 121). Due to technological advancements, inventions covered by this type of IPRs are on the rise. Although WIPO negotiated the Treaty on Intellectual Property in respect of Integrated Circuits (the IPIC Treaty) in 1989, it never came to force because of insufficient ratification by members. The TRIPS Agreement –from Article 35 through Article 38– gave effect to the IPIC Treaty provisions, and provided extended protection for layout-designs of integrated circuits.

In view of Article 36 of the TRIPS Agreement, and Article 6 of the IPIC Treaty, reproduction and importation, sale or other distribution of protected layout-design for commercial purposes without the authorization of the right holder is prohibited and is considered unlawful.

2.7 Undisclosed information

Two types of commercially valuable undisclosed information are protected by the TRIPS Agreement: trade secrets and test data submitted to government agencies. The objective of protecting undisclosed information is to ensure effective protection against unfair competition. Article 39 of the TRIPS Agreement provides legal protection for undisclosed information.

Chapter 3

Economic Impacts of IPRs

This chapter discusses the impacts of IPR protection on innovation, technology transfer, FDIs, economic development, and welfare. The next chapter discusses the impacts IPRs have on trade.

3.1 Positive Economic Impacts of IPRs

IPRs are believed to have positive impacts on the economy in different ways. First, high levels of IPR protection mechanisms promote innovation and technological advancement in a society. Pioneer social philosophers such as Adam Smith, J. S. Mill and J. W. Goethe, perceived patents as a price a society should be ready to pay in order to encourage the discovery that was essential for the unrestricted dissemination of valuable knowledge (Mokyr, 2009). Nevertheless, Kenneth J. Arrow was the first scholar who wrote extensively on economic reasoning for the protection of IPRs in closed economies. Arrow argued that without Intellectual Property Rights, the market would see no incentive to invest in the production of new technologies (Arrow, 1962).

Intellectual Property Rights assure the protection of the rights of innovators while offering an economic reward to stimulate more innovations, from which the entire society can

benefit. Many subsequent theoretical economists –such as Kamien and Schwartz (1974); Gilbert and Shapiro (1990); Klemperer (1990); and Waterson (1990) –have found "an unambiguous relationship between the strength of patent protection and rate of innovation" (as cited in (Lerner, 2002, p. 4)). Later in 1999, Fink and Braga explained that "IPRs introduce a static distortion (i.e., access to proprietary knowledge is sold above its marginal cost), which is rationalized as an effective way to foster the dynamic benefits associated with innovative activities" (Fink & Braga, 1999, p. 3). As discussed above, promotion of technological innovation has also been stipulated as one of the main objectives of establishing minimum standards for IPRs as required by the TRIPS Agreement.

Second, it is argued that a well-established IPR system in the receiving country encourages technology transfer from developed countries to less developed countries. As such, the transmission and dissemination of technology are recognized as another main objective of the TRIPS Agreement. Technology transfer is referred to as any process by which the technical information/know-how that belongs to one party is gained or learned by another party, and thereby the latter party successfully incorporates the acquired technology into its production mechanism (Maskus, 2004).

There is a clear line of academic argument pertaining to this claim. Robert M.Sherwood posits that "(t)echnology tends to flow best where conductivity for its transfer is secured by effective intellectual property systems" (Sherwood, 2002, p. 28). According to Maskus, "the major selling point of TRIPS to poor countries was the potential it would create for more technology transfer" (Maskus, 2012, p. 21).

The IP protection mechanism, if designed and implemented prudently, acts as a facilitator of technological transfer both directly and indirectly. In order to obtain patent registration, inventors are required to reveal information about their inventions, making this new knowledge part of the common pool of knowledge that can be used freely once the patent expires (World Trade Organization, 2012). This technological dissemination takes place in two ways: through market-mediated technology transfer; and through non-market technol-

ogy transfer (Maskus, 2012). Market-mediated technology transfer occurs through trade in goods and services. The main channels are FDIs, trade and licensing. Non-market technology transfer takes place through imitation, shifting jobs by highly qualified employees, studying patent applications of new inventions by another party, the government's sharing patent information with another party, and temporary migration of students, scientists and other knowledge-carriers (Maskus, 2012).

Third, countries with a high level of Intellectual Property Rights mechanism attract more FDI inflows than countries that do not have sound IPR mechanisms. While protecting IPRs, a destination country provides certainty and predictability for FDIs, which investors perceive as essential pre-requisites for mitigating market risks. For instance, an investor from a developed country –country A– who enjoys a high level of domestic protection for IPRs in country A may not be willing to invest in country B, if the IPR protection framework is weak. Instead, the investor would prefer to invest in a destination country that has a similar IPR regime to country A, or at least a stronger IPR regime than country B.

In their 1998 study, Braga and Fink refer to the Ownership-Location-Internalization (OLI) theory of John H.Dunning to shed light on understanding the theoretical relationship between IPRs and a firm's FDI decisions. The OLI theory stipulates that transnational corporations (TNCs) have ownership advantages vis-á-vis domestic firms in the form of intangible assets such as new technologies, specific organizational skills, et cetera (Braga & Fink, 1998). Moreover, the fulfilment of two conditions is required for TNCs to make destination decisions with regard to investments. These conditions are: location advantages; and internalization advantages. Location advantages include "factors such as high transportation costs and tariffs, low input prices, access to distribution networks, and local regulatory environments" (Braga & Fink, 1998, p. 170). The internalization advantages are associated with factors that lead to the avoidance of "transaction costs with potential licensees, controlling inputs, and protecting quality" (Braga & Fink, 1998, p. 170).

Taking Dunning's lead, Braga and Fink argue that a high level of Intellectual Property Rights protection provides ownership, location, and internalization advantages to TNCs. Put differently, IP rights directly provide ownership advantages to TNCs, while the territorial nature of the IPRs provide location advantage to FDIs in destination countries with a high level of IPR protection. In addition, differing levels of IPR safeguard mechanisms influences the decisions taken by TNCs in terms of whether to internalize or externalize its intellectual assets (Braga & Fink, 1998). Some scholars like Michael J. Ferrantino contend that TNCs prefer foreign investments to externalising methods –for example, licensing– because internalising through FDI guarantees direct control of their assets (Braga & Fink, 1998).

The fourth argument is that a strong IPR system can have positive implications for the economic development of a country through FDIs and increased trade. Firms and individuals are willing to invest more on innovations in a secured environment. As Lippoldt explains, according to a WTO secretariat report in 2002, FDIs create four main channels for technology diffusion, which lead to economic growth (2006). For one, FDIs create backward and forward linkages; for instance, foreign companies get local suppliers to adopt new technologies or assist them to upgrade, which may benefit other local firms through spillovers. For another, due to demonstration effects, local firms study technologies or business processes and reproduce them. Additionally, competition effects lead local firms to compete with each other and upgrade their technological performances. Finally, IPR recipient countries build human capital by on-the-job training and skill improvements (Lippoldt, 2006).

In sum, these new inventions and technologies transmit to other layers of society while contributing to economic development. This happens through various channels: by creating more employment opportunities via FDIs; increasing productivity levels; increasing economic efficiency by eliminating waste; and raising national income levels that ultimately expedite economic growth.

3.2 Negative Economic Impacts of IPRs

Until recently, the economic impacts of IPRs were not well-recognized by many economists. This section discusses some of the key negative economic impacts of IPRs that are still raised by many scholars.

The first argument is that IPRs contradict the basic principles of the free market mechanism. According to mainstream economic theory, "the restriction-free movement of goods, services, technology and people –in short, free or open trade– is considered optimal" (Curtis, 2012, p. 8) for economic growth. Following this line of argument, the introduction of Intellectual Property Rights is seen as a distortion of the free market equilibrium that creates an imbalance in allocation of economic resources and welfare.

Moreover, inventions protected by IPRs are typically knowledge-based, and therefore widely considered public goods. In general, public goods are *non-excludable* and *non-rivalrous* in consumption. Due to the non-excludable nature "once created, absent specific measures, none can be excluded from 'consuming' them" (World Trade Organization, 2012, p. 3). In addition, as a result of the non-rival nature, "one's use of a work or an invention does not deprive another of its use and it can be freely used by anyone" (World Trade Organization, 2012). Thus, introducing IPRs not only distorts the free market mechanism, but it also functions as a barrier to the free consumption of public goods. IPRs therefore can be seen as undesirable from society's perspective.

The main argument in support of IPRs is that they support and help to foster innovations; however, the validity of this claim remains unreliable. As some argue, the real impacts of IPRs on boosting innovations are uncertain due to difficulties in measurement. As Maskus (2012) argues:

> In assessing the technological capacity of countries and enterprises, economists generally rely on imperfect data, such as (research and development (R & D))

> expenditures as inputs and patent applications or trademark registrations as outputs. These measures are imperfect for many reasons: Innovation often springs from sources other than formal R & D investment, R & D figures incorporate numerous inputs that are not focused on invention, not all inventions are patented (and of those receiving patents, relatively few encounter success in the marketplace), trademarks maybe registered but not used, and so on (p. 38).

On the other hand, in a 2000 study, Bessen and Maskin argue that a strong patent system has the adverse effect of precluding other firms from developing another innovation (Lerner, 2002). As such, "(t)hey suggest that strong patent protection may actually lead to significantly less innovation than (would) no protection at all" (Lerner, 2002, p. 4).

Moreover, strong IPR protection mechanisms bring detrimental impacts on the social welfare of developing countries that are usually the destination countries. This occurs mainly because of the income diversion mechanism from the recipient country to the innovating country. Intellectual Property Rights create monopoly pricing, which leads to negative impacts on both consumers and producers of IPR-competing products and services. According to Deardorff's observation in 1992, in a circumstance where a patent extends from the originating country to a recipient country, the originating country's welfare increases while that of the recipient country declines (Yang, 2013). He further posits that the decrease in the recipient's welfare is more significant than the originator's gain (Yang, 2013).

Jagdish Bhagwati and Joseph Stiglitz are two eminent economists who have advanced arguments against expanding IPR regime. Bhagwati contends that IPRs act as a restraint to free trade. According to him, the creation of knowledge often requires the use of previous knowledge, and therefore the free flow of not only the goods, services, labor and capital, but also ideas are important (Bhagwati, 2004). In Stiglitz's view, IPRs restrict global knowledge spillover, widening the knowledge gap between the developed and developing

world (Stiglitz, 2006). He posits that knowledge is a public good, and Intellectual Property Rights circumscribe its use and, thus, necessarily cause economic inefficiency.

Taking their lead, Chang also argues that IPRs bring more harm to developing countries than good based on three main considerations. First, he contends that IPRs create monopolies that result in increased social costs. He cites the pharmaceutical issue as a case in point because when essential medicines are patented by pharmaceutical companies, the costs to the society are enormous. For instance, because the cost per patient ranges from $10-12,000 for patented medicines, poor African countries face affordability issues in providing essential medicine to their citizens who suffer from HIV/ AIDS. As a result, some African countries have been relying on *copy* drugs from India and Thailand for a price of 2-5% of the original drug price (Chang, 2007). As a second example, Chang refers to how Microsoft uses its technological monopoly to exploit the consumers in software market.

Chang's second argument is that monopolies often serve to increase the decision making power of the producer, which creates a "net social loss by allowing the producer to maximize its profits by producing at a less than socially desirable quantity" (Chang, 2007, p. 113). In technical terms, this situation is referred to as allocative deadweight loss[3] because it creates a social loss that is beyond the control of the monopoly supplier (Chang, 2007).

Third, as Chang points out, by duplicating research from various sources, Intellectual Property Rights lead to waste of social resources. In order to succeed in the "winner takes all" system (Chang, 2007), patent mechanisms encourage firms to invest resources for sim-

[3]This situation can be explained as follows: "In a competitive market, producers do not have the freedom to set the price, as a rival can always undercut them until the point where lowering the price further will result in a loss. But the monopolist firm can decide the price it charges by varying the quantity it produces, so it will produce only up to the quantity where its profit is maximized. This level of output is, under normal circumstances lower than the socially optimal one, which is where the maximum price a consumer is willing to pay is the same as the minimum price that the producer requires in order not to lose money. When the amount produced is less than the socially optimal quantity means not serving some consumers who are perfectly willing to pay more than the minimum price that the producer requires but who are unwilling to bear the price at which the monopoly firm can maximize its profit. The unfulfilled desire of those neglected consumers is essentially the social cost of monopoly" (Chang, 2007, pp. 100–101)

ilar innovations; it contributes to inappropriate allocation of scarce economic resources that would have been utilized for another essential economic activity.

Curtis also argues that "(IPR) provisions can ... have an income distribution effect: shifting commercial revenue from one producer to another; from consumers to intellectual property owners; or from one country to another" (Curtis, 2012, p. 10). As such, the negative welfare effects for developing countries include but are not limited to: loss of employment; higher costs in education due to high prices for copy-righted academic materials; deterioration of public health as a result of expensive drugs and medication; and long-lasting technological backwardness due to restrictions for technological spillovers. Based on these unfavourable considerations, some economists consider that "the introduction of such standards and enforcement procedures into trade agreements was, and remains, wrong, particularly in the WTO –whose members are at many different stages of development" (Curtis, 2012, p. 8).

3.3 Empirical Evidence

This section reviews the findings of empirical studies that attempt to understand and estimate the nature of the relationship between IPRs and five economic indicators: innovation; technology transfer; FDIs; economic growth; and welfare.

3.3.1 IPRs and Innovation

Empirical evidence on the causal relationship between IPRs and innovation is "elusive, in part because of the difficulty of finding data that could firmly attribute investments or inventions to changes in national patent laws and regulations" (Maskus, 2012, p. 44). Against this backdrop, a number of scholars have conducted systematic econometric studies to estimate the relationship between IPRs and innovation. This chapter discusses the findings

of the most recent studies carried out by Qiang Chen (2008), Josh Lerner (2002) and Petra Moser (2005).

Chen assessed the effects of IPRs on innovation by using two cross-country panels. He used two data sets comprising of 614 major inventions and innovations for the US and fourteen Western European countries during 1750-1950 and 1590-1900 respectively and related their birth to the existence of patent laws in those countries (Chen, 2008). The sample of countries established their patent systems at different times during the period from 1623 (United Kingdom) to 1898 (Finland).

Chen used Poisson regressions and negative binomial regressions for the study. After controlling for the size of each country's economy, the study found that both panels point to a significant positive effect of patent laws on invention rates (Chen, 2008). He further found that the results of the study were strong in different specifications of cross-country fixed effects and/or random effects models, after excluding the UK and the US from the sample (Chen, 2008). In other words, as most of the inventions in the sample were registered long after the patent laws were adopted in these countries, Chen's statistical results suggest that the presence of IPRs in respective economies have contributed to a higher number of innovations.

Nevertheless, Chen's study has been criticized for a few significant discrepancies. For one, the study lacks a quantitative conclusion as Chen did not estimate the economic significance of the stated positive effect (Maskus, 2012). Secondly, Chen's exclusion of a large number of control variables that would have influenced innovations makes the results less robust (Maskus, 2012). Lastly, Chen did not control for or consider the reverse causality problem, which is that countries with more inventions tend to adopt more or strengthen their IPRs (Maskus, 2012). Therefore, the findings of Chen's study should be taken into consideration with these limitations in mind.

In 2002, Josh Lerner tried to determine the impact of a patent system on innovation by

studying shifts in the strength of patent protection in sixty countries during a 150-year time period from 1852 to 1998. His approach was broader than earlier studies on this research question as he aggregated a large number of episodes to reduce the problem of confounding effects that individual case studies encounter. Based on careful selection criteria[4], he chose 177 high level patent policy changes in fifty-one out of sixty countries in the sample (Lerner, 2002).

The study examined the changes in patent applications by the nation undertaking the policy change. To avoid the confounding factors that influence this measure, the study focused on "filing made by residents of the nation undertaking the policy change in a nation with a relatively constant patent policy, Great Britain[5]" (Lerner, 2002, p. 1). As such, the study recognized three measures of activity: "patent filings in Great Britain by residents of the country undertaking the policy change; patent applications by domestic entities in the country (that undertook the policy change); and applications by foreign entities in that country" (Lerner, 2002, p. 13). Lerner only included traditional patent awards in his tabulation with the aim of eliminating weaker variants such as "design patents, inventors' certificates, patents of addition, plant patents, and utility model patents" (Lerner, 2002, p. 13). The data was collected for the "event window" (i.e. the policy change) of ten years –i.e. from five years before to five years after the policy shift (Lerner, 2002).

The basic results were "striking" as both domestic and foreign applications increased in the five-year period after the policy changes were affected that aimed to strengthen

[4]Lerner's selection of policy changes were based on five principles:

i. Selected only the policy changes in which the government has consciously set out to shift its national patent policy;
ii. Policy changing events were precisely dated;
iii. Eliminated changes to the breadth of patent protection from the sample;
iv. Wanted to compare reactions to the policy changes by domestic entities to those by foreign entities; and
v. Selected policy changes were substantive shifts in patent policy.

[5]The reasons to select Great Britain were: British patent office has continuously maintained a database on the national identity of the patent applicants since 1884 (excluding the World War I period); and comparatively British patent policy is constant.

the patent system (Lerner, 2002). Nevertheless, once adjustments were made for average growth propensities, "the impact of patent protection-enhancing shifts on applications by residents was actually negative, whether filings in Great Britain or domestically were considered" (Lerner, 2002, p. 27). It is important to note that the study further found an increase in foreign filings in the reforming nation. Thus, by analyzing Lerner's study results, Maskus (2012) states that:

> (I)n most cases national patent reforms benefitted international inventors far more than domestic inventors, at least in the short term. Indeed, applications by domestic firms seemed to be crowded out, perhaps due to greater commercial competition from abroad (p. 47).

In a subsequent cross-sectional analysis, Lerner found that the impact of patent protection-enhancing shifts were higher in countries with weaker preliminary protection and higher level of economic development, which is consistent with economic theory (Lerner, 2002). According to Lerner, the first finding –the patent-enhancing effects are lower in countries with already higher level of patent protection and vice versa– suggests diminishing returns to stronger patent regulations over time (Lerner, 2002).

The second result –the effect was significantly greater for relatively higher income countries– suggests that there is a "complementarity between high incomes and inventiveness" (Maskus, 2012, p. 47). The reasons could be the ability of the high income countries to invest in R & D that eventually leads to more innovations. This finding also delivers a blow to the proponents of the TRIPS Agreement who believe that IPRs spur innovation in developing countries. As Maskus (2012) writes:

> It may well happen in large countries with initially weaker patents and rapidly rising incomes. China and Brazil fit this model currently. In much of the developing world, however, the short- to medium-run impact will be greater growth

> in patent applications registered domestically by foreign applicants wishing to protect the new products and technologies they export or transfer... many of the patent reforms Lerner analyzed were undertaken in response to foreign pressure for protection, rather than domestic commercial interests supporting greater innovation (pp. 47–48).

The third study was conducted by Petra Moser in 2005. Taking a different path than the others, she focused on whether patent laws impact innovations in different industrial sectors. Her dataset consisted of approximately 15,000 inventions either from the London World's Fair in 1851 or the Philadelphia World's Fair in 1876. Innovations from twelve countries were presented at the London Fair, while ten countries demonstrated their innovations at the Philadelphia Fair. The hypothesis Moser developed was: if innovation depends on patent laws, the innovations from countries with strong patent laws should illustrate a broader sectoral distribution.

The study found that in the United Kingdom and the United States, dependency on the machinery and engines sectors on patent laws was higher than that of the other sectors, such as textiles, food processing and scientific instruments (Moser, 2005). The proportion of inventions was more than 20 percent in the former sectors –machinery and engines (Moser, 2005). However, the latter sectors –textiles, food processing and scientific instruments –reported less than 10 percent proportions of inventions (Moser, 2005). The statistical analysis also confirmed that the inventions from countries with weaker patent protection laws were mainly from less technology intensive sectors such as textiles, food processing, and instruments while those from countries with strong patent laws were significantly concentrated on technology intensive sectors such as machinery and engines.

In sum, it is evident that a clear and general relationship between the level of patent laws and innovation or R & D cannot be identified. However, a careful review of the findings

in several cross-country studies[6] and country specific studies[7] leads to three main conclusions (Maskus, 2012). First, "it can be difficult to sort out whether rising patent applications reflect underlying innovativeness or need to accumulate defensive portfolios to preempt entry, guard against litigation, or exchange cross-licenses, or if they reflect yet other strategic behavior" (Maskus, 2012, p. 63). Second, the "medium-term effect of patent revisions is to attract more patent applications from abroad as multinational firms seek to exploit their inventions in more locations" (Maskus, 2012, p. 63). The third conclusion is that patent reforms have a slight impact on innovativeness in developing countries" (Maskus, 2012).

3.3.2 IPRs and Technology Transfer

Two significant econometric studies related to the impact of IPRs on technology transfer are examined in this section. These studies, conducted by Jonathan Eaton and Samuel Kortum in 1996 and Giovanni Peri in 2005, estimated the relationship between patent applications and technological diffusion[8]. Patent applications were used as a reflection of knowledge flows and technology dissemination in these studies.

The first study –lead by Jonathan Eaton and Samuel Kortum in 1996– used data from 1988 in relation to OECD countries. They used two equations to estimate the decision of inventors in each country to register patents in all other countries, and the effect of those patent registrations on productivity in the recipient country. The study found that with the exception of the USA, all other OECD countries generated over 50 per cent productivity growth by importing technologies through patents (Eaton & Kortum, 1996). When the five

[6]These cross-country studies were conducted by: Nikos C. Varsakelis(2001); Sunil Kanwar and Robert Evenson (2003); Park (2005); Patricia Higino Schneider (2005); Yongmin Chen and Thitima Puttitanun (2005); Lee Branstetter, Ray Fisman, and C.Fritz Foley (2006); Allred and Park (2007); and Yi Qian (2007).

[7]The country studies were: Japan (Mariko Sakakibara and Lee Branstetter in 2001); India(Ashish Arora, Lee Branstetter, and Chirantan Chatterjee in 2011); China (Albert G. Hu, and Gary H. Jefferson in 2009); and the United States (Bronwyn H.Hall and Rosmerie H.Ziedonis in 2001, and several other studies).

[8]The other major channels of technology transfer –such as trade, and FDI will be discussed in another section.

major research nations[9] were excluded from the experiment, this finding was even more significant for all other countries. They reported over 90 percent productivity growth as a result of patent applications. This suggests that the smaller and less developed countries –in terms of technological development– reap more benefits from patents than big countries with advanced technologies. Some argue that this is an indirect endorsement for the premise that IPRs create technological spillovers in less developed countries (Maskus, 2012).

In 2005, Giovanni Peri assessed technology transfer flows across Europe and North America. The sample in this study consisted of 1.5 million US patents and 4.5 million patent citations in US applications filed by residents of these countries from 1975-1996. Peri found that only nine percent of knowledge was acquired outside the region, albeit approximately 20 percent of average knowledge within a region is diffused into knowledge outside the region (Peri, 2005). The reasons for the limitations in international diffusion of knowledge were identified as distance, border effects, and differences among regions in technological specialization (Peri, 2005). Nevertheless, this study revealed three significant findings. For one, the most significant patents such as knowledge in computers are broadly diffused (Peri, 2005). As well, "the international extent of knowledge flow is greater and travels further than merchandise trade flows as predicted by gravity equations" (Maskus, 2012, p. 74). Lastly, in line with Eaton and Kortum's study results, Peri's study "found a strong positive impact of bilateral knowledge flows on innovation" (Maskus, 2012, p. 74)).

In conclusion, Masksus posits that "(w)ith few exceptions . . . patent reforms have positive effects on inward technology transfer through organized channels" (Maskus, 2012, p. 81). His conclusion is based on the review of noteworthy statistical analyses that attempted to estimate this relationship through a number of impacting channels: patent applications, trade, FDI, and licensing. Nevertheless, Maskus further states that his conclusions carry a few significant qualifications. Those are: first, "these effects generally are

[9]These countries are: USA, Germany, Japan, France, and UK.

found only in larger and middle-income countries, where domestic imitation threats are real"; second, "the fact that international activities expand does not necessarily imply a stimulus to domestic production"; third, "an increase in technology transfer may not signal a gain in overall welfare" in the recipient country; and finally, this econometric evidence estimated that technology transfers are made exclusively through market-mediated channels and therefore the conclusions made from this evidence are incomplete and less helpful in gauging the real impact of IPRs on technology transfer (Maskus, 2012, p. 81).

3.3.3 IPRs and FDIs

Three significant studies that attempted to gauge the relationship between IPRs and FDIs are reviewed in this section.

In 1994, Mansfield studied whether IPR protection has significant impacts on a firm's choice investment destination (where to invest). He used survey evidence from 100 large US firms in six industries with respect to fourteen countries. This study found that Intellectual Property Rights are a crucial factor for determining the locations of R & D facilities, and that the chemical, pharmaceutical, machinery and electrical equipment industries are heavily dependent on strong IPRs. However, the relationship between IPRs and FDIs were not significant for other industries such as transportation equipment, metals and food. Based on these findings he concluded that FDIs are lower in countries with perceived weak IP legislation. Mansfield posited that both quantity and quality of FDIs are affected by the level of IPR protection in the receiving country (Mansfield, 1994). He extended the survey to German and Japanese firms in 1995, and those findings confirmed the results of his 1994 study to a great extent (Braga & Fink, 1998). Nevertheless, it is important to note that Mansfield's study has been severely criticized due to its small sample size.

Beata Smarzynska Javorcik studied the impact of IPRs on the composition of FDIs in some Eastern European countries and the former Soviet Union. She used firm-level data

from a 1995 world-wide survey of nearly 1,400 global companies that had operations in twenty-four Eastern European countries. The study examined whether weaker IPRs have an impact on firms' decisions to invest in these countries. Javorcik found a significant positive relationship between the level of IPR protection and FDIs in high-tech sectors, although she found the same positive relationship for low-tech industries, the statistical significance of the relationship was weak (Javorcik, 2004).

In 2003, Park and Lippoldt estimated the relationship of patent rights to trade and FDIs in developing countries. Their study found that patent rights were positively associated with FDIs. In other words, the higher the level of IPR protection, the higher the inflow of FDIs to those countries will be, and vice versa. However, they also found that "patent rights may have a positive but diminishing association with increased FDI as the strength of those rights increases" (Lippoldt, 2006, p. 51).

Additionally, in line with Javorcik's findings, Park and Lippoldt found that this statistically significant relationship depends on the economic sector. FDIs for industries such as metals, machinery and transportation were insignificantly associated with the level of IPRs. In contrast, a significant association was found in technology-associated sectors, namely computer services, finance, chemicals, petroleum and pharmaceuticals (Lippoldt, 2006). Park and Lippoldt concluded that the difference in these findings could have been due to the level and nature of technologies embodied in different sectors. In other words, when the technology embodied in a sector is easy to imitate, FDIs for that economic sector are highly dependent on the level of IPR protection in the receiving country and vice versa (Lippoldt, 2006).

3.3.4 IPRs and Economic Growth

Empirical evidence on the impacts of IPR on economic growth shows mixed results. Studies conducted by Chen and Puttitanum (2005), Ginarte and Park (1997), Gould and

Gruben (1996), Maskus (2000), and Thompson and Rushing (1996 & 1999) have found a positive relationship between IPR protection and economic growth (as cited in Yang, 2013). Nevertheless, these studies have also showed that this positive link is seen only in developed countries and not in developing countries (Yang, 2013).

For instance, in 1997, Ginarte and Park found results similar to Thompson and Rushing in 1996, and both studies revealed that the level of a county's IPR protection is determined by its trade openness, FDI level, and international IP integration (Yang, 2013). In addition, Maskus's study found that although IPRs promotes economic growth, the positive impact is felt only by the countries with open trade policies, sound FDI inflows, and availability of human capital (Maskus, 2000). Therefore, Yang concluded that IPRs does not influence economic growth independently or directly, but rather interrelated with other variables, such as trade openness, national competitiveness, international IP integration, human capital, FDI and government policy (Yang, 2013).

In conclusion, a positive relationship between IPRs and economic growth is mainly reported with respect to developed countries. The reason is that the aforementioned complementary variables for economic growth are mostly present in developed countries while most of the developing countries are still at early stages of economic and social reforms to implement desired structural changes within their economies.

3.3.5 IPRs and Welfare

Studies on the relationship between IPRs and social and economic welfare also have reported mixed results. This section reviews the results of the studies conducted by Fink and Braga in 1997, 1998, and 1999.

In 1997, Fink and Braga conducted a study that aimed at determining how tighter IPRs affect economic welfare through FDI, transfer of technology, and domestic R & D. The study found that the net welfare impacts of IPR reform for the host country will depend on

two main factors: how local consumers and producers are affected; and on the implications of greater IPR protection for world R & D levels and composition (Fink & Braga, 1997). As such, the study found that the relationship between IPRs and FDIs was contingent on the level of development of the country (Fink & Braga, 1997).

In their 1998 study on the potential implications of stronger IPRs on FDI flows, Braga and Fink (1998) further contended that:

> In a small country with limited production and innovation capabilities whose IPR regime does not affect world R & D, higher standards of protection likely will improve welfare as long as they permit access to products that would otherwise not be available. However, if the country has greater production capabilities (a proxy for its capacity to imitate), but limited innovative capacity (as measured by its R & D basis, for example), higher standards of protection will likely displace local producers, raise prices, and transfer rent from local consumers and producers to foreign titleholders, resulting a negative welfare impact (p. 167).

Based on the above observations, their conclusion is that "strengthened IPR protection will have different welfare implications depending on the characteristics of each country" (Braga & Fink, 1998, p. 167).

The static costs benefit analysis, which examines the impacts on the trading economies due to IPR protection, explains this phenomenon effectively. From a static-partial equilibrium point of view, IPRs create monopoly power in favour of the IPR holder. As a result, countries that export IPR products, services or technologies gain more profits that serve to increase their national welfare. However, as Fink and Braga argue, "the static effects on welfare of the destination country are likely to be negative: increased market power by foreign title holders leading to deadweight losses" (Fink & Braga, 1999, p. 4).

Second, a static-general equilibrium analysis points out that stronger IPRs could be unfavorable to the destination country of trade flow due to the reallocation of production (Fink & Braga, 1999). In other words, moving production from the destination country to the source country brings injurious effects to the terms of trade of the destination country. Fink and Braga further argue that "the reallocation of production may reduce welfare in both countries as efficiency considerations call for an allocation of manufacturing to the region with lower costs" (Fink & Braga, 1999, p. 5).

A clear impact of IPRs on overall economic well-being is difficult to assess. Economic theory views this problem as a trade-off between static and dynamic efficiency (Fink & Braga, 1999). Static efficiency necessitates the allocation of resources in a way that maximizes the total surplus in every circumstance. Therefore, from a static welfare standpoint, IPRs can be perceived as "a rent transfer mechanism which deteriorates the international allocation of production" (Fink & Braga, 1999, p. 5). On the other hand, dynamic efficiency requires that the allocation of resources promotes technological change and improvement of the quality of goods as a result of investment in R & D, design and creation. The dynamic standpoint thus recognizes benefits from IP protection to both source and destination countries.

The important question is whether the dynamic effects of IPR protection offset the static losses –deterioration of overall economic welfare– or not. Although mathematical calculations can assess the economic considerations to some extent, the real impacts can be difficult to estimate in numerical terms. Fink and Braga stress that "theoretical considerations" on welfare effects "may be moot in a world economy in which political economy considerations are clearly in favour of higher standards of (IPR) protection" (Fink & Braga, 1999, p. 5). Moreover, there are many other variables that should be taken into consideration when evaluating the benefits and losses due to IPR protection mechanisms. Among them, "social, cultural, humanitarian, political and even constitutional" factors are crucial in making value judgments (Curtis, 2012, p. 5).

Chapter 4

Trade Impacts of IPRs

4.1 Does Protection of IPRs Facilitate Trade Growth?

A strong IPR protection mechanism is perceived as a facilitator of trade growth in numerous ways. First, it provides certainty and predictability in international trade relations. Manufactures in the developed world, particularly those in knowledge-based economies, require similar levels of IPR protection from importing countries in order to minimize their market losses. As discussed in the previous chapter, countries with higher IPR mechanisms attract more FDIs than countries with weak IPR systems by assuring a higher level of protection for Intellectual Property Rights. In that context, IPRs increase international trade volumes, when FDI and trade flows are complements.

Second, IPR protection mechanisms safeguard the technological know-how of manufacturers. The importance of IPRs became indispensable since the 1970s, when the production process started relying more on technological progress. The level of technology used in the production process is a key determining factor in increasing economic performance. The reason is that advanced technologies increase productivity, decrease costs and escalate value-addition of the production process. Consequently, having a well-established

IPR protection mechanism encourages manufacturers to create more innovations, enhances absolute and comparative advantages and ultimately increases international trade volume.

Third, a strong IPR system increases the competiveness of firms by eliminating the free-rider problem. Firms incur enormous amounts of expenditure for R & D in order to upgrade technologies that decrease the marginal costs associated with manufacturing goods. Nevertheless, it is important to note that the marginal and fixed costs of copying products are very low for some goods (Guzman & Pauwelyn, 2012). Products like software packages, compact discs, and videos are vulnerable to multiple reproduction and sale in developing countries. Chang recounts his experience seeing Windows 98 operating systems for Personal Computers (PCs) for sale in a busy street in Hong Kong one year before its official launch (Chang, 2007). As such, Intellectual Property Rights prevent the free-rider problem while securing the competitive advantage of the firm that invested its time and money to develop the technology.

Fourth, IPRs increase international trade volume as rights themselves, in the form of licenses to use patented processes, techniques and designs, copyrights, trademarks, and franchises. Guzman and Pauwelyn quote Ryan and explain that "U.S. multinational manufacturing enterprises increasingly transfer intellectual property internationally through the industrial processes that they sell abroad. Exports, as measured by royalties and licensing fees, (amount to) about U.S. $ 6.3 billion in 1995" (Guzman & Pauwelyn, 2012, p. 634). For instance, Microsoft exports licenses of its operating system while franchises such as McDonalds, KFC, and Starbucks export their franchising rights. All of the above noted business activities serve to increase international trade volume.

4.2 Does Protection of IPRs Impede Trade Growth?

IPR protection also carries negative trade impacts. As Guzman and Pauwelyn write, a trade distortion can occur when IPR-holders block imports in order to protect their domestic

exclusive rights. In other words, a negative link between IPR protection and trade is visible as IPRs act as trade barriers (Guzman & Pauwelyn, 2012). When the price of a particular import rises as a result of an IPR royalty, consumers in the importing country tend to choose low-priced domestic substitutes, or if there are no substitutes available they may choose to forgo purchasing the product all together.

Chang argues that the existing IPR system impedes international trade by blocking technological innovation (Chang, 2007). This impact is severely felt by developing countries that are at a lower level of technological progress. In order to develop their technologies, these countries need access to existing technologies at a lower cost. Higher IPR royalty charges prevent them from having the advantage of benefiting from existing technological developments. What the world losses is the increased trade volume that could have been generated through new innovations from developing countries. For instance, India produces basic quality automobiles such as Maruti cars, which are imported by low-income consumers in developing countries. If India were to gain access to higher technologies at a lower cost, it could have increased its production and thus exported more cars while increasing the international trade volume.

4.3 Empirical Evidence

The empirical studies that have been conducted to estimate the causation between IPRs and international trade flows have yielded mixed results. The following analysis is focused on seven econometric studies pertaining to this research question.

In 1995, Maskus and Penubarti conducted the first systematic study to estimate the relationship between patent protection and international trade flows. Put differently, they solely addressed "the positive question of whether the distribution of bilateral trade across nations depends on the importing country's patent regime" (Maskus & Penubarti, 1995, p. 228).

There was very little empirical evidence on this relationship in the early 1990s. Moreover, the overall effect of IPRs on bilateral trade flows is theoretically "ambiguous" (Maskus & Penubarti, 1995, p. 229). This ambiguity has been continuously confirmed in a range of imperfectly competitive, partial equilibrium market structures such as Stackelberg model, and Cournot duopoly models for identical products (Maskus & Penubarti, 1995). Accordingly, "there is no clear presumption that in comparing two otherwise identical nations, the country with the stronger patent law will attract more imports of patentable commodities" (Maskus & Penubarti, 1995, p. 229). As they explain:

> The most straightforward reason for the ambiguity is that there is a tradeoff between the enhanced market power for the firm created by stronger patents and the larger effective market size generated by reduced abilities of local firms to imitate the product. The market-power effect would reduce the elasticity of demand facing the foreign firm and would ordinarily induce the firm to export less of its patentable product (or products made by a patentable process) to the market with the stronger IPRs (Maskus & Penubarti, 1995, p. 229).

In order to test these theoretical ambiguities, the study used an empirical version of a static, general-equilibrium trade model. The structure of their empirical study was "based on an augmented version of the Helpman-Krugman (1985) bilateral gross imports equations" (Maskus & Penubarti, 1995, p. 230). This model hypothesizes monopolistic competition among symmetric firms and "predicts what the volume of trade would be in the absence of trade barriers and variations in patent laws" (Maskus & Penubarti, 1995, p. 230). By using trade data for a single year (1984), Maskus and Penubarti conducted an empirical analysis about the relationship between manufactured exports from OECD countries and the strength of patent rights in twenty-five developing countries.

The study revealed ambitious results for future examination on this research question. Statistical findings suggested that upper levels of protection have a positive impact on bi-

lateral manufacturing imports in both small and large developing countries (Maskus & Penubarti, 1995, p. 230). Further, it was found that considering the developing countries, "bilateral imports are significantly larger than levels predicted by the Helpman-Krugman model for countries with stronger patent laws" (Maskus & Penubarti, 1995, p. 244). Another finding of the study was that the impact of IPR protection on trade flows is more significant in larger developing countries than smaller developing countries. Their findings suggest that the strength of patent protection tends to have a strong correlation with the level of development (Maskus & Penubarti, 1995). In 1997, Fink and Braga also confirmed these results when they "estimated a similar model and found the same positive link between patent protection and trade flows" (Fink & Braga, 1999, p. 2).

However, while sharing the views of Segerstrom, Anant and Dinopoulos based on their 1990 study, Maskus and Penubarti (1995) emphasize that:

> Though trade flows seem to be affected by variations in patent protection, we cannot conclude that this finding means that stronger and more harmonized global levels of patents would generate more innovation without considering also other determinants of profits and international technology diffusion (p. 244).

As their study was conducted on a general equilibrium model, they believe that studies of a "dynamic nature could help place these results into better perspective" (Maskus & Penubarti, 1995, p. 244). Also, Maskus and Penubarti's 1995 study found no effect for the industries that are the most patent sensitive (Fink & Maskus, 2005).

Employing a gravity model of bilateral trade, Fink and Braga estimated increased protection "on a cross-section of 89 x 88 countries" in 1999 (Fink & Braga, 1999, p. 2). The data source of the dependent variables –bilateral trade flows– was the United Nations Comtrade database. They estimated the gravity model for two different kinds of aggregates: total non-fuel trade and high technology trade. Their results confirmed previous findings

"suggesting a positive link between IPRs protection and trade flows for non-fuel trade products. However, IPRs are not found to be significant for high technology trade flows" (Fink & Braga, 1999, p. 2). This finding was perplexing as "the rationale for using high technology trade flows besides total non-fuel trade is based on the a priori expectation that the effects of IPRs protection are stronger for knowledge-intensive trade" (Fink & Braga, 1999, p. 6).

The reasons for this surprising result are explained up by Fink and Braga (1999) as follows:

> First, strong market power effects in the case of high technology goods may offset positive market expansion effects caused by stronger IPRs regimes. Second, stronger IPRs regimes may cause high technology firms to serve foreign markets by FDI, in-part substituting for trade flows. Third, it may be that the Park and Ginarte index does not correctly capture the IPRs effect (see below for a discussion) or that development related effects interplay with stronger IPRs protection. Fourth, our high technology aggregate may include many knowledge-intensive goods which are insensitive to the destination country's IPRs regime; for these goods other than legal means may be more important in appropriating investment in R & D (e.g., first mover advantage or rapid movement down the learning curve). Finally, we omitted important explanatory variables in our gravity equation such as tariff and non-tariff trade barriers (p. 10).

Therefore, in order to gain more insights on this empirical ambiguity, they suggested more micro level studies that target the industry and firm levels (Fink & Braga, 1999).

In the same year –1999– Smith found that weak patent rights are a barrier to US exports in countries that pose a strong threat of imitation. She used US state level export data for

the study. Although Smith confirmed a positive trade link between strong IPRs and trade flows, she found no effect in countries that do not face the threat of imitation (Smith, 1999).

Catherine Co also studied the relationship between IPRs and trade flows in 2004. Her study used US exports to 71 destination countries from 1970-1992. The sample of US exports included both high-technology and other goods. Co chose the lagged Ginarte-Park index[10] of patent rights (GP Index) as the measure of IPRs. The control variables of the study were: per capita gross domestic product (GDP), openness, and research expenditures as a share of GDP (Co, 2004). Using a gravity model, the study did not find any direct effect of GP on exports of high-technology goods, albeit the interaction coefficient was significantly positive between patents and national research intensity (Co, 2004). The study also found that "for any country with an average ratio of R & D over GDP a one-unit increase in the GP index would raise US high-technology exports by about 4 to 9 percent, while reducing exports of other goods" (Maskus, 2012, p. 77).

This finding is at odds with Fink and Braga's 1999 finding –that IPRs are not found to be significant for high technology trade flows. Nevertheless, Co's finding is more convincing than that of the 1999 study by Fink and Braga; the rationale is that strengthening IPRs would reduce the threat of imitation for high-technology goods, thereby encouraging US exporters to increase their volume. Nevertheless, this change of market behaviour does not occur with respect to other goods; irrespective of the fact that IPRs are strong or not, the domestic firms may still act monopolistically in the market by controlling the volume of goods produced. As a result, US exporters would reduce their exports of other goods while increasing the volume of high-technology exports.

The post-TRIPS era has also produced significant econometric evidence to shed some light on the empirical ambiguity of the relationship between IPRs and trade flows. This analysis discusses three significant studies conducted by: Olena Ivus (2010); Lei Yang and Keith Maskus (2012); and Pawel Folfas and Andzelika Kuźnar (2013).

[10] Appendix D provides a description of the GP Index.

Ivus examined export growth in patent intensive goods (high-technology exports) from developed countries to developing countries in the pre- and post-TRIPS eras. Her sample consisted of data on patent intensive exports from twenty-four OECD countries (developed countries) to fifty-five developing countries. The time periods of data collection were 1962-1994 (pre-TRIPS era) and 1994-2000 (post-TRIPS). The study found that exports increased significantly to developing countries during the post-TRIPS era. According to Ivus' estimates, the rise in the GP Index in the post-TRIPS period added approximately 35 billion to the value of OECD exports to non-colonial developing countries[11] (Ivus, 2010). Also, the increased exports contributed to an 8.6 percent increase in those countries annual imports.

The 2012 study by Yang and Maskus examined the impact of patent reforms and effective enforcement on industry-level manufacturing exports. The data sample was collected every five years in eighty-two countries between 1985 and 2005 (Maskus, 2012). Yang and Maskus used the composite variable of GP index multiplied by the Fraser Institute's index of effectiveness of the legal system as the measure of patent rights (Maskus, 2012). They found that:

> A one-standard deviation rise in this variable –essentially an increase from the level of Romania or South Africa to that of Japan or Singapore in 1995– would expand average sectoral exports by about 29 percent. In this regard, changes in the scope of patent protection have a significant impact on the volume and pattern of manufacturing exports. For both the developed and developing countries in the sample this impact was even stronger after 1995, while the coefficient on high-technology exports was significantly higher than for other goods (Maskus, 2012, pp. 77–78).

The last study was conducted by Pawel Folfas and Andzelika Kuźnar in 2013. This

[11] Ivus treated non-colonial and colonial developing countries differently in her study. The reason was that colonial developing countries have comparatively stronger IPRs regimes (higher GP Indexes) than that of the others as a result of the influence from their English and French colonial empires. Thus, Ivus treated 18 non-colonial developing countries as the treatment group.

study took a different approach in analyzing the impacts of IPRs on international trade flows. In contrast to other econometric studies, the study focused on analyzing the main trends –such as main exporters, importers, and volumes– in international trade in IP-intensive goods. The dependent variable, bilateral trade flows, was obtained from the UN Comtrade database. The study "included standard independent variables, such as: GDP, distance, language, participation in regional trade agreements, etc." (Folfas & Kuźnar, 2013, p. 1). They determined some factors that could influence IP-intensive goods, namely: expenditures on R & D, number of students in territory education, and evaluation of intellectual property protection.

In their first model, they estimated gravity model for IP-intensive goods. In order to determine the factors affecting IP-intensive trade, the study estimated the second gravity model for export of all commodities (Folfas & Kuźnar, 2013). The Hausman-Taylor method of estimation was used for these models. The study found that:

> More intensive export of IP-intensive goods is accompanied by higher expenditure on R & D, higher number of students and stronger protection of intellectual property rights in exporting country. And this accompaniment is tighter for export of IP-intensive goods than for export of all commodities. (Folfas & Kuźnar, 2013, p. 13).

Folfas and Kuźnar's study confirmed that stronger IPRs stimulate exports from the exporting country's side, though it does not shed light on the impact of stronger IPRs in the importing country. Nevertheless, an increase in exports indirectly signals that the imports of these goods also should have increased. As such, irrespective of which countries benefit more from stronger IPR regimes, this study supports the claim that IPRs have positive impacts on international trade.

After a careful review of the existing empirical evidence, Curtis posits that, a direct link between trade and IPRs appears to be weak (Curtis, 2012). According to him, "a direct

link between trade and intellectual property rights appears to be weaker when examined on empirical rather than theoretical grounds" (Curtis, 2012, p.9). He further indicates that an indirect link can be identifiable in some copyright segments, certain patents (such as pharmaceutical and chemical sectors, etc.), and to a "lesser extent" in trademarks (Curtis, 2012, p.9). Based on the foregoing considerations, Curtis concludes that "(t)he impact of intellectual property on innovation, creativity, international trade and on the economy more generally, depends on the unique circumstances, particular economic sector, as well as on the country's innovative potential" (Curtis, 2012, p.9). As he argues, a country's innovative potential includes adaptive capacity, educational level, nature of the work force, structure and funding for R & D, management assets and the level of institutional involvement and their development. Put differently, the benefits of IPR protection can only be absorbed by developed countries that have developed institutional and regulatory systems, higher educational levels, and high-skilled labour, et cetra.

Conclusion

IPR issues have been discussed in both public and policy forums since the early stages of industrial society. Nevertheless, since the beginnings of the 1980s, IPR issues have gained considerable prominence at international trade debates and in the policy making process at all levels including bilateral, plurilateral and multilateral forums. Based on empirical literature, this paper presents three concluding observations. First, the empirical evidence on IPRs and economic indicators –innovation, technology transfer, FDIs, economic growth, and welfare– yields mixed results. There is evidence to support the argument that a significant relationship exists between IPR protection and the above stated economic indicators in developed countries; however, there is no adequate evidence to confirm that this significant relationship holds true in relation to developing countries.

Second, the same relationship is not very significant across all industries and for all countries, and is contingent on the availability of numerous other factors. These factors include: the nature of the industry the IPR-goods and services are involved part of, the level of development of the receiving country, and the presence of other dimensions –such as administrative, social, political, and cultural elements. As such, findings with respect to developed countries illustrate a significant relationship between IPRs and economic indicators while less developed countries show a less significant relationship. Also, the statistical relationship is stronger for industries with IP-sensitive goods and services than for other industries.

Third, the relationship between IPRs and international trade volume is significant and

positive for developed countries. However, similar to other economic indicators, this relationship is less significant, and is in some cases negative, for developing countries.

In light of the above observations, it is evident that the current world trend towards stronger IPR regimes creates a lopsided outcome that leads to system imbalances. Developed countries are trying to increase their bilateral trade engagements through FTAs with each other and also with developing countries with expanded IPRs. As a result, the share of IP-intensive commodities in the international trade volume as well as an expansion of the international IPR regime has continued to increase while putting the public interests of developing countries at risk.

In conclusion, even though it is clear that the world is moving towards a stronger IPR regime, exploring the reasons for these upward trends is beyond the scope of this paper. Nevertheless, the reasons might be based on political economy considerations and the changing power dynamics in the international arena. The positive side of this development is that when all countries have developed a similar level of IPR protection mechanism, the disparity in levels of IPR regulation in different countries will be minimized while leveling the field for all participants.

Appendix A

Members of the TRIPS Agreement

Founding Members of the TRIPS Agreement (Became Members on January 1, 1995)

Antigua & Barbuda	Dominica	Italy	Nigeria	Saint Lucia
Argentina	European Union	Japan	Norway	Suriname
Australia	Finland	Kenya	Pakistan	Swaziland
Austria	France	Republic of Korea	Paraguay	Sweden
Kingdom of Bahrain	Gabon	The State of Kuwait	Peru	Tanzania
Bangladesh	Germany	Luxembourg	Philippines	Thailand
Barbados	Ghana	Macao, China	Poland	Uganda
Belgium	Greece	Malaysia	Portugal	United Kingdom
Belize	Guyana	Malta	Romania	United States of America
Brazil	Honduras	Mauritius	Saint Vincent & the Grenadines	Uruguay
Canada	Hong Kong, China	Mexico	Senegal	Bolivarian Republic of Venezuela

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Founding Members of the TRIPS Agreement (*continued*)

Chile	Hungary	Morocco	Singapore	Zambia
Costa Rica	Iceland	Myanmar	Slovak Republic	
Côte d'Ivoire	India	Namibia	South Africa	
Czech Republic	Indonesia	Netherlands	Spain	
Denmark	Ireland	New Zealand	Sri Lanka	

Source: http://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm

Table 1: Founding Members of the TRIPS Agreement

Other Members of the TRIPS Agreement

Country	**Date of Membership**	**Country**	**Date of Membership**
Albania	8 September 2000	Lesotho	31 May 1995
Angola	23 November 1996	Liechtenstein	1 September 1995
Armenia	5 February 2003	Lithuania	31 May 2001
Benin	22 February 1996	Madagascar	17 November 1995
Plurinational State of Bolivia	12 September 1995	Malawi	31 May 1995
Botswana	31 May 1995	Maldives	31 May 1995
Bulgaria	1 December 1996	Mali	31 May 1995
Burkina Faso	3 June 1995	Mauritania	31 May 1995
Burundi	23 July 1995	Republic of Moldova	26 July 2001
Cabo Verde	23 July 2008	Mongolia	29 January 1997
Cambodia	13 October 2004	Montenegro	29 April 2012
Cameroon	13 December 1995	Mozambique	26 August 1995
Central African Republic	31 May 1995	Nepal	23 April 2004

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Other Members of the TRIPS Agreement (*continued*)

Country	Date of Membership	Country	Date of Membership
Chad	19 October 1996	Nicaragua	3 September 1995
China	11 December 2001	Niger	13 December 1996
Colombia	30 April 1995	Oman	9 November 2000
Congo	27 March 1997	Panama	6 September 1997
Croatia	30 November 2000	Papua New Guinea	9 June 1996
Cuba	20 April 1995	Qatar	13 January 1996
Cyprus	30 July 1995	Russian Federation	22 August 2012
Democratic Republic of the Congo	1 January 1997	Rwanda	22 May 1996
Djibouti	31 May 1995	Saint Kitts & Nevis	21 February 1996
Dominican Republic	9 March 1995	Samoa	10 May 2012
Ecuador	21 January 1996	Kingdom of Saudi Arabia	11 December 2005
Egypt	30 June 1995	Sierra Leone	23 July 1995
El Salvador	7 May 1995	Slovenia	30 July 1995
Estonia	13 November 1999	Solomon Islands	26 July 1996
Fiji	14 January 1996	Switzerland	1 July 1995
The Gambia	23 October 1996	Chinese Taipei	1 January 2002
Georgia	14 June 2000	Tajikistan	2 March 2013
Grenada	22 February 1996	The former Yugoslav Republic of Macedonia (FYROM)	4 April 2003
Guatemala	21 July 1995	Togo	31 May 1995
Guinea	25 October 1995	Tonga	27 July 2007

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Other Members of the TRIPS Agreement (*continued*)

Country	Date of Membership	Country	Date of Membership
Guinea-Bissau	31 May 1995	Trinidad and Tobago	1 March 1995
Haiti	30 January 1996	Tunisia	29 March 1995
Israel	21 April 1995	Turkey	26 March 1995
Jamaica	9 March 1995	Ukraine	16 May 2008
Jordan	11 April 2000	United Arab Emirates	10 April 1996
Kyrgyz Republic	20 December 1998	Vanuatu	24 August 2012
Lao People's Democratic Republic	2 February 2013	Vietnam	11 January 2007
Latvia	10 February 1999	Zimbabwe	5 March 1995

Source: http://www.wto.org/english/thewto_e/whatis_e/tif_e/org6_e.htm

Table 2: Other Members of the TRIPS Agreement

Appendix B

International Treaties and Conventions on Intellectual Property

List of International Treaties and Conventions on Intellectual Property.

Year	Treaty/Convention
1883	The Paris Convention for the Protection of Industrial Property
1886	The Berne Convention for the Protection of Literary and Artistic Works
1891	Madrid Agreement Concerning the International Registration of Marks
1925	The Hague Agreement Concerning the International Deposit of Industrial Designs
1957	The Nice Agreement Concerning the International Classification of Goods and Services for the Purposes of the Registration of Marks
1961	Special Conventions in the Field of Related Rights: The International Convention for the Protection of Performers, Producers of Phonograms and Broadcasting Organizations ("the Rome Convention")
1966	The Patent Cooperation Treaty (PCT)

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List of International Treaties and Conventions on Intellectual Property (*continued*)

Year	Treaty/Convention
1968	The Locarno Agreement Establishing an International Classification for Industrial Designs
1971	The Phonograms Convention
1971	The Strasbourg Agreement Concerning the International Patent Classification
1973	The Vienna Agreement Establishing an International Classification of the Figurative Elements of Marks
1974	The Satellites Convention
1980	The Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure
1989	The Madrid Agreement Concerning the International Registration of Marks and the Protocol Relating to that Agreement
1991	The 1991 International Convention for the Protection of New Varieties of Plants
1994	The Agreement on Trade-Related Aspects of Intellectual Property Rights ("TRIPS")
1994	The Trademark Law Treaty (TLT)
1996	The WIPO Copyright Treaty (WCT)
1996	The WIPO Performances and Phonograms Treaty (WPPT)
2000	The Patent Law Treaty (PLT)

Source: (World Intellectual Property Organization, 2004)

Table 3: List of International Treaties and Conventions on Intellectual Property

Appendix C

Issues in the Current IPR Regime

The world IPR regime deals with three key issues that are briefly discussed below.

C.1 The Pharmaceutical Patent Issue

As Guzman and Pauwelyn describe, the most controversial TRIPS topic so far has been access to essential medicine (Guzman & Pauwelyn, 2012). This problem is also widely known as the pharmaceutical drugs issue. The debate with respect to this concern is intense because the negative impacts of patented drugs worsen public health conditions in developing countries due to affordability concerns. The 2001 Doha Declaration on the TRIPS Agreement and Public Health sought to remedy this issue to some extent by allowing WTO member countries to amend domestic patent law. This would allow generic pharmaceutical companies to obtain compulsory licenses to manufacture and sell medicines to LDCs facing public-health crises in the three carefully defined and circumscribed medical categories: HIV/AIDS, malaria and tuberculosis. Canada, Norway, Japan, Switzerland and some EU countries have already adopted domestic laws reflecting the above requirements (Maskus, 2012). However, in order to get the full legal effect, two-thirds of WTO members need to ratify the 2005 WTO Ministerial Declaration, which brought amendments to the TRIPS

Agreement; to date, only 45 out of 159 WTO members have ratified the Declaration. Consequently, this issue has been not yet been fully resolved.

C.2 The Issue of expanding Geographical Indications

The second issue is related to Geographical Indications. There are two different country groups that hold divergent views on GIs: the group of countries that propose a stronger system for GIs; and the group of countries that oppose stronger protection for GIs. As Taubman, Wager and Watal write this debate is called the "old world-new world debate" because the proponents are basically the "old-world" countries of Europe while the opponents are the "new world countries" of the USA, Australia, New Zealand, and Canada, etc. (World Trade Organization, 2012). The EU needs to extend its already stronger domestic protection mechanism for GIs to the WTO multilateral system (Maskus, 2012). Some influential developing country members such as India, Nigeria, and Turkey are backing the EU for extending the international legal regime for GIs. These proponents of GIs advance their arguments based on two aspects: to design a compulsory multilateral register and database for wines and spirits as stipulated by Article 23 of the TRIPS; and to extend GIs beyond the exiting high level of protection for wines and spirits. The Opponent group that is led by the US is against the proposed expansions.

Amidst the indecisiveness over GIs at the WTO forum, the interests of the parties are being addressed elsewhere. For instance, proponents for stronger protection of GIs such as the EU countries include stronger GI provisions in their bilateral and preferential trade agreements with other countries (Eugui & Spennemann, 2006). For instance, the EU was successful in including a comprehensive chapter on IPRs including extended GI provisions in its preferential trade agreement with South Korea, and the EU has demanded extended protection for GIs in its recently concluded preferential trade agreement with Canada, the Comprehensive Economic and Trade Agreement (CETA). Although the final legal text of

the CETA is not yet available, the CETA Overview document published by the Government of Canada stipulates that: "CETA will include a wider recognition of EU Geographical indications for foodstuffs, such as certain meats and cheeses... that built upon Canada's existing regime for geographical indications" (Public Works and Government Services Canada, 2013, p. 34).

Some scholars argue that the planned expansion of GIs under the CETA could deny the market access to imports from the USA (Viju, Yeung, & Kerr, 2012; Viju, 2013). If Canada were to accept the EU regulations, the USA would likely face an increase in the cost of labeling, and denial of access to Canadian markets without proper GI marks. Viju et al. (2012) write:

> Denying access to the Canadian market for certain products of U.S. origin would represent a nullification or impairment of a benefit for the U.S. and, thus, according to TRIPS... the U.S. will be able to ask for compensation for denial of market access (p. 6).

However, these political economy considerations will likely change in the future with the on-going negotiations between the USA and the EU under the Transatlantic Trade and Investment Partnership (TTIP). The TTIP is the proposed free trade agreement between the US and the EU, and the issue of GIs is a main consideration at the TTIP negotiation table. The USA may have to make important decisions on whether to accept EU's strong demands on GIs or not before concluding the TTIP negotiations. As such, the GI issue remains a living issue for years to come.

C.3 The Triplets Issue

The third issue in relation to IPRs has three elements: traditional knowledge and folklore; biotechnology; and biodiversity. In particular, developing countries complain that

these three areas demonstrate IPR characteristics, and therefore should be recognized and treated as other IPRs. Traditional knowledge and folklore includes: traditional medical treatments, oral histories, linguistic expressions, as well as music, dancing and artistic work (Maskus, 2012). Oguamanam describes bio-piracy as "the activities of western-based transnational corporations backed by their home governments in regard to the acquisition of biological resources and or associated knowledge of indigenous and local communities of the global South and elsewhere" (Oguamanam, 2011, pp. 39–40). Bio-piracy occurs mainly on medicinal plants and agriculture products and therefore considered issues with regard to biotechnology and biodiversity. The number of cases involving using traditional knowledge and bio-piracy without offering an economic compensation to the original communities is on the rise. This issue therefore will continue to be contentious in the years to come.

Appendix D

Ginarte-Park Patent Rights Index

The Ginarte-Park Index (GP Index) is the commonly-used IP index in order to gauge the impacts of IPR policy changes on economy. It was developed by Juan C.Jinarte and Walter G.Park in 1997 and subsequently modified by Park in 2008.

The GP Index used a scale from zero to five in order to grade national IPRs regimes. The country ranking is computed by using five different categories: extent of coverage, membership in international patent agreements, provisions for loss of protection, enforcement mechanisms, and duration of protection (Fink & Braga, 1999). As such:

> For each category, they use several benchmark criteria (e.g. patentability of pharmaceuticals for extent of coverage) and compute the share of "fulfilled" criteria. A country's score is the unweigthed sum of these shares over all categories. The United States receives the highest score with 4.52; several countries without patent laws (e.g. Angola, Burma, Ethiopia, Papua New Guinea) receive a score of (zero) (Braga & Fink, 1998, p. 7).

By so doing, the GP Index "captures the presence or absence of particular elements in patent law" (Maskus, 2012, p. 26). The GP Index started in 1960 with 80 countries, and by now it is computed every five years through 2005 to cover 117 countries (Maskus, 2012).

GP Index is considered the "most prominent measure used in the economics and legal literature to assess policy reforms and their impact" (Maskus, 2012, p. 26), albeit there are some concerns about "the accuracy of the GP index in capturing the actual scope of patent protection" (Maskus, 2012, p. 27).

Reference

Arrow, K. J. (1962). Economic Welfare and the Allocation of Resources for Invention. In *The Rate and Direction of Inventive Activity: Economic and Social Factors* (pp. 609–626). National Bureau of Economic Research, Inc.

Bhagwati, J. (2004). *In Defense of Globalization*. Oxford, NY: Oxford University Press.

Blakeney, M. L. (2006, July). Geographical Indications and TRIPS. In M. P. Pugatch (Ed.), *The intellectual property debate: Perspectives from law, economics and political economy* (pp. 293–304). Northampton, MA: Edward Elgar Publishing.

Braga, C. A. P., & Fink, C. (1998). The relationship between intellectual property rights and foreign direct investment. *The Duke Journal of Comparative & International Law*, *9*(1), 163–187.

Chang, H.-J. (2007). *Bad samaritans: The myth of free trade and the secret history of capitalism* (Reprint edition ed.). London, UK: Bloomsbury Press.

Chen, Q. (2008, December). The effect of patent laws on invention rates: Evidence from cross-country panels. *Journal of Comparative Economics*, *36*(4), 694–704.

Co, C. Y. (2004, August). Do Patent Rights Regimes Matter? *Review of International Economics*, *12*(3), 359–373.

Correa, C. M. (2000). *Intellectual property rights, the WTO and developing countries: The TRIPS agreement and policy options*. New York, NY: Zed Books.

Curtis, J. M. (2012, May). Intellectual property rights and international trade: An overview. *CIGI Papers*, *3*. Available from `http://www.cigionline.org/sites/default/files/no.3_0.pdf`

Eaton, J., & Kortum, S. (1996, May). Trade in ideas Patenting and productivity in the OECD. *Journal of International Economics*, *40*(3–4), 251–278.

Eugui, D. V., & Spennemann, C. (2006). *The treatment of geographical indications in recent regional and bilateral free trade agreements*. Edward Elgar Publishing.

Fink, C., & Braga, C. A. P. (1997). Public policy and global technological integration.

In F. M. Abbott & D. J. Gerber (Eds.), (pp. 99–121). The Netherlands: Kluwer Academic Publishers.

Fink, C., & Braga, C. A. P. (1999, February). *How stronger protection of intellectual property rights affects international trade flows* (Policy Research Working Paper Series No. 2051). The World Bank. Available from http://ideas.repec.org/p/wbk/wbrwps/2051.html

Fink, C., & Maskus, K. E. (2005). *Intellectual property and development: Lessons from recent economic research.* Washington, DC and New York, NY: World Bank Publications and Oxford University Press. Available from http://siteresources.worldbank.org/INTRANETTRADE/Resources/Pubs/IPRs-book.pdf

Folfas, P., & Kuźnar, A. (2013, September). International trade in intellectual property-intensive goods. In *The European Trade Study Group (ETSG) 2013, Fifteenth Annual Conference.* Birmingham, UK. Available from http://www.etsg.org/ETSG2013/Papers/230.pdf

Guzman, A., & Pauwelyn, J. H. B. (2012). *International trade law* (Edition, 2nd ed.). New York, NY: Aspen Publishers.

Ivus, O. (2010, May). Do stronger patent rights raise high-tech exports to the developing world? *Journal of International Economics*, *81*(1), 38–47.

Javorcik, B. S. (2004, February). The composition of foreign direct investment and protection of intellectual property rights : Evidence from transition economies. *European Economic Review*, *48*(1), 39–62.

Lerner, J. (2002, June). *Patent protection and innovation over 150 years* (Working Paper No. 8977). National Bureau of Economic Research. Available from http://www.nber.org/papers/w8977

Lippoldt, D. (2006). Can stronger intellectual property rights boost trade, foreign direct investment and licensing in developing countries. In M. P. Pugatch (Ed.), *The intellectual property debate: Perspectives from law, economics and political economy* (pp. 44–61). Massachusetts, MA: Edward Elgar Publishing Inc.

Mansfield, E. (1994). Intellectual property protection, foreign direct investment and technology transfer. In *International finance corporation (discussion paper no. 19).* Washington, DC: World Bank.

Maskus, K. E. (2000). Intellectual property rights and economic development. *Case Western Journal of International Law*, *32*, 471–506.

Maskus, K. E. (2004). *Encouraging international technology transfer* (Vol. 7). Geneva: International Centre for Trade and Sustainable Development.

Maskus, K. E. (2012). *Private rights and public problems: The global economics of intellectual property in the 21st century*. United Books Press Inc.

Maskus, K. E., & Penubarti, M. (1995, November). How trade-related are intellectual property rights? *Journal of International Economics*, *39*(3–4), 227–248.

Mokyr, J. (2009, May). Intellectual property rights, the industrial revolution, and the beginnings of modern economic growth. *American Economic Review*, *99*(2), 349–355.

Moser, P. (2005, September). How do patent laws influence innovation? Evidence from nineteenth-century World's fairs. *The American Economic Review*, *94*(4), 1214–1236.

North American Free Trade Agreement (NAFTA). (1994). Available from `https://www.nafta-sec-alena.org/`

Oguamanam, C. (2011). *Intellectual property in global governance: A development question*. New York, NY: Routledge.

Peri, G. (2005, May). Determinants of knowledge flows and their effect on innovation. *Review of Economics and Statistics*, *87*(2), 308–322.

Public Works and Government Services Canada. (2013). *Opening new market in Europe - Creating jobs and opportunities for Canadians: An overview, Canada-European Union Comprehensive Economic and Trade Agreement* (Tech. Rep.). Available from `http://actionplan.gc.ca/sites/default/files/pdfs/overview.pdf`

Saez, C. (2013, June). WTO members agree on draft extension of TRIPS transition for LDCs. *Intellectual Property Watch*. Available from `http://www.ip-watch.org/2013/06/07/wto-members-agree-on-draft-extension-of-trips-transition-for-ldcs/`

Sherwood, R. M. (2002). Global prospects for the role of intellectual property in technology transfer. *IDEA: The Journal of Law and Technology*, *42*(1), 27–36.

Smith, P. J. (1999, June). Are weak patent rights a barrier to U.S. exports. *Journal of International Economics*, *48*(1), 151–177.

Stiglitz, J. E. (2006). *Making Globalization Work*. New York, NY: W. W. Norton & Company.

Viju, C. (2013, October). CETA and geographical indicators: Why a sensitive issue? *Canada-Europe Transatlantic Dialogue: CETA Policy Briefs Series*. Available from `http://labs.carleton.ca/canadaeurope/`

Viju, C., Yeung, M. T., & Kerr, W. A. (2012, February). Geographical indications, barriers to market access and preferential trade agreements. *CATPRN Commissioned Paper 2012-01: Canadian Agricultural Trade Policy and Competitiveness Research Network*.

World Intellectual Property Organization. (2004). *WIPO intellectual property handbook: policy, law and use*. Geneva: WIPO.

World Trade Organization. (2012). *A handbook on the WTO TRIPS agreement* (A. Taubman, H. Wager, & W. Jayashree, Eds.). Cambridge, NY: Cambridge University Press.

World Intellectual Property Organization (WIPO). (2013, September). Available from http://www.wipo.int/

World Trade Organizaton (WTO). (2013, November). Available from http://www.wto.org/

Yang, D. (2013). *Understanding and profiting from intellectual property: Strategies across borders* (Edition, 2nd ed.). Houndmills, Basingstoke, Hampshire England: Palgrave Macmillan.