World Economy Brief

August 9, 2021 | Vol. 11 No. 34 | ISSN 2233-9140

The Impact of Intellectual Property Protection through FTA on International Trade

Hyunsoo Kim Research Fellow, New Trade Strategy Team, International Trade Department (kimhs@kiep.go.kr)
Sangjun Yea Research Fellow, Trade and Investment Policy Team, International Trade Department (sjyea@kiep.go.kr)
Hyeyoon Keum Senior Researcher, Trade Agreement Team, International Trade Department (hykeum@kiep.go.kr)
Min Ji Kang Senior Researcher, Trade Agreement Team, International Trade Department (mjkang@kiep.go.kr)

I. Introduction

The importance of intellectual property rights (IPRs) for innovation has grown and the protection of intellectual property in international trade has also been strengthened. AI-related patent applications have been increasing rapidly and many AI patents are being filed in various industries. AI patents for robotics increased by 254% in the period 2013 to 2016 and many sectors such as telecommunication, transportation, and medical sciences are exploring the commercial exploitation of AI patents.

Intellectual property also represents one of the main controversies of U.S.-China trade relations in the past three decades and remains one of the core issues behind the two countries' recent trade conflicts. The trade conflicts were mainly triggered by U.S. concerns about a wide range of practices by China related to compulsory technology transfer and intellectual property thefts.

As a result, global protection for IPRs has been expanded in recent decades. The basis of this campaign has been the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) which requires WTO member countries to set up minimum standards of IPRs protection. However, developed countries such as the United States and the European Union have sought to further strengthen the standard of IPRs protection through their FTAs. According to Valdes and McCann (2014), more than 60% of FTAs did not contain IP provisions and only 11% contained high IP content before 2000. In contrast, most of the FTAs that have entered into force from 2000 contained some type of IP provision and 23% of these had high IP content. High standard and comprehensive IPR chapters were included in several FTAs recently entering into force, such as the CPTPP and USMCA, and movements to strengthen IPR protection through FTAs continue to accelerate.

II. Discussion on Current Issue in the TRIPS

When the TRIPS Agreement entered into force, it was not a static legal instrument. Several provisions were included in the Agreement which left the door open to further development. The most significant addition to the Agreement is the 2001 Doha Declaration on the TRIPS Agreement and Public Health. The Doha Declaration recognized the difficulty of developing countries in using compulsory licensing and demanded the WTO find a solution. Under Article 31(f) in the TRIPS Agreement, supply of generic medicines from developed countries would be inadequate because the article limits the conditions under which generic medicines can be exported. The Doha Declaration and subsequent works called for the TRIPS Council to revise Article 31(f) and establish a special compulsory licensing system. Although an agreement on revision was reached in the General Council in 2005, it took more than 10 years for the amendment to be accepted by two-thirds of the membership. The amendment finally entered into force in January 2017.

A number of other issues regarding the TRIPS Agreement have been considered in the WTO, and are of ongoing interest. The protection of traditional knowledge (TK), relationship between the TRIPS Agreement and the Convention on Biological Diversity (CBD), and the non-violation complaints relating to the TRIPS Agreement are among these issues. The TRIPS Council has continued to work on the protection of TK since 2002. The work covers the grant of patents relating to TK, and consent and benefit sharing when using existing IP, and protecting TK under a *sui generis* system. Also, in order for members to implement both the TRIPS Agreement and CBD, the TRIPS Council has discussed proposals for amending the TRIPS Agreement to introduce a mandatory requirement for patent applicants to disclose the source of TK used in inventions. The issue remains on the agenda of the TRIPS Council but a number of members dispute whether such a disclosure mechanism would be able to ensure compliance with prior informed consent and fair and equitable benefit sharing obligations. When the TRIPS Agreement entered into force, the Agreement provided a moratorium on the application of non-violation and situation complaints to the TRIPS Agreement and the moratorium has been extended in succession. Despite debates on this issue for more than 20 years, there is disagreement between members whether non-violation and situation complaints can apply to the TRIPS Agreement. Members who oppose extension of the moratorium argue that non-violation and situation complaints are necessary to balance rights and obligations in the TRIPS Agreement, while other members insist that non-violation disputes can restrict members' effective use of policy flexibilities in the implementation of their IP systems.

For most ongoing issues which have been considered in the TRIPS Council, amendment to the Agreement took a long time, or members

remain unable to reach an agreement, and discussions have been limited recently. As a result, developed countries began to turn to bilateral discussions for strengthening IPR protection and stronger provisions for protecting IPR have been introduced in FTAs.

III. Measuring the Depth of IPR Chapters in FTAs

This study measures the depth of IPR chapters in FTAs all over the world. It is based on 305 FTAs notified to the WTO and in force by August 2020. Out of the 305 FTAs, 221 FTAs are classified as containing IPR-related provisions. As illustrated in Figure 1 in the appendix, while only 14 FTAs out of 38 contained IPR provisions before 1995, more than 80% of FTAs which entered into force after 2005 contained IPR provisions.

The methodology used is to survey each FTA to determine whether it contains any specific IPR-related provisions. We then use the number of IPR provisions in each FTA to classify FTAs according to the depth of their IPR chapters. As IPR provisions in FTAs vary widely in terms of nature, scope, and depth, they are classified into three groups: i) general provisions and enforcement, ii) provisions related to types of IPR and iii) TRIPS-plus provisions. Based on the general provisions and enforcement, we assess whether each FTA contains basic provisions for protecting IPRs such as a statement of commitment to IPR protection, reaffirmation of TRIPS Agreement, and enforcement procedures. In addition to the general provisions and enforcement, FTAs contain more detailed provisions which aim to protect a certain type of IPR. We take into account the following nine types of IPR: copyright and related rights, trademarks, geographical indications, industrial designs, patents, undisclosed information, layout designs of integrated circuits, new plant varieties, and traditional knowledge or genetic resources.

As a general observation regarding the analysis of IPR provisions in FTAs, we pursue two approaches. The first approach aims at a comprehensive overview of broad trends in FTAs over time. The second approach is to look at developments of IPR-related provisions beyond the TRIPS Agreement, so-called TRIPS-plus provisions. Thus we apply the general methodology explained above to more detailed provisions which provide more extensive protection for each type of IPR and higher enforcement standards. Data protection for pharmaceutical products, terms of copyright protection, *ex officio* action are among those provisions. As illustrated in Figure 2 in the appendix, there are wide variations in the inclusion of the provisions in FTAs. In general, figures show that the inclusion of TRIPS-plus provisions in FTAs is less common than other provisions.

As mentioned above, the depth of IPR chapters of FTAs is established based on the number of IPR-related provisions in the FTAs. The

aforementioned three categories are consolidated in a global score representing the overall depth of IPR chapter, by assigning asymmetric weights for each category. The tally for each FTA is then normalized to 100. Based on the score of the IPR chapter, the 221 FTAs containing IPR provisions are classified into three groups: FTAs with a high level of IPR provisions (hereafter IPA: Intellectual Property-related Free Trade Agreement), a moderate level of IPR provisions, and negligible IPR provisions. According to our analysis, 78 (25.6%) of the 305 FTAs were IPAs. The numbers of FTAs with a moderate level of IPR provisions and negligible IPR provisions are 69 (22.6%) and 74 (23.9%), respectively. Although each group shows relatively even distribution, this differ by period. Among 71 FTAs which entered into force before 2000, only 18.3% of FTAs had high level or moderate level of IPR provisions. Among 129 FTAs which entered into force between 2000 and 2010, however, 50.4% of FTAs had high level or moderate level of IPR provisions and the share of FTAs with high level or moderate level of IPR provisions increased to 65.7% after 2010.

Table 1. Depth of IPR Chapters in Korea's FTAs

Partner	Year of Entry into Force	General Provisions	Specific IPR Types	TRIPS-Plus Provisions	Overall Depth
Chile	2004	66.7	22.2	7.1	41.4
Singapore	2006	66.7	11.1	0	36.7
EFTA	2006	77.8	55.6	14.3	58.4
ASEAN	2010	55.6	0	0	27.8
India	2010	77.8	22.2	0	45.6
EU	2011	77.8	88.9	64.3	**78.4**
Peru	2011	88.9	33.3	21.4	58.7
USA	2012	100	66.7	85.7	**87.1**
Turkey	2013	66.7	33.3	14.3	46.2
Australia	2014	100	66.7	64.3	**82.9**
Canada	2015	100	66.7	50	**80.0**
China	2015	100	77.8	21.4	**77.6**
New Zealand	2015	66.7	55.6	14.3	52.9
Vietnam	2015	100	44.4	14.3	**66.2**
Columbia	2016	88.9	22.2	28.6	56.8
Average		82.2	44.4	26.7	59.8

Source: By author

The depth of IPR chapter in FTAs by the parties' level of development shows the difference in viewpoint on IPR protection between developed and developing countries. Among 44 FTAs to which developed countries were signatory, 32 FTAs had high or moderate level of IPR provisions. However, only 29 FTAs out of 124 FTAs which include developing or LDC countries had high or moderate level of IPR provisions and 66 FTAs of them did not contain IPR-related provisions

The IPR chapters in Korea's FTAs have grown in their depth. There is no IPA among Korea's FTAs which entered into force before 2010, but six out of 10 FTAs which entered into force after 2011 contained a high level of IPR-related provisions. Table 1 shows the depth of IPR chapters in Korea's FTAs included in this study. The average level of IPR protection in Korea's 15 FTAs is 59.8 (out of 100), which is similar to the average level in the EU (60.7), EFTA (59.3), or Japan's (57.9) FTAs.

IV. Empirical Analysis of the Trade Effect of IPA

To analyze the effect of IPA on trade, this study estimate the following specification, as in Maskus and Ridley (2020).

$$\begin{aligned}\log(TR_{ist}) = {} & \beta_1 \log(GDP_{it}) + \beta_2 HighIP_s \times \log(GDP_{it}) \\ & + \sum_g \beta_{3g} Group_{ig} \times HighIP_s \times IPA_{it} \\ & + \sum_g \beta_{4g} Group_{ig} \times LowIP_s \times IPA_{it} \\ & + \sum_g \beta_{5g} Group_{ig} \times HighIP_s \times TRIPS_{it} \\ & + \sum_g \beta_{6g} Group_{ig} \times LowIP_s \times TRIPS_{it} \\ & + \alpha_{gst} + \alpha_i + \varepsilon_{ist}\end{aligned}$$

$\log(TR_{ist})$ is country i's aggregate imports or exports in sector s in year t. The sector basically consists of two groups: an IP-intensive group of products (HighIP) and a less IP-intensive group of products (LowIP). The sample period covers the years 1993 to 2018 for capturing the prevalence of IPA in recent decades as well as changes in IPR regime at the WTO level. We consider the relationship between economic size and trade volume by including country i's GDP in year t, $\log(GDP_{it})$.

A key variable in the analysis is IPA_{it} which represents differences in joining IPAs across countries. The impact of FTAs related to IPR protection is different from other effects of FTAs, such as the trade effect from tariff reductions in at least one crucial way. The difference results from the spillover effect created by domestic IPR policies. When a country strengthens the protection of IPRs as a result of IPR-related provisions in a FTA, it is very difficult to discriminate across the origins of applications for IPR protection. Therefore, IP right-holders from countries not party to a FTA can benefit under the same

terms as their counterparts from FTA parties. In this sense, considering the spillover effect, the first IPA is important for each country. We introduce IPA_{it}, which is equal to zero for the years in which country *i* is not a member of a IPA and 1 for each year in which country *i* is a member of at least one IPA. Previous literature suggests that the effect of IPRs on trade is likely to vary across levels of economic development and the role of differences in economic development in determining the trade is explored by inserting interaction terms of $Group_{ig}$ and IPA. We consider whether the effects of membership in IPAs are heterogeneous across three income groups, - high-, middle-, and low-income groups - in addition to the sectoral intensiveness of IPRs.

The specification contains an analogous set of controls for each country's compliance with the TRIPS Agreement. And we control for unobservable factors that may affect trade volumes and may be correlated with IPA variable. α_{gst} are income group-sector-time fixed effects and α_i are countries fixed effects.

Table 2. Effect of IPA on Trade

	Import		Export	
	(1)	(2)	(3)	(4)
log(GDP)	0.908***	0.791***	1.156***	0.465***
	(0.0210)	(0.0513)	(0.0482)	(0.0971)
HighIP x log(GDP)	0.072***	0.071***	0.154***	0.149***
	(0.0095)	(0.0098)	(0.0196)	(0.0201)
LowIP x IPA	0.557***	0.125***	0.866***	0.126
	(0.0891)	(0.0456)	(0.1717)	(0.0892)
HighIP x IPA	0.392***	-0.044	1.046***	0.294**
	(0.0795)	(0.0523)	(0.1901)	(0.1032)
LowIP x TRIPS	-0.056	-0.079*	-0.020	-0.017
	(0.1207)	(0.0478)	(0.2243)	(0.0613)
HighIP x TRIPS	0.129	0.110**	0.175	0.144
	(0.0869)	(0.0502)	(0.2758)	(0.0891)
Number of observations	3,029,648	3,029,648	2,268,160	2,268,160
Group-industry-year fixed effect	Yes	Yes	Yes	Yes
Country fixed effect	No	Yes	No	Yes

Source: By author

Table 2 reports the regression results for imports and exports. In column (2) and (4), the country fixed effect is controlled for and the effects of IPA on imports and exports are analyzed, respectively. Column (4) shows that exports increase with the accession to an IPA, especially in IP-intensive industries. Column (2) shows that import of less IP-intensive products increases with the accession to an IPA. However, the effect of IPA on import in IP-intensive industries is statistically insignificant but negative. One interesting point is that the compliance of TRIPS has an opposite effect on imports. As illustrated in table 3 in the appendix, the positive effect of IPA on exports is found in all groups of countries but the positive effect of IPA on imports is mainly found in high-income or upper-middle-income countries. The impact of TRIPS on imports, however, is found in upper-middle-income and lower-middle-income countries and the compliance of TRIPS does not significantly affect imports of high-income countries. The effect of IPA on imports varies across industries depending on reliance on IPR, especially in upper-middle-income and lower-middle-income countries. The import of IP-intensive commodities increases with the TRIPS, but decreases with an IPA. In contrast, accession to the TRIPS and an IPA had a reverse effect on imports in less IP-intensive industries. This result stands in contrast with previous studies because previous literature largely considered only trade with developed countries.

Since many of the strong IPR-related provisions arise in order to address issues in specific sectors, we analyze the effect of IPA on trade by the sector level for capturing variations at more disaggregated levels. Analogous to the equation above, the following equation describes the relationship between imports or exports and the income group- and sector-specific effects for both IPA and TRIPS.

$$\begin{aligned}\log(TR_{ist}) = {} & \beta_1 \log(GDP_{it}) + \sum_{s=LowIP} \beta_{2s} Sector_s \times \log(GDP_{it}) \\ & + \sum_g \sum_s \beta_{gs} Group_{ig} \times Sector_s \times IPA_{it} \\ & + \sum_g \sum_s \beta_{gs} Group_{ig} \times Sector_s \\ & \times TRIPS_{it} + \alpha_{gst} + \alpha_i + \varepsilon_{ist}\end{aligned}$$

Table 4 and 5 in the appendix show the regression results for this equation for imports and exports, respectively. In IP-intensive industries, the positive effect of IPA on exports can be found in all sub-sectors, except the chemical sector, while the effect of TRIPS on exports is positive in the chemical and ICT sectors. One of interesting outcomes is that exports of biopharmaceuticals significantly increased in countries which signed IPAs. This result suggests that high standard of IPAs in pharma-related patents may lead higher exports from developed countries.

V. Conclusion

IPR-related provisions in FTAs have proliferated since the launch of the WTO and the TRIPS. The extent to which these provisions

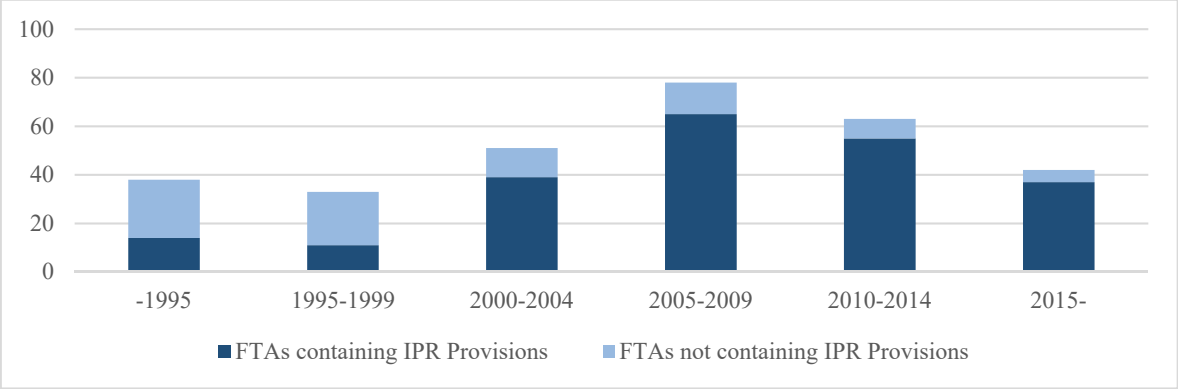
have influenced member countries' trade has gone largely unstudied and represents a potentially important area of research. This research draws suggestions and lessons from the aforementioned observations and analysis results.

While the IPR chapters in Korea's FTAs have grown in their depth, the partners which signed an IPA with Korea are generally developed countries with a high degree of standards in IPRs, such as the United States, the European Union, Australia, and Canada. That is, in practical terms, Korea's IPAs were limited in terms of requiring partners to introduce strengthened IPR regimes.

Korea's trade of IPRs has significantly increased over the last decade. Korea's exports of IPRs have quadrupled over the last 10 years from 3.9 billion USD in 2010 to 15.2 billion USD in 2019. Imports of IPRs have also increased by 60% from 10.6 billion USD in 2010 to 16.1 billion USD in 2019. Especially, the increase in IPR exports for copyrights is prominent due to a surge in demand for Korean music and online games. The trading partners of IPRs have also diversified. Trade volumes with emerging markets such as India, Vietnam, and Brazil have increased. In this sense, there is a growing need to protect Korean IPRs abroad. The ongoing FTA negotiations or potential FTAs should aim to include comprehensive and rigorous IPR-related provisions. According to the results in this study, the impact of IPAs on imports in upper-middle-income or lower-middle-income countries is positive. Considering the increase in trade of IPRs with developing countries, we expect an increase in exports of IP-intensive products as well as IPRs themselves through the IPAs. KIEP

Appendix

Figure 1. Classification of FTAs based on IPR Protection



Source: By author

Figure 2. FTAs Containing Provisions in Three Categories

Source: By author.

Table 3. Effect of IPA on Trade by Country Groups

	Import		Export	
	(1)	(2)	(3)	(4)
log(GDP)	0.903***	0.790***	1.153***	0.473***
	(0.0214)	(0.0509)	(0.0487)	(0.0955)
HighIP x log(GDP)	0.075***	0.074***	0.151***	0.147***
	(0.0092)	(0.0095)	(0.0205)	(0.0209)
HI x LowIP x IPA	0.466***	0.124*	0.952***	0.132
	(0.1211)	(0.0687)	(0.2563)	(0.1461)
HI x HighIP x IPA	0.351***	0.003	1.164***	0.336**
	(0.1293)	(0.0886)	(0.2600)	(0.1604)
UMI x LowIP x IPA	0.548***	0.101*	0.745***	0.100
	(0.1411)	(0.0552)	(0.2480)	(0.1090)
UMI x HighIP x IPA	0.370***	-0.078	0.936***	0.263*
	(0.0882)	(0.0657)	(0.3027)	(0.1592)
LMI x LowIP x IPA	0.799***	0.160	0.795**	0.221
	(0.2511)	(0.1554)	(0.3836)	(0.2345)
LMI x HighIP x IPA	0.566***	-0.073	0.770	0.212
	(0.1654)	(0.0959)	(0.4905)	(0.2061)
HI x LowIP x TRIPS	0.253*	-0.036	0.051	-0.144
	(0.1415)	(0.0580)	(0.2571)	(0.1075)
HI x HighIP x TRIPS	0.245*	-0.040	0.312	0.077
	(0.1450)	(0.0655)	(0.2662)	(0.1216)
UMI x LowIP x TRIPS	-0.258	-0.175**	-0.138	0.005
	(0.1858)	(0.0705)	(0.3423)	(0.1474)
UMI x HighIP x TRIPS	0.067	0.143*	-0.031	0.105
	(0.1414)	(0.0759)	(0.4423)	(0.1610)
LMI x LowIP x TRIPS	-0.115	0.044	0.169	0.173
	(0.2547)	(0.1285)	(0.5344)	(0.1801)
LMI x HighIP x TRIPS	0.087	0.262*	0.467	0.390**
	(0.1333)	(0.1407)	(0.6128)	(0.1924)
Number of observations	3,029,648	3,029,648	2,268,160	2,268,160
Group-industry-year fixed effect	Yes	Yes	Yes	Yes
Country fixed effect	No	Yes	No	Yes

Source: By author.

Table 4. Effect of IPA on Import by IP-intensive Sector

	(1) Low IP	(2) AI	(3) BIO	(4) CHEM	(5) ICT	(6) MED	(7) PT	(8) Other
log(GDP)	0.802***							
	(0.0509)							
Sector x log(GDP)		0.082***	0.220***	0.307***	0.082***	0.012	0.120***	0.010
		(0.0152)	(0.0296)	(0.0269)	(0.0156)	(0.0130)	(0.0167)	(0.0100)
Sector x IPA	0.173***	-0.129**	0.137	-0.070	0.031	-0.068	-0.153**	-0.017
	(0.0489)	(0.0692)	(0.1196)	(0.0953)	(0.0905)	(0.0638)	(0.0676)	(0.0480)
Sector x TRIPS	-0.092	-0.005	0.090	0.277**	0.215***	-0.018	0.079	0.061
	(0.0562)	(0.0821)	(0.1212)	(0.1090)	(0.0770)	(0.0630)	(0.0887)	(0.0419)
Number of observations								3,029,648
Group-industry-year fixed effect								Yes
Country fixed effect								Yes

Source: By author

Table 5. Effect of IPA on Export by IP-intensive Sector

	(1) Low IP	(2) AI	(3) BIO	(4) CHEM	(5) ICT	(6) MED	(7) PT	(8) Other
log(GDP)	0.457***							
	(0.0982)							
Sector x log(GDP)		0.153***	0.207***	0.358***	0.192***	0.239***	0.190***	0.105***
		(0.0399)	(0.0508)	(0.0387)	(0.0473)	(0.0353)	(0.0355)	(0.0189)
Sector x IPA	0.123	0.508**	0.514**	-0.084	0.637***	0.629***	0.360**	0.216**
	(0.1005)	(0.2100)	(0.2073)	(0.1756)	(0.2373)	(0.1849)	(0.1423)	(0.0860)
Sector x TRIPS	-0.044	0.129	0.280	0.463**	0.358**	0.032	0.054	0.105
	(0.0916)	(0.1796)	(0.1894)	(0.1861)	(0.1780)	(0.1627)	(0.1394)	(0.0837)
Number of observations								2,268,160
Group-industry-year fixed effect								Yes
Country fixed effect								Yes

Source: By author