

The Effect of Intellectual Property Rights on Export: A Case Study on G15 Countries

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Abstract: *Different levels of knowledge and technology, is one of the factors influencing development gap between countries. Hardware technology consists of machinery and equipment, in the other hand; software technology is arising from intellectual secretions of human which is supported by intellectual property rights. Supporting of inventions in the framework of intellectual property plays a decisive role in the country's commercial development, because new ideas, whose ownership is preserved, will establish or strengthen competitive advantage. In this paper, we study the effect of intellectual property rights protection on exports of Group 15 countries between 1995-2007. For this purpose, the index of patent programs is used as an indicator of intellectual property rights protection. The effect of intellectual property rights protection on exports has been examined both directly and through other variables such as Gross domestic product (GDP), foreign direct investment and research and development expenditure. The results indicate that broader supporting for intellectual property rights in terms of mutual needs of members of the group 15, will provide fertile ground for increased investment in research and development and in addition to attract foreign direct investment, increase competitiveness and thereby increase high-tech exports.*

Keywords: Exports, intellectual property rights, competitiveness

1. Introduction

The importance of intellectual property rights protection in order to promote intellectual creativity and protection of intellectual property on one hand, and extend communication and international exchanges, on the other hand, has led to lots of international efforts to develop regulations governing the intellectual property rights supporting carried out mainly under the auspices of the World Intellectual Property Organization. International system of intellectual property with two core treaties, the Treaty of Paris in 1882 for the Protection of Industrial Property and the Berne Convention for the Protection of Literary and Artistic Works in 1886, took root in the minds. These efforts reached its peak by the approval of the commercial aspects of intellectual property rights agreements in 1995 [1].

Intellectual property has a pivotal role in international business transactions. Intellectual property is now one of the most valuable, or often the most valuable asset in business dealings. The most important point of the granted rights within the framework of intellectual property rights is their exclusivity feature. This means that utilization of the rights is solely belong to its author and owner and others do not have the right to use them without the owner's permission and due to this, the rights for merchantability and assignment possibility there will be for a certain limited period of time[1]. Hence some of developing countries believe that the extent of protection of intellectual property rights policy will damage to the technology procedure. Instead, developed countries use trade policy as a major factor to strengthen intellectual property rights for bilateral or multilateral negotiations. So it can be said that stronger protection of intellectual property rights will effect on international trade flows.

Property rights protection policies, depending on the impact of the extension or market power can increase or decrease

the trade flow. To investigate these two effects one can see that the demand for exporter country goods in countries with stronger intellectual property rights would be increased because it will reduce the likelihood of fraud in the importing country. So despite the impact of the market extension, trade flows will increase towards countries with strong intellectual property rights. On the other hand the effect of the market power will reduce demand strength facing foreign firms and also will be result in exports volumes toward countries with strong intellectual property rights, because exclusive right holders with strong intellectual property rights can decrease exports by increasing prices and limiting exports.

This paper examines the role of intellectual property rights in exports of group 15 member's countries over the period of 1995 – 2007. The group 15 has considerable capabilities and potential, and according to the composition of the members and having rich natural resources, 30% of the business share between developing countries, as well as with 30 percent of the world population can play a key role in promoting South-South and North-South cooperation.

2. Theoretical basics and experimental studies

Intellectual property rights was legislated internationally recognized for the first time in 1882 under the Treaty of Paris which was signed by 55 countries in Paris for the protection of intellectual property industries. The Treaty of Paris was signed due to the failure of Vienna international exhibition in 1873, where many industrialists and inventors did not participate because of disclose of their inventions. According to the international treaty, the intellectual property rights were divided to 3 main categories including the inventions, trademarks and industrial designs. In other words, industrial property includes patents, trademarks, industrial designs, origin geographical indications, full circuits and trade secrets, and right of authorship includes literary and artistic works such as novels, poems, games,

videos, musical works, drawings, paintings, photos, sculptures, construction projects and other related rights.

Yang and Huang (2009) have evaluated the sensitivity of Taiwan's exports goods regarding to the importing countries differences in terms of intellectual property rights and the degree of imitation risk for the period of 2005-1997. The results show the positive impact of intellectual property rights of countries on the export of Taiwan. Also, while distinguishing the degree of imitation risk in countries, they state that intellectual property rights protection can have both positive and negative impact on exports. The other interesting point is that high-tech exports are more sensitive to the protection of intellectual property rights than low-tech exports[2].

Taylor (1993) have investigated the relationship between intellectual property rights and trade and expressed that support for intellectual property rights have two different simultaneous effects on business (positive effect of market expansion channel and negative effect of market power. The impact of the market extension have positive effect on trade, since the strengthening of intellectual property rights increase the cost of duplication and thereby reduce duplication of existing technologies in imported goods by the importing countries. In contrast, the impacts of market power decrease exports in countries with strong intellectual property rights. This decrease is due to the owners of new products restrict the export volume and increase prices through their market power.

So because of the impacts of market power and expansion assuming other conditions be constant, the effect of intellectual property on trade is unpredictable and depends on its importance degree. The effects may be simultaneous, while Maskas and Penobarty (1995) using the extended monopolistic competition model to estimate the effect of the protection of intellectual property rights (patent) on the flow of international trade, concluded that the impact of the market extension in the major countries that their internal firms have high imitate ability, tends to be more dominant. While the effect of the market power in small countries with limited ability to imitate is more powerful[3].

The results of Yang and kua (2008) shows a positive powerful correlation between the protection of intellectual property rights with expanding exports and foreign direct investment in 30 member states of the World Intellectual Property developers (WIPO) between 1995 and 1998[4].

Rafiqzaman (2002) examined the role of intellectual property rights protection on exports of 10 Canadian provinces to 67 countries in 1990, and states that to improve the rights of intellectual property, regardless of the degree of development in importing countries, will increase exports[5].

Falvey and colleagues (2006) examined the effect of intellectual property rights protection on industrial exports of 5 advanced countries to 69 countries in the period of 1970 to 1999. The results of this study show that the effect of intellectual property rights on trade and business is related to

the level of development, ability to imitate and the importing country's market size[6].

Ivus (2010)has examined the role of patent rights protection of 55 developing countries on exports in developed countries (24 members of OECD) during the period of 2000-1962. The results of this study indicate that increase of protection of intellectual property rights increased exports of developed countries about 53 billion dollars. Because developed countries are more patent-sensitive than developing countries[7].

Yang and Maskus (2009) examined the role of protecting the rights of intellectual property on the ability of export of developing countries firms engaged in export markets. They found that stronger intellectual property rights, facilitate technology transfer and reducing the marginal cost of production in the south side firms. As a result, if developing countries have a high absorption capacity (lower), an increase (decrease) in exports and welfare will be obtain in the south. They also noted that an excessive increase in protection of intellectual property rights will reduce the competitiveness and prosperity of the country[8].

Smith (2001), has considered the effect of intellectual property rights and export licenses. Experimental findings show that stronger foreign intellectual property rights, would increase further American exports in particular among the countries with more imitation ability though the effect of market expansion. In contrast, stronger foreign intellectual property rights will decrease the American exports to countries with less imitation capabilities, through the effect of market power [9].

D. Pham (2010) examined the economic impact of innovation and protection of intellectual property rights on export of 27 America's industry during the period 2000 to 2007, and states that increase in protection of property rights will create new jobs, and thereby, increased competition and the development of exports [10].

Lin and Liu (2005) examined the relationship between foreign patent rights and export of hi-tech industries in Taiwan's economy during the period 2000-1989, and according to estimates, states that both the impact of the market power and expansion exist in the export of economy of Taiwan[11].

3. Statistical Analysis of Exports Determining Factors

Intellectual property rights are the cornerstone of a free economy and individual countries needs to have strong intellectual property rights protection system in order to liberalization of economic policies. Therefore, countries should seek to create a stronger system for intellectual property rights to maintain or boost its position in the international arena or to join the World Trade Organization. We use analytical- comparative method to study the effect of intellectual property rights on exports ofG-15 for the period of 1995 –2007.For this purpose, we used the index of patent programs for intellectual property rights measurement and then we compared countries in the G15 but the main focus is

on the Islamic Republic of Iran. To evaluate the indirect effect of intellectual property rights on the export, we use components such as GDP, foreign direct investment, exports and high-tech products and also research and development expenditures.

3.1 Exports of goods and services

Export Development increased income and employment and performance and productivity of the production factors will improve due to the economies resulted from scale and improving production methods, and if there is unused production capacity or defective employment in developing countries (which actually exists), then the increase in production and exports of not only would not increase domestic prices, but also, it extend increase in efficiency, economies of scale and improving production techniques production and domestic production (even with constant data), and reduces the price of goods produced within the country[12].

New knowledge and ideas whose intellectual property system have been reserved, is considered as foundation of the success of many businesses. The exclusive right of patent provides a unique opportunity for protector country to work in international markets as a monopoly for export their product or service. So if all other conditions are provided, greater protection of intellectual property rights could lead to greater exports.

Based on the data from Table 1 as well as statistical data, during the years 1995 to 2007 the first to third place in exports of goods and services belongs to Mexico, Malaysia and India respectively, and last place is also owned by Senegal. While the first to third order of high-tech products exports belongs to Malaysia, Mexico and Brazil respectively, and the last place also belongs to Jamaica. (See Appendix .A).

It is worth noting that the average level of exports of goods and services of Asian, American and African countries in groups 15 in 2007 is 92/61, 75/31 and 31/53 billion dollars respectively, while the average high-tech products exports in Asian, American, and African countries in groups 15 in 2007 is 13.3, 4/31 and 0/02 billion dollars, respectively. Noteworthy point is that the share of exports of high technology products out from total exports in groups 15 is 9/52% and in group 7 is 12/88 percent, while the share of the Islamic Republic of Iran is only 0/45 Percent. In other words the eighth to tenth ranks for exports of goods and services and ninth to eleventh ranks for high-tech goods between the 19 Members is dedicated to the economy of Islamic Republic of Iran.

In order to increase the share of exports of goods and services, especially high-tech products of Islamic Republic of Iran in international trade, one should investigate the role of its determinants, particularly intellectual property rights.

The third, fifth and first ranks in patent programs have been allocated to the top three countries in the field of exports of goods and services, while Malaysia, Mexico and Brazil, the top three countries in the field of high-tech exports, are in

fifth third and second places relation to patents, respectively. It should be stated that the increase in number of patent programs will be result in impact of market extension if other affecting factors will be considered. As it can be seen from table 5 actions, the Islamic Republic of Iran with 242/04% average growth in number of patent, only observed 10.6% growth in exports of goods and services, while regarding exports of high technology goods we can observed 145/84% growth during given period. So it can be said that increase of number of patents wouldn't be able to develop exports of goods and services. According to table 2, the average ratio of exports to GDP in Asian, American and African countries of groups 15 in 2007 is 0/43, 0/19 and 0/25, respectively. The highest and lowest average ratio of exports to GDP of Asian countries of G15 re related to Malaysia and Sri Lanka (respectively 1/18 and 0/15) and about American countries is Chile and Argentina, (respectively 0/33 and 0/12 without considering Jamaica) and about African countries is Algeria and Nigeria (0/38 and 0/11 respectively). In general we can conclude that among the G-15 countries, the highest and lowest average ratio of exports to GDP over the study period belongs to Malaysia and Nigeria and the eleventh place is devoted to the economy of Iran. According to Table 2, the average ratio of high-tech products exports to GDP in Asian, American and African countries of groups 15 in 2007 respectively is 0/073, 0/006 and 0/001. The highest and lowest average ratio of high-tech products exports to GDP of Asian countries belongs to the Islamic Republic of Iran and Malaysia respectively, 0/39 and 0/005 respectively and about American countries it belongs to Mexico and Jamaica 0/004 and 0/001 respectively, and for African countries it belongs to Kenya and Egypt and is equal to 0/00009 and 0/002. Overall, it can be said that, among the G-15 countries, the highest average ratio of high-tech exports to GDP over the study period was owned by Malaysia and Egypt and fifteenth position has been allocated to the Islamic Republic of Iran. Although Malaysia, Mexico, Nigeria and Indonesia have been top countries in terms of the ratio of exports of goods and services to GDP and the ratio of exports of high-tech products to GDP, they have been placed in third (Mexico), fifth (Malaysia) and sixth (Indonesia) regarding patent programs. (See Appendix .B).

3.2 Patent

Patent is a kind of copyrights which is granted to inventor or his/her legal representative for a given invention (WIPO). According to table 3, indicators of patent programs have been considered by Patent Office as an indicator for the protection of property rights, among Asian countries, India ranked in first position with an average of (20746/4) and Sri Lanka with average of (344/6) was considered as of last rank. Mexico (12960/2) and Jamaica (96) from American countries and Egypt (1564/25) and Kenya (71) from African countries (without considering Nigeria and Senegal) have occupied first and last ranks. In general, among G15 countries India is in first and Kenya is in last place. (See Appendix .C).

3.3 Gross domestic production (GDP)

According to endogenous growth patterns, invention is economic growth driver. So, intellectual property rights protection is an economic determinant. Ivus, O(2010) says that intellectual property rights protection is responsible for industrial revolution in 20th century. Because patent usually results in increase of patent incomes through licensing canal and then it can lead to economic growth motivation[13].

According to table 4, first to third ranks of GDP of understudying countries belongs to Brazil, India and Mexico, while the last place is owned by Senegal.(See Appendix .D).

Also it should be noted that, average gross domestic product in Asian, American and African countries of G15 in 2007 were 206, 293 and 50 billion dollars respectively, while Iran GDP was equal to 151 billion dollars in 2007, which is lower than all other Asian countries in G15. In total, the top three countries in the field of patent applications, India, Brazil and Mexico, with a slight displacement can also be taken into account as top countries in terms of GDP, and countries ranks are very closely together almost regarding these two indicators. As mentioned earlier, patent revenues has led to economic growth of countries.

3.4 Foreign Direct Investment

Foreign direct investment (FDI) may increase the production capacities, especially in the case of export goods and in terms of linking and communication with international economy through the development of export markets and progress in the areas of research and development it can help to the host country. On the other hand, foreign investment in order to persistence presence in the host country requires protecting the intellectual property rights of host countries[14]. The gaps in the intellectual property systems between developing and developed countries are the main factor explaining the gap in the flow of foreign direct investment[15]. However, there is no doubt that the calm and stable political situation is the necessary condition to attract foreign direct investment. According to table 5, during years 1995 to 2007, first, second and third places of net inflow of foreign direct investment among G 15 countries belongs to Brazil, Mexico and India, and the final rankings is of the Zimbabwe and Senegal. It should also be noted that, the average net inflow of foreign direct investment from Asian, American and African countries of group 15 in 2007, were equal to 13/4, 3/8 and 24/5 billion dollars, respectively. As previously noted, the three countries, in the field of patent programs, are also in the top three, so it can be said that protection of property rights in the three countries has provided motivation of attracting foreign direct investment.(See Appendix .E).

However, net inflows of foreign direct investment in Iran is 3/12 billion dollars in 2007 which is lower than the average net inflow of foreign direct investment of Asian countries of G15. In other words, the Islamic Republic of Iran with an average net inflow of foreign direct investment of one billion dollars during the period under review has not been successful in attracting foreign investment and always the twelfth to eighteenth ranks are allocated to it. Although, understanding the importance of the subject, institution-

building, strengthening and directing research centers, accelerate privatization and outsourcing of the government, improve the business climate, strong macroeconomic management and more protection of intellectual property are considered as important factors in attracting foreign direct investments.

3.5 Expenditure on Research and Development

In literature, strengthening the protection of intellectual property rights encourages investment in research and development and increase the competitiveness and development of exports and especially high-tech exports. Based on table 1, during years 1995 to 2007, the top three ranks in research and development (R & D) accumulation among the G-15 belongs to Brazil, India and Mexico, and the last places belongs to Senegal and Kenya (regardless Venezuela and Zimbabwe due the lack of data and information), It should also be mentioned that the average R & D in Asian, American and African countries of group 15 in 2007 were 1/65, 1/87 and 0/11, respectively, while this number is 1/12 billion dollars in the Islamic Republic of Iran that is lower than the average R & D accumulation of Asia countries G15 members. In other words, the Islamic Republic of Iran, with an average R & D accumulation about 0/61 billion dollars during the understudying period, have promoted its rank within the group from the eleventh and twelfth places to the fourth one. Meanwhile, the eleventh and ninth rank of Iran in patent programs have been raised to fourth place at the end of the course. This has led to encourage investment in research and development and improving the position of the Islamic Republic of Iran in this field. This situation can be fertile ground for the rise in exports, especially exports of high technology products in the future.

4. Conclusions

In order to study the effect of protection of property rights on exports, patent applications index were used. The figures and stats in the tables show that in top countries in terms of patents, necessary fields to increase exports, especially high-tech exports, foreign direct investment will be provided, but what is striking in this respect will be that further support of property rights will be affective directly or through other variables if appropriate conditions for the application of this patent would be provided. If the patent has only the nominal aspect (what is seen in most developing countries) it can lead to increased exports. More protection of intellectual rights by creating an incentive for new ideas increases the success in international trade. Also it is worth noting that, in order to optimal allocation of resources such innovations should be more supported that can boost exports capabilities and thereby improve the country's trade balance, otherwise, the increase in patent applications on its own will not lead to an increase in exports. It should also be noted that the purpose of the various groups is to increase economic interactions among member countries, but now the main weight of economic interactions of the Group of 15 is with developed countries. So, in order to increase economic interactions of G-15 countries, it is essential to consider the needs of trading partners as well as the potential and the actual abilities of members regarding export. Another

interesting point is that, further support of property rights among members will provide fertile ground for confidence and security increase in order to provide more foreign direct investment. In addition, member states to maintain their advantage in the field of the business should protect intellectual property in areas where there is commercial advantage in accordance with the needs of other members to increase research and development costs and thereby improve their competitiveness.

References

[1] Seldon, T., 2011. Beyond patents: effective intellectual property strategy in biotechnology. *Innov. Manage.PolicyPract.* 13, 55–61.

[2] Yang, Chih-Hai& Yi-Ju Huang (2009),“Do Intellectual property rights matter to Taiwan’s exports? A dynamic panel approach,” *Pacific Economic Review*, Oxford, Vol. 14, pp. 555-578.

[3] Taylor, M.S., 1993, TRIPs, trade and technology transfer, *Canadian Journal of Economics* 26, 625-638.

[4] Yang, Chih-Hai&Nai-Fong Kuo(2008), “Trade-Related influences,foreign intellectual property rightsand outbound international patenting,”

[5] Rafiqzaman, M (2002), “Impact of patent rights on international trade:evidence from Canada,” *Canadian Journal of Economics*, Vol. 35, pp.307–330.

[6] Falvey, R (2006), “TRIPs Trade,imitative ability and intellectual property rights,” *Review of World Economics*,Vol. 145, No. 3, pp. 373-404.

[7] Ivus, Olena (2010), “Do stronger patent rights raise high-tech exports to the developing world?” *Journal of International Economics*, Vol. 81, pp.38–47.

[8] Yang, Lei & K.E. Maskus (2009),“Intellectual property rights, technology transfer and exports in developing countries,” *Journal of Development Economics*, Vol. 90, pp. 231–236.

[9] Smith, P.J (2001), “How do foreign patent rights affect U.S. exports, affiliate sales, and licenses,” *Journal of International Economics*, Vol. 55, pp.411–439.

[10] D Pham, Nam. (2010), “The impact of innovation and the role of intellectual property rights on U.S. productivity,competitiveness, jobs, wages and exports,” NDP Consulting.

[11] Liu, W. & Lin, Y (2005), “Foreign patent rights and high-tech export: evidence from Taiwan,” *Applied Economics*, Vol.37, pp.1543-1555.

[12] Santos Silva, J., Tenreyro, S., & Wei, K. (2014). Estimating the extensive margin of trade. *Journal of International Economics*, 93(1), 67–75.

[13] Archibugi, D., &Filippetti, A. (2013).The globalization of intellectual property rights: Much ado about nothing? SSRN eLibrary, March

[14] Branstetter, Lee, Fisman, Raymond, Foley, C. Fritz, Saggi, Kamal, 2007. Intellectual property rights, imitation and foreign direct investment: Theory and Evidence.NBER Working Paper, vol. 13033.

[15] Hudson, J., &Minea, A. (2013). Innovation, intellectual property rights and economic development: A unified empirical investigation.*World Development*,46,66-78.

(Appendix A)Table1.Exports of goods and services and Exports of high-tech goods of countries of G15 (Billion dollars at constant prices on 2000).

Country	Exports of goods and services					Exports of high-tech goods				
	1995	2000	2005	2006	2007	1995	2000	2005	2006	2007
Argentina	22.84 (7)	30.94 (7)	42.62 (7)	45.75 (6)	49.91 (6)	0.239 (6)	0.776 (6)	1.385 (6)	1.635 (6)	1.611 (6)
Algeria	17.29 (9)	22.56 (11)	27.42 (11)	26.76 (11)	26.60 (11)	0.002 (14)	0.021 (12)	0.006 (17)	0.006 (17)	0.004 (15)
Indonesia	60.81 (3)	67.62 (3)	94.23 (5)	103.10 (5)	111.90 (5)	1.308 (3)	5.698 (4)	4.779 (4)	3.549 (4)	2.820 (5)
Iran	20.56 (8)	23.00 (10)	28.80 (10)	30.27 (10)	31.11 (9)	---	0.038 (11)	0.088 (10)	0.237 (9)	---
Brazil	46.49 (4)	64.33 (4)	105.82 (4)	111.16 (4)	118.63 (4)	0.909 (5)	5.936 (3)	6.717 (3)	5.949 (3)	5.570 (3)
Peru	5.64 (13)	8.53 (14)	13.81 (13)	13.92 (13)	14.79 (13)	0.015 (11)	0.042 (10)	0.053 (12)	0.043 (12)	0.049 (11)
Jamaica	1.80 (16)	2.66 (17)	1.89 (15)	---	---	0.001 (15)	0.001 (17)	0.001 (18)	0.001 (18)	0.002 (16)
Zimbabwe	4.43 (14)	6.37 (15)	---	---	---	0.010 (12)	0.009 (15)	0.013 (15)	---	---
Sri Lanka	1.28 (17)	1.31 (18)	1.51 (16)	1.57 (15)	1.69 (15)	---	---	0.080 (11)	0.053 (11)	0.076 (9)
Senegal	22.84 (7)	30.94 (7)	42.62 (6)	45.75 (6)	49.91 (6)	---	0.014 (13)	0.051 (13)	0.011 (16)	0.012 (12)
Chile	16.11 (10)	23.76 (9)	32.58 (8)	34.24 (8)	36.85 (8)	0.060 (9)	0.100 (8)	0.268 (8)	0.264 (7)	0.276 (7)
Colombia	11.98 (12)	16.35 (12)	19.27 (12)	20.81 (12)	23.18 (12)	0.225 (7)	0.328 (7)	0.285 (7)	0.262 (8)	0.214 (8)
Kenya	2.79 (15)	2.74 (16)	4.01 (14)	4.11 (14)	4.35 (14)	0.022 (10)	0.013 (14)	0.025 (14)	0.028 (133)	0.052 (10)
Malaysia	73.89 (2)	112.37 (2)	145.86 (2)	156.03 (2)	162.53 (2)	21.220 (1)	46.999 (1)	49.405 (1)	50.698 (1)	45.999 (1)
Egypt	14.72 (11)	16.17 (13)	30.27 (9)	36.71 (7)	45.25 (7)	0.008 (13)	0.005 (16)	0.012 (16)	0.018 (15)	0.005 (13)

Mexico	93.78 (1)	179.89 (1)	215.04 (1)	238.31 (1)	253.01 (1)	14.455 (2)	31.09 (2)	24.255 (2)	25.134 (2)	22.435 (2)
Nigeria	---	24.82 (8)	---	---	---	---	0.000 (18)	---	0.028 (14)	0.005 (14)
India	36.90 (6)	60.88 (5)	121.98 (3)	144.99 (3)	155.80 (3)	0.974 (4)	1.569 (5)	2.692 (5)	3.103 (5)	3.239 (9)
Venezuela	41.27 (5)	34.84 (6)	34.12 (7)	32.59 (9)	30.78 (10)	0.107 (8)	0.080 (9)	0.109 (9)	0.063 (10)	---
Average of Asian's countries of G15	38.69	53.04	78.48	87.19	92.61	7.83	13.58	11.41	11.53	13.03
Average of American's countries of G15	29.99	45.16	58.14	70.97	75.31	2.00	4.79	4.13	4.17	4.31
Average of African's countries of G15	12.41	17.27	26.08	28.33	31.52	0.01	0.01	0.02	0.02	0.02
Total Average of countries of G15	27.52	38.43	56.58	65.38	69.77	2.64	5.15	5.01	5.06	5.15

The numbers in parentheses are the rank of countries in G1

(Appendix B) Table 2. The ratio of exports of goods and services and high-tech goods to GDP of G15 (Percent)

country	The ratio of exports of goods and services to GDP					The ratio of Exports of high-tech goods to GDP				
	1995	2000	2005	2006	2007	1995	2000	2005	2006	2007
Argentina	0.091	0.109	0.136	0.134	0.135	0.0010	0.0027	0.0044	0.0048	0.0044
Algeria	0.368	0.412	0.394	0.377	0.364	0.0000	0.0004	0.0001	0.0001	0.0000
Indonesia	0.382	0.410	0.453	0.470	0.480	0.0082	0.0345	0.0230	0.0162	0.0121
Iran	0.247	0.227	0.217	0.215	0.205	---	0.0004	0.0007	0.0017	0.0000
Brazil	0.080	0.100	0.143	0.145	0.146	0.0016	0.0092	0.0091	0.0077	0.0069
Peru	0.120	0.160	0.211	0.197	0.193	0.0003	0.0008	0.0008	0.0006	0.0006
Jamaica	---	---	---	---	---	0.0001	0.0001	0.0001	0.0001	0.0002
Zimbabwe	0.252	0.359	0.336	---	---	0.0014	0.0012	0.0023	---	---
Sri Lanka	0.347	0.390	---	---	---	---	---	0.0041	0.0025	0.0033
Senegal	0.334	0.279	0.256	0.260	0.267	---	0.0030	0.0086	0.0019	0.0019
Chile	0.263	0.316	0.353	0.354	0.364	0.0010	0.0013	0.0029	0.0027	0.0027
Colombia	0.133	0.174	0.169	0.171	0.177	0.0025	0.0035	0.0025	0.0021	0.0016
Kenya	0.245	0.216	0.264	0.255	0.252	0.0020	0.0010	0.0017	0.0017	0.0030
Malaysia	0.996	1.198	1.234	1.248	1.222	0.2859	0.5011	0.4179	0.4054	0.3459
Egypt	0.190	0.162	0.255	0.289	0.333	0.0001	0.0001	0.0001	0.0001	0.0000
Mexico	0.210	0.309	0.338	0.357	0.367	0.0324	0.0535	0.0381	0.0377	0.0326
Nigeria	---	0.540	---	---	---	---	0.0000	---	0.0004	0.0001
India	0.106	0.132	0.189	0.205	0.202	0.0028	0.0034	0.0042	0.0044	0.0042
Venezuela	0.366	0.297	0.257	0.222	0.194	0.0009	0.0007	0.0008	0.0004	---
Average of Asian's countries of G15	0.416	0.471	0.419	0.428	0.422	0.059	0.108	0.090	0.086	0.073
Average of American's countries of G15	0.158	0.183	0.201	0.198	0.197	0.005	0.009	0.007	0.007	0.006
Average of African's countries of G15	0.211	0.338	0.250	0.230	0.237	0.001	0.001	0.001	0.001	0.001
Total Average of countries of G15	0.249	0.305	0.274	0.272	0.272	0.018	0.032	0.027	0.027	0.023

(Appendix C) Table 3. Patent programs issued by The Bureau OF Patent office

country	1995	2000	2005	2006	2007
Argentina	---	---	5266 (5)	---	---
Algeria	162 (12)	159 (13)	524 (12)	669 (10)	849 (9)
Indonesia	2874 (5)	3889 (5)	4303 (7)	4606 (6)	---
Iran	407 (9)	616 (11)	4494 (6)	6527 (4)	---
Brazil	7448 (1)	17376 (1)	20005 (2)	24074 (2)	21825 (2)
Peru	---	1078 (10)	1020 (11)	1271 (9)	1359 (8)
Jamaica	61 (13)	101 (14)	69 (14)	153 (12)	---
Zimbabwe	180 (11)	---	---	---	---
Sri Lanka	189 (10)	321 (12)	360 (13)	423 (11)	430 (10)

Senegal	---	---	---	---	---
Chile	1706 (6)	3120 (6)	3007 (8)	3215 (7)	3806 (4)
Colombia	1234 (7)	1769 (8)	1761 (9)	2022 (8)	1981 (7)
Kenya	---	---	---	71 (13)	---
Malaysia	4052 (4)	6227 (4)	6286 (40)	4800 (5)	2372 (5)
Egypt	1101 (8)	1615 (9)	1436 (10)	---	2105 (6)
Mexico	5234 (3)	13061 (2)	14435 (30)	15505 (3)	16566 (3)
Nigeria	---	---	---	---	---
India	6566 (2)	8503 (3)	24505 (1)	28940 (1)	35218 (1)
Venezuela	---	2348 (7)	---	---	---
Average of Asian's countries of G15	2817.60	3911.20	7989.60	9059.20	7604.00
Average of American's countries of G15	1960.38	4856.63	5695.38	5870.00	5692.13
Average of African's countries of G15	240.50	295.67	326.67	123.33	492.33
Total Average of countries of G15	1672.83	3021.16	4670.55	4987.51	4596.15

(Appendix D)Table4. The ratio of exports of goods and services to population and the process of GDP for G15

country	<i>The ratio of exports of goods and services to population (Based on Dollar for each person)</i>					<i>The ratio of GDP for G15 (Billion dollars at constant prices on 2000).</i>				
	1995	2000	2005	2006	2007	1995	2000	2005	2006	2007
Argentina	656	837	1100	1169	1263	250 (4)	284 (4)	313 (4)	240 (4)	369 (4)
Algeria	611	739	834	802	785	46 (13)	54 (12)	69 (12)	70 (12)	73 (13)
Indonesia	317	329	429	46	498	159 (5)	165 (5)	207 (5)	219 (5)	233 (5)
Iran	348	359	416	431	438	83 (8)	101 (7)	132 (6)	140 (7)	151 (7)
Brazil	287	369	568	590	623	583 (1)	644 (1)	738 (1)	768 (1)	812 (1)
Peru	235	328	496	494	518	47 (12)	53 (13)	65 (13)	70 (13)	76 (13)
Jamaica	0	0	0	0	0	9 (16)	9 (17)	9 (17)	10 (17)	10 (17)
Zimbabwe	153	213	151	0	0	7 (17)	7 (18)	5 (19)	---	---
Sri Lanka	245	340	0	0	0	12 (14)	16 (15)	19 (15)	21 (15)	22 (15)
Senegal	147	132	133	135	142	3 (18)	4 (19)	5 (18)	6 (18)	6 (18)
Chile	1117	1540	1999	2079	2215	61 (11)	75 (11)	92 (11)	96 (11)	101 (11)
Colombia	328	411	447	476	522	89 (7)	94 (9)	113 (10)	121 (10)	131 (10)
Kenya	101	87	111	111	115	11 (15)	12 (16)	15 (16)	16 (16)	17 (16)
Malaysia	3587	4828	5690	5979	6120	74 (10)	93 (10)	118 (9)	125 (9)	132 (9)
Egypt	230	230	392	467	565	77 (9)	99 (8)	118 (8)	126 (8)	135 (8)
Mexico	1028	1836	2085	2286	2403	445 (2)	581 (2)	636 (3)	667 (3)	688 (3)
Nigeria	0	198	0	0	0	39 (13)	64 (14)	26 (14)	66 (14)	70 (14)
India	39	59	111	130	138	346 (3)	460 (3)	644 (2)	707 (2)	771 (2)

Venezuela	1872	1433	1283	1205	1119	112 (6)	117 (6)	132 (7)	146 (6)	158 (6)
Average of Asian's countries of G15	907	1183	1329	1401	1438	135	167	224	242	262
Average of American's countries of G15	690	844	997	1037	1083	200	232	262	277	293
Average of African's countries of G15	219	293	298	276	293	31	37	46	47	50
Total Average of countries of G15	595	751	855	885	919	151	179	215	229	244

(Appendix E)Table5.Net inflows of foreign direct investment and the average R & D expenditures for G15

country	Net inflows of foreign direct investment (Billion dollars at constant prices on 2000)					The average R & D expenditures for G15 (Billion dollars at constant prices on 2000)				
	1995	2000	2005	2006	2007	1995	2000	2005	2006	2007
Argentina	5.78 (3)	10.42 (3)	3.08 (11)	3.48 (11)	4.60 (11)	1.05 (4)	1.25 (4)	1.45 (4)	1.68 (3)	1.88 (3)
Algeria	0.00 (19)	0.44 (13)	1.59 (13)	2.95 (12)	3.10 (13)	0.09 (9)	0.11 (10)	0.05 (13)	0.11 (11)	0.11 (12)
Indonesia	5.51 (4)	-4.55 (19)	11.46 (4)	8.17 (8)	12.84 (7)	0.80 (10)	0.11 (9)	0.10 (10)	0.11 (10)	0.13 (10)
Iran	0.02 (18)	0.04 (17)	1.33 (14)	0.50 (15)	3.12 (12)	0.04 (11)	0.05 (12)	0.98 (5)	0.94 (4)	1.12 (4)
Brazil	6.40 (1)	32.79 (1)	18.01 (2)	26.60 (2)	56.75 (1)	4.18 (1)	6.05 (1)	7.15 (1)	5.87 (1)	9.75 (1)
Peru	2.91 (7)	0.81 (11)	3.13 (10)	4.54 (10)	7.48 (10)	0.04 (12)	0.06 (11)	0.10 (11)	0.11 (11)	0.12 (11)
Jamaica	0.09 (14)	0.47 (12)	0.77 (15)	1.04 (13)	1.08 (16)	0.005 (15)	0.005 (15)	0.06 (12)	0.06 (12)	0.06 (13)
Zimbabwe	0.12 (12)	0.02 (18)	0.06 (18)	---	---	---	---	---	---	---
Sri Lanka	0.06 (15)	0.17 (14)	0.34 (16)	0.64 (14)	0.86 (17)	0.02 (13)	0.02 (13)	0.04 (14)	0.04 (13)	0.04 (14)
Senegal	0.04 (16)	0.06 (16)	0.07 (17)	0.34 (16)	0.53 (18)	0.002 (17)	0.003 (17)	0.005 (16)	0.005 (15)	0.006 (16)
Chile	3.44 (6)	4.86 (4)	8.94 (7)	11.08 (5)	20.37 (4)	0.32 (5)	0.40 (6)	0.62 (7)	0.65 (6)	0.68 (6)
Colombia	1.00 (9)	2.39 (8)	13.00 (3)	8.86 (6)	14.34 (5)	0.27 (6)	0.13 (8)	0.21 (9)	0.22 (9)	0.24 (9)
Kenya	0.03 (17)	0.11 (15)	0.03 (19)	0.07 (17)	1.14 (15)	0.003 (16)	0.004 (16)	0.01 (16)	0.01 (15)	0.01 (17)
Malaysia	5.00 (5)	3.79 (6)	4.63 (8)	7.60 (9)	11.87 (8)	0.16 (8)	0.46 (5)	0.73 (6)	0.80 (5)	0.86 (5)
Egypt	0.46 (12)	1.24 (9)	4.06 (9)	8.51 (7)	11.12 (9)	0.17 (7)	0.19 (7)	0.30 (8)	0.33 (8)	0.31 (8)
Mexico	6.13 (2)	17.94 (2)	29.23 (1)	27.62 (1)	40.88 (2)	1.38 (3)	2.17 (3)	3.21 (3)	0.33 (7)	0.34 (7)
Nigeria	0.77 (10)	1.14 (10)	9.03 (6)	19.71 (4)	14.30 (6)	0.02 (14)	0.02 (14)	0.02 (15)	0.03 (14)	0.03 (15)
India	2.20 (8)	3.58 (7)	9.56 (5)	26.31 (3)	38.35 (3)	2.24 (2)	3.55 (2)	5.18 (2)	5.62 (2)	6.18 (2)
Venezuela	0.65 (11)	4.70 (5)	2.85 (12)	-0.64 (18)	1.45 (14)	---	---	---	---	---
Average of Asian's countries of G15	2.56	0.61	5.46	8.64	13.41	0.51	0.84	1.41	1.50	1.65
Average of American's countries of G15	0.18	0.38	1.86	3.95	3.77	1.03	1.43	1.83	1.56	1.87
Average of African's countries of G15	4.40	12.40	13.17	13.77	24.49	0.07	0.08	0.09	0.12	0.11
Total Average of countries of G15	2.71	5.36	8.08	10.49	16.28	0.59	0.85	1.19	1.11	1.28