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Does Pharmaceutical Industry Boost Economic Growth? A Competitiveness-Related Approach

İlaç Endüstrisi Ekonomik Büyümeyi Yükseltiyor mu? Rekabet Gücü Açısından Bir Yaklaşım

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Abstract: Pharmaceutical industry is an important source of growth and competitiveness in many advanced economies, especially in USA, Japan and several European countries. However, related literature is scarce, there are only a few studies which have analyzed the relationship between growth and pharmaceutical industry from a trade-related perspective. This study aims to analyze the relationship between pharmaceutical industry exports and GDP. In this context, firstly the Revealed Comparative Advantage Index of all countries in pharmaceutical industry exports are calculated. This index revealed that 27 countries in the world are specialized in pharmaceutical exports by 2014. Then, panel data models are specified to test the relationship between pharmaceutical industry exports and GDP & GDP per capita in these countries for 2000-2014 period. Results indicate that pharmaceutical exports of these specialized countries effect both GDP and GDP per capita positively. High levels of export competitiveness in this particular industry which heavily relies on the discovery and production of new drugs/medical products also contribute to the advancement of economy.

Keywords: Pharmaceutical Industry, Export Competitiveness, GDP, Panel Data

Öz: İlaç endüstrisi, başta ABD, Japonya ve bazı Avrupa ülkeleri olmak üzere birçok gelişmiş ekonomide büyümenin ve rekabet gücünün önemli bir kaynağıdır. Buna karşın ilgili literatür oldukça sınırlı olup, ilaç endüstrisi ile büyüme arasındaki ilişkiyi ticaretle bağlantılı olarak analiz eden az sayıda çalışma bulunmaktadır. Bu çalışmanın amacı, ilaç endüstrisi ihracatı ile GSYH arasındaki ilişkiyi analiz etmektir. Bu çerçevede öncelikle ülkelerin Açıklanmış Karşılaştırmalı Üstünlük Endeksi hesaplanmıştır. Buna göre, 2014 yılında dünyada 27 ülke ilaç endüstrisi ticaretinde uzmanlaşmıştır. Daha sonra, panel veri yöntemleri kullanılarak, bu ülkelerde 2000-2014 dönemi için, ilaç endüstrisi ihracatı ile GSYH ve kişi başına düşen GSYH değişkenleri arasındaki ilişki test edilmiştir. Sonuçlar, ilaç endüstrisinde uzmanlaşmış ülkelerin bu alandaki ihracatı ile GSYH ve kişi başına düşen GSYH arasında pozitif yönlü bir ilişkiyi göstermektedir. Ayrıca, büyük ölçüde yeni ilaçların/ürünlerin buluşuna ve geliştirilmesine dayanan bu spesifik endüstrinin ihracatında uzmanlaşma düzeyinin yüksek olması da, GSYH'yi ve kişi başına düşen GSYH'yi artırmaktadır.

Anahtar Kelimeler: Farmasötik Endüstrisi, İhracat Rekabet Gücü, GSYH, Panel Veri

1. Introduction

The pharmaceutical industry is a fundamental sector of knowledge and innovation based economy which is comprised of companies engaged in manufacturing and distributing drugs for human or veterinary use. It is driven mostly by innovation and R&D activities to produce new pharmaceuticals. Pharmaceuticals (biopharmaceuticals, drugs, medicines) are defined as the substances intended for use in the diagnosis, cure, mitigation, treatment or prevention of diseases or substances intended to affect the structure or function of the body. New pharmaceuticals have a significant positive effect on welfare and economic productivity by saving lives, increasing life spans, preventing surgeries and shortening hospital stays (ITA, 2016).

Pharmaceutical industry's benefits on a national economy include (EC, 2014; Nusser and Tischendorf, 2010):

- Decreasing the expenditures of public health,
- Decreasing the weights on pension systems and medical care systems,
- Improvement in health-related quality of life,
- Boosting the value of total economic production,
- Maintaining existing employment and generating new job opportunities,
- Increasing long-term economic growth and international competitiveness (via innovations, which result from a "well-aimed production of technological knowledge").

Therefore, it is obvious that pharmaceutical industry is a major sector of growth and competitiveness for national economies. In 2014, total revenues of the world pharmaceutical market added up to about € 965.03 billion and is expected to reach € 1,159.7 billion in 2018 (Lehnhausen, 2017). Global trade volume was approximately € 1000 billion in 2014 (WTO, 2016). Exports of pharmaceutical goods are important especially for advanced economies. The European Union as a whole is the largest importer and exporter of pharmaceutical products. Its main trading partners are the United States and Switzerland (Eurostat, 2016). In 2014, pharmaceutical exports in Europe amounted to € 316 billion. According to the European Federation of Pharmaceutical Industries and Associations, pharmaceutical imports, however, were only € 238.5 billion, leaving a positive trade balance of € 78 billion (EFPIA, 2015). In comparison, the European automotive sector showed a trade balance of € 95.1 billion, with € 124.2 billion exports and € 29.1 billion imports (European Automobile Manufacturers Association, 2015). Although the automotive industry showed a higher

trade balance, the trade volume was much higher in pharmaceutical industry. This fact also indicates the significance of the pharmaceutical industry for the European economy (Lehnhausen, 2017).

In a report of European Commission in 2014, it is indeed mentioned that "the European pharmaceutical sector has been one of the gems of European industry with regard to economic growth. A viable European pharmaceutical industry is important for European public health, economic growth, trade and science" (EC, 2014). This is true for the US economy, Japan, several emerging economies such as China and India and non-EU economies such as Switzerland as well.

Large and diversified, pharmaceutical sector has been one of the most critical and competitive sectors in the US economy. According to the Pharmaceutical Research and Manufacturers Association, more than 810,000 people work in this industry in the US. Directly and indirectly, the industry supports over 3.4 million jobs across the US and added an estimated $800 billion to the economy in 2015 (PhRMA, 2016). The pharmaceutical industry has consistently been one of the most R&D intensive industries in the US. The research-based industry generally allocates around 15 to 20 percent of revenues to R&D activities and invests over $50 billion on R&D annually (ITA, 2016). With $47 billion in exports in 2015, pharmaceuticals rank as one the top exporting sectors in the US. The largest export markets are Belgium, Netherlands, Canada, UK and Japan.

Pharmaceutical products are among the most important products within the chemicals sector. The pharmaceutical sector in total was the world's most research intensive sector in 2015 with more than € 100 billion spent on R&D (EC, 2015). This industry operates under unusual characteristics, both in its structure and in its business transactions. Due to the specific features of the industry, it is heavily regulated by both national, regional and international measures. Pharmaceutical industry has also been protected by strict patent laws and applications which ensure huge gains from both domestic market sales and international trade which makes it even more important for national economies and transnational firms.

However, despite the importance of this sector, there is a void in the related literature on this topic and only a few studies have analyzed the relationship between economic growth and pharmaceutical industry from a trade-related perspective (Blanc, 2015).

Considering that pharmaceutical industry exports can contribute to restoring the leader countries of this sector to economic growth, this study aims to analyze the relationship between GDP (and GDP per capita) and pharmaceutical industry exports.

The study is organized as follows: First of all, the global view of the industry is going to be presented with figures and statistics. Then one of the most distinctive features of this industry, which is the strict protection covered by TRIPS Agreement is going to be explained. In the next section, some aspects of the trade and competitiveness in this specific industry is going to be referred. The quantitative analysis is covered in methodology, model and results sections. These sections also include some explanations on the importance of R&D, which is the other distinctive feature of this industry.

2. The General View of Pharmaceutical Industry in the World

Pharmaceutical industry is a critical sector for all countries because the products of this industry are directly meeting vital consumer needs in a critical area i.e. health care. Needless to say, global pharmaceutical products market has been expanding exponentially.

According to WTO data, by 2014, this industry had a global trade volume of approximately $1118 billion (WTO, 2016).

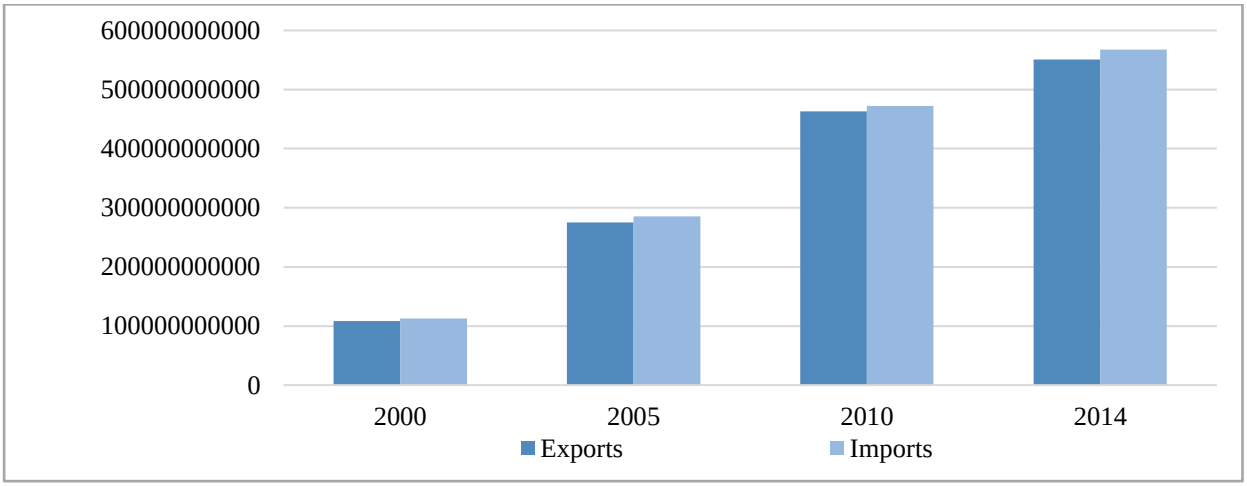

Figure 1. World Pharmaceutical Industry Trade (Million US$)
Source: WTO, International Trade Statistics Database, 2016.

Between 2000 and 2014, pharmaceutical sector trade increased incrementally. By 2014, both exports and imports of pharmaceutical products increased more than 5 times relative to their level at 2000 (Figure 1).

European countries and USA are currently the dominant actors of global pharmaceutical market. By sales, North America accounted for 44.5% of world pharmaceutical sales and Europe accounted for 25.3% of sales in 2014 (Figure 2). Japan also keeps a substantial share in the global pharmaceutical market with a sales percentage of 8.9%.

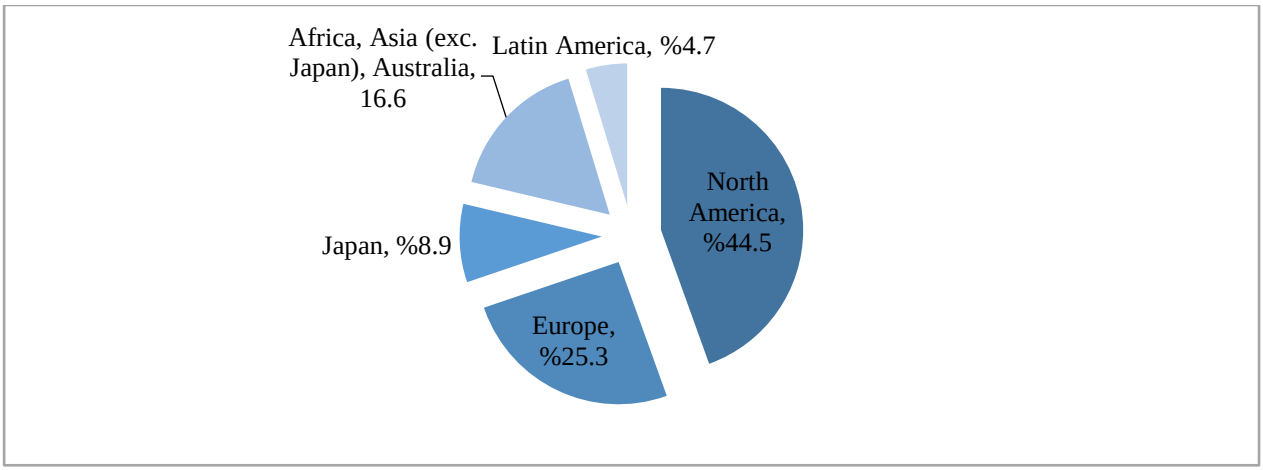

Figure 2. Global Pharmaceutical Market, By Sales of 2014 (% Shares)
Source: EUROSTAT, 2016; Efpia, 2015.

For Europe, ever since the XIX Century, pharmaceutical industry has been an engine industry, and it supplies the biggest contribution to the Europe's trade balance in high-technology, research and development-intensive industries (Gambardella et al, 2000).

Table 1 shows the fact that European pharmaceutical industry is an important employer and producer as well as it has been a net exporter of trade:

Table 1. European Pharmaceutical Industry (€ Million)

	2000	**2014**
Production	125,301	220,000
Exports (1)	90,935	316,500
Imports	68,841	238,500
Trade balance	22,094	78,000
R&D expenditure	17,849	30,500
Employment (units)	534,882	707,000
Total pharmaceutical market value at retail prices	140,345	267,400

(1) Data relate to EU-27, Norway and Switzerland for 2014 (EU-15 for 2000).
Source: EFPIA, 2015

It should be mentioned that pharmaceutical industry is mainly operated by multinational firms and three types of firms run within the sector which are:

i) Multinational firms which set their activities both in their home country markets and across national or even continental borders. These are highly R&D intensive firms.

ii) Smaller national firms which are specialized in the sales of pharmaceuticals for their domestic markets which are not R&D-intensive.

iii) R&D intensive firms in the field of biotechnology which are specialized in the discovery and development of new drug compounds, new drug screening tools and research tools (Gambardella et al, 2000).

Given the multinational character of the pharmaceutical industry, two different approaches with respect to international competitiveness can be considered. The first approach depends on the ownership structure while the second one depends on the country of origin for new product discoveries. From this perspective, for example, the discovery of a new drug in country A by a subsidiary of a country B firm would be considered a country B innovation since the country B parent firm owns the patent rights according to the first approach. On the other hand, it would be considered a country A innovation because of the scientific prominence and R&D employment according to the second approach, regardless of the patent rights (Grabowski, 1990: 167).

Table 2 presents top 25 pharmaceutical firms by their sales in 2015. According to the table, 10 of the top 25 firms are originated from Europe and similarly 10 of them are USA firms. There are four firms from Japan and one from Israel. These data reveal the global situation that big firms from advanced countries outrank the rest of the firms from other countries that set activities in pharmaceutical industry.

Table 2. Top 25 Pharmaceutical Firms by Global Sales

	Firm	**2015 ($ millions)**	**Country of origin**
1	Pfizer	43112	USA
2	Novartis	42467	Switzerland
3	Roche	38733	Switzerland
4	Merck & Co.	35244	USA
5	Sanofi	34896	France
6	Gilead Sciences	32151	USA
7	Johnson & Johnson	29864	USA
8	GlaxoSmithKline	27051	UK
9	AstraZeneca	23264	UK
10	AbbVie	22724	USA
11	Amgen	20944	USA
12	Allergan	18403	USA
13	Teva	16982	Israel
14	Novo Nordisk	16054	Denmark
15	Lilly	15792	USA
16	Bayer	15558	Germany
17	Bristol-Myers Squibb	14480	USA
18	Takeda	12565	Japan
19	Boehringer Ingelheim	12348	Germany
20	Astellas	10937	Japan
21	Mylan	9291	USA
22	Biogen Idec	9189	USA
23	Celgene	9069	USA
24	Merck KGaA	7693	Germany
25	Daiichi Sankyo	7215	Japan

Source: Pharmaceutical Executive, 2017.

The main reason of this phenomenon is the fact that pharmaceutical industry is characterized by a high degree of investment in research and development. The industry is highly competitive and it is strictly regulated.

All new medicines introduced into the market are the result of lengthy, costly and risky research and development conducted by pharmaceutical companies. Before a newly innovated drug enters the market, it has to pass through several phases to prove that it does not endanger patients' lives because of side effects. It also needs to be proved that the drug offers additional benefits in comparison to other pharmaceuticals that are already available on the market (Grabowski and Wann 2008: 379):

- When a pharmaceutical product arrives at the market, approximately 12-13 years of time will have passed since the first synthesis of its new substance;
- The research and development cost of a new chemical entity was calculated an average of € 1,172 million in 2012 (Mestre-Ferrandiz et al, 2012; Efpia, 2015).

Phases of R&D process of one medical product are (FDA, 2016):

<table>
<tr><td>1 year</td><td rowspan="5">Patent application
Acute toxicity
Pharmacology
Chronic toxicity</td><td rowspan="5">Discovery& Development

Pre-clinical development</td><td rowspan="10">10 years of R&D</td></tr>
<tr><td>2 years</td></tr>
<tr><td>3 years</td></tr>
<tr><td>4 years</td></tr>
<tr><td>5 years</td></tr>
<tr><td>6 years</td><td rowspan="5">Phase I
Phase II
Phase III</td><td rowspan="5">Clinical research</td></tr>
<tr><td>7 years</td></tr>
<tr><td>8 years</td></tr>
<tr><td>9 years</td></tr>
<tr><td>10 years</td></tr>
<tr><td>11 years</td><td rowspan="3">Registration/ Marketing Authorization
Price
Reimbursement</td><td rowspan="3"></td><td rowspan="3">2 to 3 years of administrative procedures</td></tr>
<tr><td>12 years</td></tr>
<tr><td>13 years</td></tr>
</table>

	Pharmacovigilance		
14 years			
15 years			
20 years	**Patent Expiry**		
25 years	**Supplementary Protection Certificate +5 years**		

Figure 3. Steps of the Development of One Medical Product
Source: EFPIA, 2015; FDA, 2016.

1) Discovery and Development (R&D intensive)

In the discovery phase, researchers generally discover new pharmaceutical products or new technologies with new insights into a problematic process that allow them to design a product to stop or reverse the effects of the disease.

In the development phase, once researchers find a promising compound for development, they conduct experiments to gather information on side effects, how it affects different groups of people, its effectiveness as compared with similar drugs... etc.

2) Preclinical Research (R&D intensive)

Before testing a drug in people, researchers find out whether it has the potential to cause serious harm. After the preclinical testing, researchers review their findings and decide whether the drug should be tested in people.

3) Clinical Research (R&D intensive)

"Clinical research" refers to studies, or trials, that are done in people. Clinical trials typically follow a series from early, small-scale, Phase 1 studies to Phase 2 studies and late-stage, large scale, Phase 3 studies. The purposes of these trials are safety, dosage, efficacy, side effects and monitoring of adverse reactions.

4) Administrative Procedures

After a long period of R&D intensive phases, the product is whether approved or declined. If this new product is approved, this step includes a series of post-development administrative procedures.

In a nutshell, these facts indeed show the complex and costly nature of the production process of pharmaceuticals. Although the development process of a medical product is this long and rough, global pipeline of new drugs has been expanding nevertheless. There were 13718 new products in the pipeline in 2016. This means 11.5 % growth in the pipeline since 2015 (Figure 4). According to Citeline Pharma (2016), half of the new drugs were in the preclinical phase and almost 5000 of them were in the clinical trials phase. USA has the biggest share in world drug pipeline. Firms originating from European countries also contribute to the pipeline significantly.

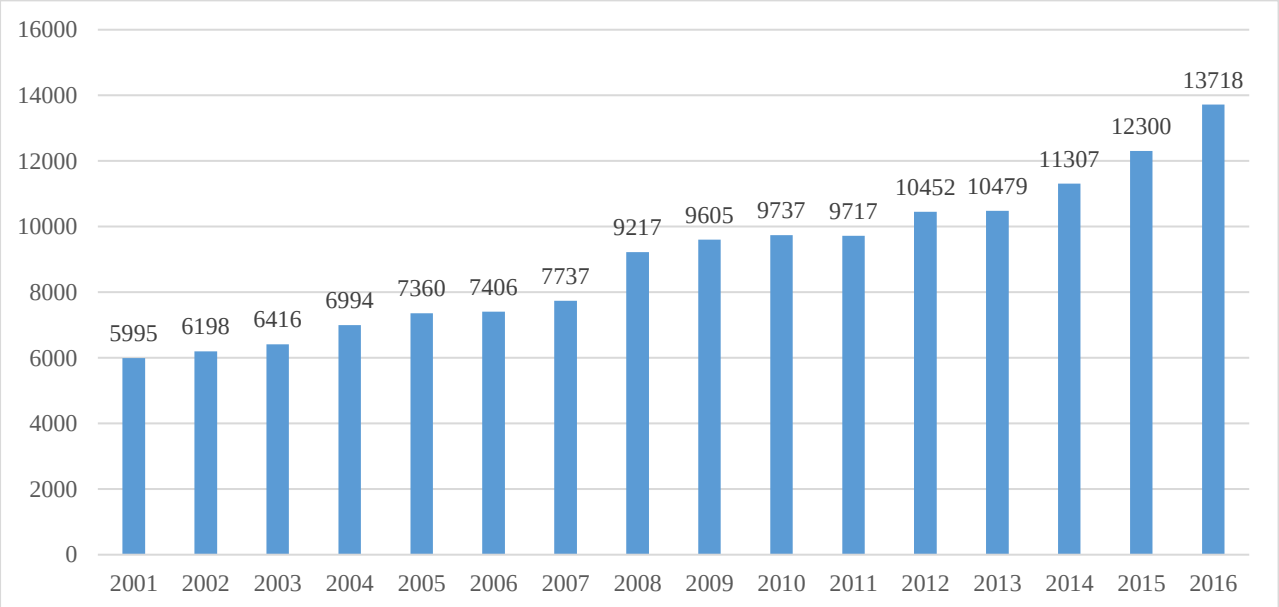

Figure 4. World Drug Pipeline Size by Year
Source: Citeline Pharma R&D Annual Review 2015.

Figure 4 also shows that the number of 13718 by 2016 is more than twice as many drugs under development as there were in 2001. These numbers altogether show that the pharmaceutical industry is an expanding sector and it seems to keep on expanding especially in USA and in EU.

3. Protection and Trade in Pharmaceutical Industry

The pharmaceutical industry operates under unusual characteristics, both in its structure and in its business transactions, that are little known outside the industry but which substantially affect the process of bringing new pharmaceuticals to world markets. As mentioned before, the development of a new pharmaceutical product is very time consuming, extremely costly and risky, with a relatively little chance of a successful outcome (Taylor, 2015). Therefore pharmaceutical industry has been protected by strict patent laws and applications which ensure large gains from both domestic market sales and international trade. The fixed cost of innovation is very large as mentioned in the previous section. The duration of protection is shorter than in other sectors because of the time period between discovery and approval of a new pharmaceutical product, the effective protection is estimated to last approximately twelve years – and a few more years of extension when available. Thus it is argued that the only industry in which patents play a crucial role in bringing new products to market is the pharmaceutical industry. The pharmaceutical industry is distinctive from others for another reason: The technology operated by the pharmaceutical industry fits the constant returns to scale hypothesis almost perfectly. Large fixed costs, constant marginal costs, innovation as the main driver, and the market concentrated in advanced countries are the main features of this industry (Boldrin and Levine, 2007).

Developing countries used to have a drug manufacturing capacity at some level too, especially in inexpensive generic medicine production for their domestic consumers. However, the production of medicines has been a critical issue since the implementation of some international agreements such as the Patent Cooperation Treaty (1970), which initiated a process of international expansion of more strict patent protection for pharmaceutical products and the Munich Convention (1973) which defined the notion of a "European Patent". Finally, Trade Related Intellectual Property Rights Agreement (TRIPS) which was designed within the WTO system, was implemented in January 1, 1995 (Boldrin and Levine, 2007).

The Trade Related Intellectual Property Rights Agreement, which requires all members of the WTO to guarantee intellectual property rights protection for pharmaceuticals and ensures that all WTO members guarantee at least 20 years of market exclusivity for patented medicines. The emergence of TRIPS-plus, which tends to have even more stringent requirements for intellectual property rights protection has made the potential effects of TRIPS on many developing countries to be pharmaceutical product suppliers even more compelling. Prior to the ratification of the TRIPS, many developing countries allowed very little intellectual property rights protection for pharmaceutical products. Those countries have since reformed their patent laws to be in compliance with the TRIPS and have been granting patents for new medicines. One possible implication of this change in patent policy is that developing countries with an active generic drug industry have been unable to continue copying innovative drugs from the developed world (Hafner and Popp, 2011).

According to Abbot, "Until January 1, 2005, the restrictions imposed by TRIPS Agreement was not likely to present a practical problem as it is now for many developing countries, because India, a thriving generic drug manufacturer and exporter, would not be providing patent protection for pharmaceutical products before that date. India had successfully developed its generic drug industry partly because it had not provided patent protection for the products of the pharmaceutical companies under patent elsewhere. If a developing country in Africa, for example, wanted to grant a compulsory license to import a low-priced generic version of an antiretroviral medicine (ARV) to treat HIV/AIDS, it could import the medicine from an Indian producer. However, India was obligated to introduce patent protection for pharmaceutical products as of January 1, 2005, when a ten-year transitional period given by TRIPS Agreement came to an end. Thus, newly developed medicines after January 1, 2005 have been subject to patenting. If new ARVs are developed, these drugs will not be available in low-priced generic versions unless India (or another country) issues compulsory licenses*. After January 1, 2005, "new" medicines had to be offered patent protection in all developed and developing (though not least-developed countries; the transitional period on pharmaceutical patents and data protection for least-developed WTO members was extended to January 1, 2016) countries" (Abbott, 2005).

As WTO General Council declared "we recognize that WTO Members with insufficient or no manufacturing capacities in the pharmaceutical sector could face difficulties in making effective use of compulsory licensing under the TRIPS Agreement. We instruct the Council for TRIPS to find an expeditious solution to this problem", pharmaceutical companies are largely based in a few advanced countries have the majority of pharmaceutical patents (Abbott, 2005). Although India, China, and some other developing countries are increasingly competing in the development of new pharmaceutical products, it can be said that developing countries are affected negatively from TRIPS agreement.

From the pharmaceutical companies' point of view, patent revenues are used for R&D activities which leads up to new medicines. New drugs are extremely costly to develop. The pre-clinical component of cost is especially large. With this huge research and development costs, it seems impossible for the pharmaceutical industry to operate and innovate without a strict patent protection.

However, looking back, the modern pharmaceutical industry developed faster where patent protection was not this strong. Since 1950s patent lobbyists have successfully increased the patent protection for pharmaceutical products.

In most of continental Europe, for example in France, Germany, Switzerland and Italy, patents for pharmaceutical products were prohibited until recently. Just the course of producing a medicine could be patented, thus when a drug

was discovered, other parties could produce it too, if they developed another way of producing that drug. However, these European countries have implemented new national patent laws which allow for the patent of pharmaceutical products in last few decades. Combined with the measures of international agreements mentioned above, pharmaceutical industry has been shielded even more which gives the big firms of advanced countries maximum advantage.

On the other hand, developing countries tend to run a trade deficit on pharmaceuticals because most countries lack manufacturing and innovative capability. They therefore depend on imports for their domestic supply of medicines. Local pharmaceutical industries in developing countries tend to be small and focused on the production of traditional medicines or generic medicines for domestic consumption. Some countries are an exception to that trend. Argentina, Brazil, China, Cuba, India, Mexico and South Africa, for example, have domestic pharmaceutical industries with varying levels of innovative capability (Gonzales et al, 2008; Hafner and Popp, 2011; Boldrin and Levine, 2007).

Looking at the exports statistics of pharmaceutical industry confirms the ongoing leading status of advanced economies in the world pharmaceutical exports market. Top 25 countries according to their shares in total world pharmaceutical exports by 2014 are shown in Table 3:

Table 3. Leading Countries in Pharmaceutical Exports (% of Total World Pharmaceutical Exports)[1]

		2000	**2002**	**2004**	**2006**	**2008**	**2010**	**2012**	**2014**
1	**Germany**	12.67	10.48	13.71	14.35	16.34	14.26	14.12	14.57
2	**Switzerland**	9.23	9.26	9.12	9.78	10.29	10.59	11.55	12.19
3	**Belgium**	6.33	13.10	12.34	12.21	11.73	10.98	9.13	9.64
4	**USA**	12.09	9.68	9.72	9.34	9.11	9.63	8.79	8.84
5	**France**	9.63	9.09	8.63	8.04	7.92	7.49	7.01	6.52
6	**UK**	9.92	9.00	9.14	8.18	7.57	7.43	7.21	6.29
7	**Ireland**	4.58	8.88	7.60	5.67	5.91	6.91	6.18	5.36
8	**Netherlands**	4.08	4.36	4.51	4.37	3.07	3.43	4.87	4.99
9	**Italy**	5.88	5.37	4.55	4.48	3.96	3.80	4.18	4.81
10	**Spain**	1.94	2.03	2.01	2.44	2.70	2.55	2.66	2.46
11	**China**	1.65	1.39	1.30	1.43	1.92	2.31	2.34	2.43
12	**Denmark**	2.69	2.31	2.27	2.09	1.91	1.94	2.26	2.39
13	**India**	1.06	0.96	0.92	1.09	1.38	1.54	2.14	2.38
14	**Austria**	1.71	1.73	1.44	1.70	1.74	1.76	1.84	2.06
15	**Sweden**	3.61	2.69	2.91	2.79	2.17	1.98	1.66	1.57
16	**Singapore**	0.93	0.55	0.48	1.68	1.18	1.32	1.79	1.49
17	**Canada**	1.13	0.93	1.21	1.49	1.47	1.23	1.02	1.29
18	**Israel**	0.39	0.56	0.55	1.01	1.15	1.40	1.29	1.13
19	**Hungary**	0.34	0.29	0.45	0.60	0.79	0.76	0.95	0.89
20	**Panama**	0.02	0.01	0.01	0.29	0.29	0.62	1.08	0.81
21	**Poland**	0.14	0.12	0.15	0.24	0.40	0.48	0.48	0.65
22	**Japan**	2.52	1.69	1.43	1.02	0.87	0.93	0.79	0.61
23	**Slovenia**	0.37	0.36	0.43	0.47	0.55	0.49	0.53	0.57
24	**Czech Rep.**	0.19	0.16	0.20	0.26	0.34	0.36	0.33	0.49
25	**Australia**	1.07	0.63	0.77	0.83	0.80	0.77	0.88	0.48

Source: Author's own calculations based on WTO merchandise trade statistics.

Between the end of World War II and 1980s, USA was the world leader of pharmaceutical production and exports. Japan, West Germany and Switzerland used to show an outstanding performance along with USA as well (Grabowski, 1990). Till then, many other European countries and several other countries i.e. China, India and Panama invested in pharmaceutical industry and gained significant shares in global markets. It can be seen in Table 3 that 16 out of 25 leading countries occur to be European countries. For the last 15 years, Germany has been the leader of world pharmaceutical exports.

There is an important fact here which should be emphasized again right here. Pharmaceutical industry exhibits a multinational firm based structure. The firms of USA, Germany, Japan and other leading countries set a big portion of their activities abroad which reduce their exports levels by country. For example, USA and Canada hold 45% of total world pharmaceutical sales but they hold approximately 10% of total world pharmaceutical exports. This situation about the recording of exports reflects the low shares of Japan as well as the European countries in the list.

It is seen from the table that China, India, Singapore and Panama are the high-growth countries of this sector in the list.

One main reason of this fact is the significant growth in the market and R&D conditions in major developing countries such as China and India, which causes the economic activities and R&D to migrate from European countries to these emerging economies (Efpia, 2015).

[1] The full list of the countries by their share in world pharmaceutical exports is presented in Appendix A.

4. International Export Competitiveness in Pharmaceutical Industry Exports

Another common measure to assess a country's export potential of an industry or product is Bela Balassa's RCA Index (revealed comparative advantage index). RCA Index identifies the industries, products and/ or product groups where the country apparently has an advantage in international competition. This aspect of the index allows the country to promote trade according to these products/ product groups revealing comparative advantages.

RCA of a specific industry i of a country j is (ITC, 2016: 42; Muratoglu and Muratoglu, 2016):

$$RCA_{ij} = \left(X_{ij} / X_{j}\right) / \left(X_{wi} / X_{w}\right)$$

Where;

X_{ij}: the value of exports of commodity i by country j
X_j: the value of total exports by country j
X_{wi}: the value of world exports of commodity i
X_w: the value of total world exports.

In other words, the revealed comparative advantage of a specific country in the trade of a given industry's products is measured by the industry's share in the country's exports relative to its share in world trade.

The RCA Index takes values between 0 and +∞. If it takes a value less than 1, this implies that the country is not specialized in exporting the product. If the index takes a value more than 1, this implies that the country is specialized in exporting that product (ITC, 2016: 42).

Using this index of Balassa, the RCA values of all countries according to their pharmaceutical industry exports are calculated in this section[2]. According to our calculations, 27 countries have x>1 RCA values which means only 27 countries are specialized in pharmaceutical industry exports in the world.

Table 4 shows the ranking of these countries from highest to the lowest according to their RCA values in 2014:

Table 4. Leading Countries in Pharmaceutical Exports (RCA Values)

		2000	**2002**	**2004**	**2006**	**2008**	**2010**	**2012**	**2014**
1	**Panama**	1.14	0.97	0.52	4.37	4.85	8.68	12.33	11.71
2	**Ireland**	3.82	6.54	6.69	6.33	7.60	9.08	9.80	8.67
3	**Switzerland**	7.41	6.57	6.85	8.02	8.28	8.28	6.84	7.44
4	**Cyprus**	3.11	3.27	4.30	4.28	5.41	5.56	6.32	6.12
5	**Denmark**	3.39	2.61	2.72	2.73	2.64	3.08	3.97	4.08
6	**Malta**	0.50	0.39	0.43	1.79	2.80	2.61	2.81	4.08
7	**Belgium**	2.17	3.94	3.71	4.04	4.02	4.12	3.79	3.89
8	**Barbados**	3.37	2.23	1.19	1.66	3.34	5.14	4.46	3.78
9	**Israel**	0.81	1.23	1.31	2.62	3.03	3.66	3.79	3.16
10	**Slovenia**	2.72	2.25	2.42	2.45	2.60	2.54	3.05	3.02
11	**Jordan**	3.49	3.06	2.35	2.35	2.57	3.23	2.90	2.77
12	**UK**	2.24	2.09	2.42	2.20	2.59	2.73	2.82	2.36
13	**Austria**	1.63	1.43	1.12	1.51	1.55	1.77	2.04	2.20
14	**France**	1.90	1.78	1.76	1.97	2.08	2.19	2.28	2.13
15	**Moldova**	0.34	0.18	0.15	0.37	0.40	1.30	1.58	1.85
16	**Germany**	1.48	1.11	1.39	1.57	1.83	1.73	1.86	1.84
17	**Sweden**	2.67	2.15	2.17	2.29	1.91	1.91	1.78	1.81
18	**Italy**	1.58	1.37	1.19	1.30	1.18	1.30	1.54	1.73
19	**Hungary**	0.78	0.55	0.74	0.97	1.18	1.21	1.70	1.53
20	**Spain**	1.09	1.05	1.01	1.38	1.55	1.54	1.66	1.44
21	**Netherlands**	1.13	1.16	1.16	1.14	0.78	0.91	1.37	1.41
22	**India**	1.61	1.27	1.10	1.09	1.15	1.04	1.34	1.40
23	**Croatia**	2.54	1.53	1.15	1.05	0.88	1.21	1.61	1.37
24	**Greece**	1.32	0.97	2.06	2.12	1.86	1.62	1.27	1.32
25	**Georgia**	0.98	0.35	0.16	0.41	0.63	0.64	0.86	1.26
26	**Bulgaria**	1.08	0.62	0.43	0.38	0.66	0.95	1.06	1.24
27	**USA**	1.00	0.91	1.10	1.10	1.14	1.15	1.05	1.04

Source: Author's own calculations based on WTO merchandise trade statistics.

Evaluating Table 3 and Table 4 together, it is seen that almost the same countries take place in both lists. However, Panama and USA are exceptional cases. Surprisingly, Panama is the 20th country in the ranking according to the shares in total world pharmaceutical exports while this country is the leader among all the other countries according to RCA level ranking. Moreover, USA is the 4th country according to world share of pharmaceutical exports but ranks as the

[2] The full list of the RCA values of all countries is presented in Appendix B.

27th country in the world according to the sorting by RCA levels. These findings make sense when it's considered that RCA means the relative share of that specific industry in a country's exports to that industry's share in total world exports. In other words, while Table 3 demonstrates the importance of countries in world pharmaceutical exports; RCA demonstrates the importance of pharmaceuticals in country's exports relative to its importance in overall world exports. For example, the share of pharmaceutical exports in total merchandize exports is 34% in Panama in 2014. The same ratio is 3% in USA. The relative importance of that sector to economy is much larger in Panama, hence the bigger RCA values. On the other hand, USA pharmaceutical exports by 2014 are more than 10 times larger than Panama's pharmaceutical exports.

Obviously, the strategies based on information and innovations are the vital elements of competitiveness both by firm level and country level in the 21st century. Therefore, firms operating within the pharmaceutical industry invest larger percentages of their sales in R&D than the other industries, including high-tech industries such as computer software and electrical and electronics firms (Danzon et al, 2005).

Pharmaceutical industry is the most innovative and R&D intense sector today. Therefore, the research-based pharmaceutical industry can play a critical role in restoring countries to growth and ensuring future competitiveness in an advancing global economy (Efpia, 2015).

5. Pharmaceutical Industry Trade and Economic Growth: The Literature

The effect of pharmaceutical industry production and/or trade on economic growth can be analyzed indirectly through the life expectancy variable and its relationship with economic growth in the literature. According to this approach, advances in pharmaceutical industry has a positive impact on life expectancy. And many studies in the literature indicate a positive correlation between the prolonged life expectancy and economic growth (Barro, 1996; Barro and Lee, 1994; Barro and Sala-i Martin, 1995; Bloom, Canning and Malaney, 2000).

Another link of economic growth and pharmaceutical industry is the one via innovations. Lichtenberg (1998) analyzed the relationship between pharmaceutical innovations and economic growth for the periods 1970-1980 and 1980-1991 in USA. The findings of the study suggest a positive effect of pharmaceutical innovation on lifetime income, which means a significant contribution to economic growth.

On the other hand, the relationship between pharmaceutical industry trade and GDP has been studied mainly with Gravity Model in the literature.

Blanc (2015) analyzed the determinants of the extra-EU exports of the pharmaceutical products of the EU-25 countries for the period 2004-2011 using the Gravity Model of international trade. According to this study, GDPs of trading partner countries of the exporting EU countries have positive coefficients and are statistically significant. The geographical distance between EU and importing countries has a negative coefficient. On the other hand, the quality of infrastructure, the size of healthcare sector of the importing country and the level of intellectual property rights in the importing country variables all have positive coefficients and are statistically significant. GDP of the exporting country was not included in this analysis. Thus, the relationship between pharmaceutical industry exports and economic growth of the exporting country was not analyzed. Other than that, the variables of the Gravity Model revealed the expected results.

Boring (2010) also used Gravity Model to find out whether foreign patent protection increased the United States' trade of pharmaceuticals. The US exports and imports of pharmaceuticals for the period 1993-2007 was analyzed. The results indicate that patent protection has not been a strong determinant of the US exports and imports of pharmaceuticals. However, GDPs of importing countries have been positively correlated with the increases in exports and imports of the US pharmaceutical industry.

Wilkman (2012) analyzed the determinants of the Swedish pharmaceutical exports for 1995-2010 period. The results of this study indicate that both GDP and GDP per capita of the importing countries have been positively correlated with the increases in Swedish pharmaceutical exports.

All of these three studies mentioned above employed Gravity Model of international trade to assess the determinants of pharmaceutical industry trade for different countries. However, they all neglected to include the GDP of the exporting country variable to their models although it is one of the main variables of the Gravity Model. In other words, the effect of the economic growth of the importing countries on the pharmaceutical exports of the exporting country has been analyzed but the relationship between the economic growth of the exporting countries and their own pharmaceutical industry trade has not been analyzed. To the extent of our literature survey, this remains a huge void in both pharmaceutical industry studies and economic growth literature.

6. The Model

This study aims to analyze the relationship between economic growth and pharmaceutical industry exports of 27 leading countries in pharmaceutical industry over the period 2000-2014.

In this context, two dependent variables are selected for the analyses: GDP and GDP per capita. The logic to use two dependent variables is to find out whether these models turn out to give similar results by direction and magnitude. In other words, the results for these two dependent variables will prove crosscheck for each other and for the consistency of results.

Two of five independent variables are related to pharmaceutical industry exports: First one is the level of pharmaceutical industry exports and the second variable is the RCA values of countries according to their pharmaceutical industry exports. These RCA values are calculated for every country in the world (130 countries that report their data in WTO database). Sorting these values (by 2014) from highest to lowest, world rankings of countries according to their RCA levels are obtained. The countries, which have RCA values bigger than 1, in other words, the countries which are specialized in pharmaceutical industry exports are analyzed in this study. These 27 countries are listed in Table 4. These two explanatory variables generate multicollinearity when they are employed together in a regression so their effects are measured in separate regressions.

Another outstanding variable is human capital in this analysis. The effects of human capital on success of firms have largely been explored in the literature. When it comes to pharmaceutical industry, the literature is relatively limited though. Hess and Rothaermel (2011) and Liu (2014) analyzed the effects of human capital in pharmaceutical sector. Both studies revealed positive effects. Liu (2014) emphasized the importance of human capital especially in value preservation and protection of patents in pharmaceutical companies. In this study, human capital is included in the model in order to test its effects on pharmaceutical exports.

Finally, total factor productivity and capital stock of these countries are used as the conventional variables for testing their effects on GDP and GDP per capita, along with the effect of pharmaceutical industry exports.

Sub-sectoral trade data begins from the year 2000 in WTO Database where pharmaceutical exports data was retrieved from. On the other hand, human capital, total factor productivity and capital stock data was retrieved from Penn World Table 9 dataset which ends at 2014. Thus, the period of this study is determined as 2000-2014 by data availability.

The sources of data are presented in Table 5:

Table 5. Data Sources

Pharmaceutical exports	WTO, Time Series on International Trade Database
Total exports	WTO, Time Series on International Trade Database
Human capital	Penn World Table 9
Total factor productivity	Penn World Table 9
Capital stock	Penn World Table 9
GDP	World Bank, World Development Indicators database
GDP per capita	World Bank, World Development Indicators database

Pharmaceutical exports, GDP, GDP per capita and capital stock variables are taken as level; human capital and RCA variables are taken as index values.

Summary statistics of the variables are presented in Table 6.

Table 6. Summary Statistics

Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
GDP	404	1.09e+12	2.68e+12	1.29e+09	1.73e+13
GDP per capita	404	26533.28	18966.52	354.0013	88002.61
Human capital	405	3.079296	.3914063	1.78207	3.73428
Capital stock	405	4224431	9150020	4082.072	5.28e+07
TFP	405	.79691	.2211054	.16846	1.3806
Pharma exports	405	1.15e+10	1.61e+10	2692736	8.02e+10
RCA	405	2.471108	2.144241	.08229	13.171

Source: Created by the author using Stata 13.

7. Methodology

The equations of the first group of models where the dependent variable is GDP are as follows:

MODEL 1: $\ln(GDP_{it}) = \alpha + \beta_1 \ln(pharmaexports_{it}) + \beta_2 \ln(tfp_{it}) + \beta_3 \ln(capstock_{it}) + \beta_4 \ln(hc_{it}) + u_{it}$

MODEL 2: $\ln(GDP_{it}) = \alpha + \beta_1 \ln(RCA_{it}) + \beta_2 \ln(tfp_{it}) + \beta_3 \ln(capstock_{it}) + \beta_4 \ln(hc_{it}) + u_{it}$

The equations of the second group of models where the dependent variable is GDP per capita are as follows:

MODEL 3: $\ln(GDPpercapita_{it}) = \alpha + \beta_1 \ln(pharmaexports_{it}) + \beta_2 \ln(tfp_{it}) + \beta_3 \ln(capstock_{it}) + \beta_4 \ln(hc_{it}) + u_{it}$

MODEL 4: $\ln(GDPpercapita_{it}) = \alpha + \beta_1 \ln(RCA_{it}) + \beta_2 \ln(tfp_{it}) + \beta_3 \ln(capstock_{it}) + \beta_4 \ln(hc_{it}) + u_{it}$

Where;

- GDP is the gross domestic product level of the selected country,
- GDP per capita is the per capital gross domestic product level of the country,
- pharmaexports is the country's share of pharmaceutical exports in total world pharmaceutical exports,
- RCA is the revealed comparative advantage index value of countries,
- tfp is the total factor productivity variable,
- capstock is the capital stock level of the country,
- hc is the human capital variable,
- u is the error term,
- i denotes the cross sectional dimension of the model and,
- t denotes the time series dimension of the model.

All the variables are in natural logarithm form. Models 1 and 3 include pharmaexports variable while Models 2 and 4 include RCA variable. These two explanatory variables are used in separate equations in order to prevent multicollinearity problem amongst them as mentioned before.

At the first step of the analysis, the models are tested for heteroscedasticity and autocorrelation. Results of the tests showed that all of the models suffer from heteroscedasticity and autocorrelation. The results of these diagnostic tests are as shown in Table 6 and Table 7.

Since the models are heteroscedastic and autocorrelated, cluster option of the panel fixed effects and cluster option of the panel random effects are performed. Clustering on the panel variable produces an estimator of the VCE that is robust to cross-sectional heteroscedasticity and within-panel (serial) correlation. This aspect of clustering on the panel variable makes it suitable for the models of this study.

8. Results

Here are the results of the analyses for 27 countries which are specialized in pharmaceutical exports over the period 2000-2014. All of these countries have >1 RCA values of their export competitiveness in pharmaceutical exports.

The estimation results from the first group of models are presented in Table 7. Dependent variable is GDP and all the variables including the dependent variable are in natural logarithm form. The results indicate that capital stock, and total factor productivity variables are statistically significant and they have positive signs. On the other hand, human capital variable is statistically significant in two regressions.

Furthermore, both the pharmaceutical exports variable of the 27 countries and their RCA's according to their pharmaceutical industry exports have positive coefficients and are statistically significant.

The magnitudes of the variables indicate that human capital has a huge impact on the dependent variable. One percent increase in human capital generates more than one percent increase in gross domestic income. Capital stock has the second biggest impact on GDP which explains the dominance of advanced economies to a certain degree. Capital stock is followed by total factor productivity. Pharmaceutical exports and revealed comparative advantages in pharmaceutical exports of countries have the lowest effects on GDP. All of these variables have positive effects on the dependent variable in both fixed effects and random effects models.

Table 7. Model specifications (Dependent variable: World share of pharmaceutical exports)

Dependent Variable: Log GDP (2000-2014)				
	FEM regression (1)	**REM regression (1)**	**FEM regression (2)**	**REM regression (2)**
.constant	13.6406***	13.6223***	14.6634***	14.6902***
.lcapstock	0.5478***	0.6005***	0.6173***	0.6570***
.lhc	1.2032	0.1544	3.0833**	2.5967***
.ltfp	0.3718***	0.3984***	0.4904***	0.5168***
.lpharmaexports	0.1671***	0.1892***		
.lrca			0.1401**	0.1463***
R^2				
Within	0.8462	0.8448	0.8154	0.8150
Between	0.7898	0.8106	0.6258	0.6449
Overall	0.7886	0.8094	0.6283	0.6471
Hausman test	0.0022		0.3569	
Wooldridge test	0.0000		0.0000	
Wald test	0.0000		0.0000	
No. of observations	389	389	389	389

Note: All variables are in logs, and *** denotes statistical significance at 1% level, ** represents statistical significance at 5% level, and * represents statistical significance at 10% level. Source: Author's own estimates.

The estimation results from the second model are presented in Table 8. Dependent variable is GDP per capita and all the variables including the dependent variable are in natural logarithm form. The results indicate that capital stock variable is statistically significant and it has a positive coefficient. Similarly, total factor productivity and human capital variable are statistically significant in three of the total four regressions. They also have positive coefficients. Both pharmaexports and RCA variables have positive coefficients and are statistically significant as well.

The magnitudes of the variables show that human capital has the largest impact on GDP once again. It is followed by capital stock and total factor productivity respectively. Pharmaceutical exports and RCA values of countries have the lowest effects on GDP. All of these variables have positive effects on the dependent variable in both fixed effects and random effects models similar to the previous set of regressions.

Table 8. Model specifications (Dependent variable: Level of pharmaceutical exports)

Dependent Variable: Log GDP Per Capita (2000-2014)				
	FEM regression (1)	**REM regression (1)**	**FEM regression (2)**	**REM regression (2)**
.constant	-1.0868*	-0.4452	-0.1408	0.3525
.lcapstock	0.5049***	0.2800***	0.5729***	0.4227***
.lhc	0.3552	2.5871**	2.3692*	3.7300***
.ltfp	0.2537*	0.0909	0.3719***	0.2560***
.lpharmaexports	0.1702**	0.1650**		
.lrca			0.1356**	0.1342**
R^2				
Within	0.8093	0.7968	0.7688	0.7636
Between	0.1246	0.2715	0.1249	0.1958
Overall	0.1471	0.3011	0.1465	0.2216
Hausman test	0.0114		0.0003	
Wooldridge test	0.0000		0.0000	
Wald test	0.0000		0.0000	
No. of observations	389	389	389	389

Note: All variables are in logs, and *** denotes statistical significance at 1% level, ** represents statistical significance at 5% level, and * represents statistical significance at 10% level. Source: Author's own estimates.

The results from the first group of regressions (where GDP is regressed on capital stock, human capital, total factor productivity, the pharmaceutical industry exports and the RCA values of the countries) and the results from the second group of regressions (where GDP per capita is regressed on capital stock, human capital, total factor productivity, the pharmaceutical industry exports and RCA) show a great deal of resemblance in significance of the variables, their signs and the magnitude of the coefficients. This is an important finding that empowers the consistency of the results.

9. Conclusion

Pharmaceutical industry is a critical sector of welfare for all countries in the world and it is an important source of growth and competitiveness for the main producer and exporter countries. Pharmaceutical industry is different from other manufacturing industries by two main aspects: i) the strict patent protection of the industry (both techniques, materials and products are covered by patent laws), ii) the massive R&D expenditures of the firms. These aspects of the sector are mainly the result of the uphill, long, costly and risky process of developing new products to markets. Therefore, advanced economies with qualified infrastructure, high levels of capital stock, resources and facilities lead the world pharmaceutical production and exports. Several European countries, USA and Japan are the main actors in this market. A few developing countries such as India and China are important producers in the world pharmaceutical market as well. However, given the multinational firm dominance of this industry, Europe and the US economy seem to maintain their leading status in the global market.

The studies on pharmaceutical industry, especially from a trade-related perceptive seem to be limited. The main goal of this study is to analyze the effects of pharmaceutical industry trade on economic growth in major pharmaceuticals producer and hence exporter countries. This is the first study in the related literature which analyzes the relationship between the exporter country's GDP (and GDP per capita) and pharmaceutical industry trade.

Within this framework, panel data fixed effects and random effects models are specified to analyze the relationship between economic growth and pharmaceutical industry exports. Clustering on the panel variable techniques are employed to handle the heteroscedasticity and autocorrelation problems.

The main findings of the analyses altogether suggest that large capital stocks and high total factor productivities of these countries are contributing to their economic growth more than the other variables except for the human capital

variable. Human capital is also a crucial factor to determine the high levels of GDP and GDP per capita of these countries.

The pharmaceutical industry exports effect economic growth positively which is an important finding for the purpose of this study. Revealed comparative advantage index value also shows a positive correlation with GDP and GDP per capita which means that these 27 countries benefit from specializing in pharmaceutical exports to boost their economic growth. These findings are consistent with the opinion that pharmaceutical industry is an important sector for many advanced countries in order to upgrade their industrial trade competitiveness and economic growth.

Taking into account all of these findings, it would be safe to suggest keeping up with the measures to increase human capital. Innovation aspect of pharmaceutical industry depends on human capital as much as it depends on physical capital. Furthermore, massive R&D expenditures of varying sorts, which cause huge sunk costs, are the vital components of pharmaceutical competitiveness and high levels of pharmaceutical value added. Therefore, while big pharmaceutical firms maintain their R&D investments, governments may provide augmented subsidies and facilities for this industry to boost up economic growth without enforcing additional strict protection measures for the rest of the world.

End note

[*]The case of India has also been analyzed thoroughly by Sudip Chaudhuri in his book "The WTO and India's Pharmaceuticals Industry: Patent Protection, TRIPS, and Developing Countries"

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APPENDIX A
TABLE: THE WORLD SHARES OF PHARMACEUTICAL INDUSTRY EXPORTS (%) (ALL COUNTRIES)

		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1	Germany	12.67	13.62	10.48	12.80	13.71	13.88	14.35	15.20	16.34	15.14	14.26	14.01	14.12	14.51	14.57
2	Switzerland	9.23	9.78	9.26	8.93	9.12	9.22	9.78	9.54	10.29	10.17	10.59	11.43	11.55	11.97	12.19
3	Belgium	6.33	7.07	13.10	12.44	12.34	12.73	12.21	12.58	11.73	11.80	10.98	9.78	9.13	9.37	9.64
4	United States	12.09	11.63	9.68	9.36	9.72	9.43	9.34	9.01	9.11	10.10	9.63	8.47	8.79	8.52	8.84
5	France	9.63	9.76	9.09	8.98	8.63	8.34	8.04	7.70	7.92	7.88	7.49	6.75	7.01	7.28	6.52
6	United Kingdom	9.92	9.58	9.00	9.50	9.14	8.17	8.18	7.86	7.57	7.29	7.43	7.23	7.21	6.36	6.29
7	Ireland	4.58	6.06	8.88	7.51	7.60	6.57	5.67	5.42	5.91	6.58	6.91	7.35	6.18	5.41	5.36
8	Netherlands	4.08	3.78	4.36	4.18	4.51	4.32	4.37	4.65	3.07	3.15	3.43	4.41	4.87	4.82	4.99
9	Italy	5.88	5.54	5.37	5.00	4.55	4.78	4.48	4.20	3.96	3.67	3.80	4.05	4.18	4.78	4.81
10	Spain	1.94	1.85	2.03	2.14	2.01	2.45	2.44	2.64	2.70	2.52	2.55	2.71	2.66	2.67	2.46
11	China	1.65	1.49	1.39	1.40	1.30	1.37	1.43	1.61	1.92	1.97	2.31	2.34	2.34	2.36	2.43
12	Denmark	2.69	2.53	2.31	2.37	2.27	2.33	2.09	1.96	1.91	1.82	1.94	2.08	2.26	2.43	2.39
13	India	1.06	1.00	0.96	0.96	0.92	1.00	1.09	1.20	1.38	1.35	1.54	1.88	2.14	2.36	2.38
14	Austria	1.71	1.58	1.73	1.64	1.44	1.64	1.70	1.67	1.74	1.77	1.76	1.80	1.84	1.93	2.06
15	Sweden	3.61	3.14	2.69	3.21	2.91	2.63	2.79	2.33	2.17	2.03	1.98	1.76	1.66	1.66	1.57
16	Singapore	0.93	0.85	0.55	0.48	0.48	1.07	1.68	1.69	1.18	1.32	1.32	1.39	1.79	1.51	1.49
17	Canada	1.13	1.09	0.93	1.14	1.21	1.27	1.49	1.66	1.47	1.47	1.23	1.12	1.02	1.06	1.29
18	Israel	0.39	0.48	0.56	0.47	0.55	0.75	1.01	0.94	1.15	1.04	1.40	1.40	1.29	1.17	1.13
19	Hungary	0.34	0.34	0.29	0.35	0.45	0.46	0.60	0.68	0.79	0.72	0.76	0.95	0.95	0.93	0.89
20	Panama	0.02	0.02	0.01	0.01	0.01	0.01	0.29	0.27	0.29	0.83	0.62	0.98	1.08	1.03	0.81
21	Poland	0.14	0.14	0.12	0.12	0.15	0.20	0.24	0.30	0.40	0.39	0.48	0.46	0.48	0.61	0.65
22	Japan	2.52	2.06	1.69	1.56	1.43	1.21	1.02	0.85	0.87	0.94	0.93	0.89	0.79	0.71	0.61
23	Slovenia	0.37	0.35	0.36	0.43	0.43	0.41	0.47	0.52	0.55	0.49	0.49	0.53	0.53	0.59	0.57
24	Czech Republic	0.19	0.20	0.16	0.17	0.20	0.23	0.26	0.29	0.34	0.32	0.36	0.36	0.33	0.38	0.49
25	Australia	1.07	0.95	0.63	0.71	0.77	0.90	0.83	0.87	0.80	0.73	0.77	0.76	0.88	0.66	0.48
26	Mexico	0.81	0.82	0.70	0.61	0.58	0.51	0.43	0.40	0.35	0.33	0.35	0.38	0.41	0.37	0.36
27	Korea, Rep. of	0.31	0.24	0.21	0.19	0.19	0.18	0.19	0.22	0.24	0.27	0.26	0.26	0.30	0.30	0.33
28	Brazil	0.24	0.21	0.17	0.15	0.16	0.18	0.21	0.22	0.25	0.27	0.29	0.31	0.31	0.31	0.30
29	Greece	0.24	0.27	0.16	0.31	0.34	0.42	0.36	0.35	0.30	0.30	0.30	0.25	0.24	0.27	0.25
30	Hong Kong	0.67	0.55	0.38	0.32	0.26	0.25	0.31	0.32	0.36	0.36	0.37	0.36	0.33	0.24	0.25
31	Russian Fed.	0.17	0.10	0.10	0.12	0.09	0.08	0.08	0.08	0.08	0.09	0.14	0.14	0.17	0.15	0.24
32	Portugal	0.26	0.23	0.20	0.17	0.15	0.13	0.15	0.15	0.15	0.16	0.15	0.17	0.18	0.19	0.21
33	Finland	0.24	0.22	0.25	0.25	0.25	0.28	0.31	0.24	0.28	0.27	0.29	0.32	0.27	0.23	0.20
34	Romania	0.02	0.02	0.01	0.01	0.01	0.02	0.02	0.03	0.06	0.12	0.17	0.20	0.23	0.24	0.20
35	Bulgaria	0.08	0.07	0.05	0.05	0.05	0.05	0.05	0.08	0.09	0.10	0.13	0.16	0.15	0.18	0.19
36	Argentina	0.28	0.25	0.19	0.15	0.16	0.14	0.16	0.15	0.16	0.17	0.17	0.18	0.19	0.19	0.17
37	Norway	0.22	0.18	0.18	0.18	0.18	0.19	0.18	0.19	0.17	0.15	0.16	0.14	0.15	0.15	0.17
38	Turkey	0.14	0.12	0.10	0.11	0.12	0.12	0.11	0.11	0.11	0.11	0.13	0.12	0.14	0.16	0.15
39	Jordan	0.10	0.15	0.13	0.10	0.10	0.11	0.10	0.12	0.13	0.12	0.15	0.12	0.12	0.14	0.12
40	Lithuania	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.05	0.06	0.07	0.07	0.08	0.10	0.12
41	Slovak Republic	0.07	0.07	0.06	0.06	0.07	0.09	0.09	0.09	0.09	0.09	0.10	0.10	0.07	0.09	0.11
42	Colombia	0.19	0.20	0.14	0.11	0.09	0.10	0.09	0.08	0.09	0.09	0.08	0.08	0.09	0.10	0.10
43	Croatia	0.17	0.13	0.12	0.10	0.10	0.10	0.09	0.08	0.08	0.08	0.09	0.10	0.11	0.10	0.10
44	Indonesia	0.07	0.07	0.06	0.07	0.05	0.04	0.05	0.05	0.05	0.05	0.07	0.08	0.09	0.09	0.10
45	Chinese Taipei	0.06	0.05	0.04	0.04	0.04	0.05	0.06	0.06	0.05	0.05	0.06	0.06	0.08	0.10	0.09
46	Thailand	0.11	0.09	0.07	0.07	0.06	0.06	0.06	0.06	0.07	0.07	0.08	0.08	0.09	0.09	0.09
47	Latvia	0.05	0.04	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.07	0.08	0.08	0.07	0.08	0.08
48	South Africa	0.10	0.06	0.06	0.05	0.05	0.05	0.04	0.04	0.05	0.04	0.09	0.10	0.09	0.09	0.08
49	Saudi Arabia	0.02	0.02	0.02	0.02	0.02	0.04	0.04	0.04	0.01	0.01	0.05	0.06	0.06	0.08	0.07
50	Cyprus	0.05	0.05	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.04	0.05	0.06	0.06	0.06	0.06
51	Egypt	0.05	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.04	0.06	0.05	0.05	0.06	0.06	0.06
52	Luxembourg	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.03	0.04	0.06	0.07	0.06
53	Malaysia	0.07	0.06	0.05	0.05	0.05	0.05	0.04	0.05	0.04	0.05	0.07	0.05	0.06	0.06	0.06
54	Malta	0.02	0.02	0.01	0.01	0.01	0.03	0.04	0.06	0.06	0.05	0.06	0.06	0.06	0.07	0.06
55	New Zealand	0.07	0.06	0.06	0.06	0.06	0.06	0.05	0.05	0.05	0.04	0.05	0.05	0.05	0.06	0.06
56	Guatemala	0.08	0.06	0.07	0.05	0.06	0.05	0.05	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05
57	Ukraine	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05
58	Chile	0.03	0.03	0.03	0.03	0.03	0.02	0.03	0.02	0.03	0.02	0.03	0.03	0.03	0.04	0.04
59	Costa Rica	0.13	0.12	0.10	0.10	0.09	0.09	0.04	0.08	0.08	0.08	0.07	0.06	0.04	0.05	0.04
60	Pakistan	0.04	0.03	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.04
61	UAE	0.03	0.02	0.02	0.03	0.03	0.04	0.04	0.04	0.03	0.04	0.03	0.03	0.04	0.04	0.04
62	Belarus	0.05	0.04	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.03
63	Dominican Rep	0.29	0.23	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.03	0.02	0.04	0.04	0.03
64	Iran	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.04	0.04	0.02	0.02	0.03	0.03	0.02	0.03
65	Uruguay	0.03	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.03	0.03	0.03
66	El Salvador	0.05	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02
67	Georgia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
68	Iceland	0.01	0.03	0.04	0.03	0.05	0.03	0.03	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.02
69	Kenya	0.03	0.02	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02

70	Moldova	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.02	0.02
71	Morocco	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.02	0.02	0.02
72	Viet Nam	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
73	Bangladesh	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
74	Barbados	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
75	Ecuador	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
76	Estonia	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
77	FYR Macedonia	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.02	0.02	0.02	0.02	0.01
78	Lebanese Rep.	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01
79	Mauritius	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01
80	Oman	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01
81	Paraguay	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
82	Peru	0.02	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
83	Philippines	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
84	Tunisia	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
85	Albania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
86	Algeria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
87	Armenia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
88	Aruba	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
89	Azerbaijan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00
90	Bahamas	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
91	Bahrain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
92	Belize	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
93	Benin	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
94	Bolivia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95	Botswana	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
96	Cambodia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
97	Cameroon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
98	Co´te d'Ivoire	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
99	Fiji	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	Gabon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
101	Ghana	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
102	Greenland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
103	Guyana	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
104	Honduras	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
105	Jamaica	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
106	Kazakhstan	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
107	Kuwait	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00
108	Macao, China	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
109	Madagascar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110	Malawi	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
111	Mongolia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00	0.00
112	Mozambique	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
113	Nicaragua	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
114	Niger	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
115	Qatar	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
116	Rwanda		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
117	St Vincent & G	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
118	Samoa		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
119	Senegal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
120	Sri Lanka		0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
121	Suriname	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
122	Syrian Arab Rep	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03	0.05	0.06	0.02	0.02	0.01	0.00	0.00
123	Tanzania	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
124	Trinidad &Tobago	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
125	Uganda	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
126	Venezuela	0.05	0.05	0.04	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
127	Yemen		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
128	Zambia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129	Zimbabwe	0.01	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
130	Mali	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Source: Author's own calculations based on WTO merchandise trade statistics.

APPENDIX B
TABLE: THE RCA VALUES OF PHARMACEUTICAL INDUSTRY EXPORTS (ALL COUNTRIES)

	Countries	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1	Albania	0.08	0.13	0.07	0.07	0.04	0.04	0.02	0.03	0.03	0.04	0.03	0.04	0.03	0.02	0.02
2	Algeria	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Argentina	0.70	0.59	0.47	0.38	0.42	0.37	0.41	0.38	0.38	0.37	0.37	0.38	0.44	0.45	0.45
4	Armenia	0.26	0.22	0.06	0.06	0.05	0.05	0.09	0.10	0.13	0.16	0.16	0.16	0.18	0.19	0.22

5	Aruba	0.21	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.02	0.02	0.01
6	Australia	1.09	0.93	0.63	0.76	0.82	0.89	0.82	0.87	0.69	0.59	0.56	0.52	0.63	0.49	0.38
7	Austria	1.63	1.38	1.43	1.28	1.12	1.38	1.51	1.43	1.55	1.62	1.77	1.86	2.04	2.09	2.20
8	Azerbaijan	0.01	0.01	0.06	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.09	0.01	0.02
9	Bahamas	0.85	0.12	0.26	0.33	0.27	0.00	0.71	0.17	0.08	0.05	0.03	0.00	0.00	0.00	0.01
10	Bahrain	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11	Bangladesh	0.02	0.03	0.04	0.03	0.09	0.07	0.09	0.11	0.12	0.05	0.05	0.07	0.05	0.07	0.07
12	Barbados	3.37	3.17	2.23	2.33	1.19	2.10	1.66	1.80	3.34	3.21	5.14	5.49	4.46	3.72	3.78
13	Belarus	0.48	0.30	0.24	0.21	0.15	0.13	0.11	0.09	0.09	0.12	0.15	0.11	0.12	0.16	0.16
14	Belgium	2.17	2.30	3.94	3.69	3.71	4.00	4.04	4.09	4.02	4.00	4.12	3.77	3.79	3.79	3.89
15	Belize	0.03	0.00	0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
16	Benin	0.02	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.02	0.05	0.04	0.06	0.01	0.02
17	Bolivia	0.05	0.05	0.04	0.04	0.03	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
18	Botswana	0.06	0.06	0.07	0.12	0.06	0.03	0.05	0.06	0.11	0.10	0.05	0.08	0.07	0.05	0.04
19	Brazil	0.29	0.22	0.18	0.16	0.15	0.16	0.19	0.19	0.20	0.22	0.22	0.22	0.24	0.24	0.25
20	Bulgaria	1.08	0.83	0.62	0.51	0.43	0.40	0.38	0.61	0.66	0.79	0.95	1.01	1.06	1.14	1.24
21	Cambodia	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.02	0.02	0.03	0.01	0.01	0.01
22	Cameroon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
23	Canada	0.26	0.26	0.24	0.32	0.35	0.37	0.47	0.55	0.52	0.58	0.49	0.45	0.41	0.44	0.52
24	Chile	0.11	0.11	0.10	0.09	0.07	0.06	0.05	0.05	0.07	0.06	0.06	0.07	0.07	0.09	0.09
25	China	0.43	0.35	0.28	0.24	0.20	0.19	0.18	0.18	0.22	0.21	0.22	0.23	0.21	0.20	0.20
26	Chinese Taipei	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.04	0.03	0.03	0.03	0.04	0.05	0.06	0.05
27	Colombia	0.95	1.03	0.79	0.62	0.53	0.48	0.47	0.39	0.38	0.36	0.30	0.26	0.28	0.31	0.33
28	Costa Rica	1.41	1.53	1.29	1.26	1.36	1.30	0.66	1.16	1.32	1.09	1.05	1.13	0.72	0.75	0.71
29	CÃ´te d'Ivoire	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.01
30	Croatia	2.54	1.74	1.53	1.21	1.15	1.19	1.05	0.90	0.88	0.93	1.21	1.42	1.61	1.56	1.37
31	Cyprus	3.11	2.94	3.27	3.02	4.30	3.42	4.28	4.99	5.41	4.40	5.56	6.21	6.32	5.83	6.12
32	Czech Republic	0.42	0.37	0.27	0.26	0.26	0.31	0.34	0.33	0.37	0.35	0.41	0.41	0.39	0.44	0.53
33	Denmark	3.39	3.03	2.61	2.70	2.72	2.87	2.73	2.67	2.64	2.43	3.08	3.42	3.97	4.18	4.08
34	Dominican Rep.	3.32	2.71	0.07	0.09	0.07	0.11	0.15	0.09	0.29	0.19	0.58	0.54	0.82	0.70	0.60
35	Ecuador	0.34	0.33	0.28	0.26	0.21	0.12	0.14	0.08	0.07	0.09	0.12	0.06	0.07	0.04	0.06
36	Egypt	0.56	0.48	0.46	0.26	0.17	0.19	0.15	0.18	0.25	0.30	0.31	0.29	0.37	0.43	0.45
37	El Salvador	1.17	0.92	0.67	0.73	0.80	0.90	1.00	0.94	0.92	0.75	0.80	0.74	0.76	0.76	0.73
38	Estonia	0.35	0.22	0.17	0.15	0.20	0.15	0.12	0.13	0.17	0.16	0.18	0.14	0.16	0.16	0.16
39	Fiji	0.08	0.10	0.14	0.16	0.15	0.20	0.23	0.35	0.41	0.32	0.38	0.35	0.32	0.29	0.22
40	Finland	0.34	0.32	0.36	0.36	0.37	0.45	0.49	0.37	0.47	0.54	0.63	0.73	0.68	0.59	0.52
41	France	1.90	1.87	1.78	1.74	1.76	1.89	1.97	1.93	2.08	2.04	2.19	2.07	2.28	2.37	2.13
42	FYR Macedonia	0.99	0.96	0.98	0.82	0.86	0.77	0.71	0.61	0.52	0.22	0.75	0.67	0.76	0.67	0.57
43	Gabon	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
44	Georgia	0.98	0.64	0.35	0.24	0.16	0.19	0.41	0.81	0.63	0.65	0.64	0.73	0.86	0.74	1.26
45	Germany	1.48	1.48	1.11	1.29	1.39	1.50	1.57	1.61	1.83	1.70	1.73	1.74	1.86	1.89	1.84
46	Ghana	0.04	0.12	0.03	0.02	0.05	0.00	0.01	0.08	0.02	0.04	0.01	0.01	0.00	0.00	0.01
47	Greece	1.32	1.47	0.97	1.74	2.06	2.57	2.12	2.06	1.86	1.83	1.62	1.37	1.27	1.39	1.32
48	Greenland	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
49	Guatemala	1.87	1.39	1.02	0.90	1.01	1.04	0.91	0.85	0.87	0.67	0.74	0.78	0.86	0.88	0.86
50	Guyana	0.22	0.20	0.17	0.14	0.10	0.15	0.16	0.14	0.16	0.11	0.10	0.10	0.07	0.09	0.11
51	Honduras	0.00	0.00	0.03	0.04	0.03	0.04	0.04	0.14	0.16	0.12	0.09	0.02	0.03	0.04	0.04
52	Hong Kong	0.21	0.18	0.12	0.11	0.09	0.09	0.12	0.13	0.16	0.14	0.14	0.14	0.12	0.09	0.09
53	Hungary	0.78	0.68	0.55	0.62	0.74	0.77	0.97	0.99	1.18	1.10	1.21	1.56	1.70	1.64	1.53
54	Iceland	0.50	0.84	1.17	1.05	1.64	1.15	0.91	0.72	0.79	0.69	0.92	0.84	0.88	0.69	0.58
55	India	1.61	1.42	1.27	1.24	1.10	1.06	1.09	1.12	1.15	1.03	1.04	1.14	1.34	1.42	1.40
56	Indonesia	0.07	0.07	0.07	0.08	0.07	0.05	0.06	0.06	0.06	0.06	0.07	0.07	0.09	0.09	0.10
57	Iran	0.02	0.02	0.03	0.04	0.03	0.05	0.03	0.06	0.06	0.03	0.04	0.04	0.06	0.05	0.06
58	Ireland	3.82	4.53	6.54	6.14	6.69	6.30	6.33	6.25	7.60	7.13	9.08	10.71	9.80	8.97	8.67
59	Israel	0.81	1.03	1.23	1.12	1.31	1.85	2.62	2.44	3.03	2.73	3.66	3.79	3.79	3.32	3.16
60	Italy	1.58	1.40	1.37	1.27	1.19	1.35	1.30	1.18	1.18	1.13	1.30	1.42	1.54	1.75	1.73
61	Jamaica	0.09	0.10	0.08	0.07	0.05	0.06	0.05	0.06	0.06	0.09	0.14	0.07	0.06	0.09	0.09
62	Japan	0.34	0.32	0.26	0.25	0.23	0.21	0.19	0.17	0.18	0.20	0.19	0.20	0.18	0.19	0.17
63	Jordan	3.49	3.94	3.06	2.54	2.35	2.63	2.35	2.94	2.57	2.35	3.23	2.65	2.90	3.32	2.77
64	Kazakhstan	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
65	Kenya	1.06	0.54	0.15	0.47	0.39	0.43	0.49	0.66	0.63	0.45	0.47	0.53	0.83	0.74	0.73
66	Korea, Rep.	0.12	0.10	0.09	0.07	0.07	0.07	0.07	0.08	0.09	0.09	0.09	0.09	0.10	0.10	0.11
67	Kuwait	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01
68	Latvia	1.71	1.32	1.09	1.10	1.05	0.94	1.22	1.26	1.18	1.17	1.28	1.18	0.88	0.99	0.98
69	Lebanese Rep.	0.54	0.23	0.14	0.08	0.11	0.14	0.12	0.11	0.14	0.11	0.11	0.23	0.20	0.25	0.24
70	Lithuania	0.60	0.49	0.41	0.31	0.33	0.27	0.26	0.32	0.33	0.46	0.48	0.48	0.50	0.57	0.72
71	Luxembourg	0.15	0.12	0.11	0.11	0.11	0.10	0.09	0.12	0.15	0.21	0.26	0.36	0.58	0.69	0.63
72	Macao, China	0.19	0.29	0.17	0.15	0.11	0.14	0.17	0.15	0.22	0.41	0.56	0.78	0.09	0.41	0.01
73	Madagascar	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
74	Malawi	0.01	0.01	0.01	0.02	0.01	0.00	0.03	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00
75	Malaysia	0.05	0.04	0.04	0.04	0.04	0.04	0.03	0.04	0.03	0.04	0.05	0.04	0.05	0.05	0.05
76	Mali	0.06	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00
77	Malta	0.50	0.61	0.39	0.18	0.43	1.11	1.79	2.29	2.80	2.22	2.61	2.38	2.81	3.43	4.08
78	Mauritius	0.08	0.04	0.04	0.06	0.09	0.09	0.12	0.25	0.35	0.31	0.46	0.43	0.43	0.37	0.36
79	Mexico	0.31	0.32	0.28	0.28	0.28	0.25	0.21	0.20	0.19	0.18	0.18	0.20	0.20	0.18	0.17

80	Moldova	0.34	0.30	0.18	0.16	0.15	0.16	0.37	0.41	0.40	1.01	1.30	1.26	1.58	1.70	1.85
81	Mongolia	0.00	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
82	Morocco	0.11	0.11	0.10	0.08	0.11	0.11	0.12	0.12	0.13	0.13	0.13	0.12	0.16	0.20	0.17
83	Mozambique	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.00	0.06	0.00	0.00	0.00
84	Netherlands	1.13	1.02	1.16	1.07	1.16	1.12	1.14	1.18	0.78	0.80	0.91	1.21	1.37	1.36	1.41
85	New Zealand	0.32	0.29	0.26	0.28	0.27	0.28	0.27	0.27	0.28	0.23	0.22	0.26	0.26	0.29	0.25
86	Nicaragua	0.05	0.07	0.09	0.11	0.12	0.12	0.11	0.11	0.09	0.06	0.04	0.03	0.03	0.03	0.03
87	Niger	0.05	0.01	0.00	0.01	0.00	0.01	0.07	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.00
88	Norway	0.24	0.19	0.20	0.20	0.20	0.20	0.17	0.19	0.16	0.16	0.19	0.16	0.17	0.18	0.22
89	Oman	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.02	0.04	0.03	0.04
90	Pakistan	0.28	0.21	0.15	0.16	0.16	0.18	0.20	0.23	0.22	0.26	0.21	0.22	0.25	0.25	0.28
91	Panama	1.14	1.02	0.97	0.63	0.52	0.08	4.37	4.29	4.85	9.76	8.68	12.33	12.33	13.17	11.71
92	Paraguay	0.13	0.15	0.12	0.15	0.12	0.11	0.14	0.14	0.12	0.14	0.19	0.18	0.23	0.22	0.18
93	Peru	0.15	0.06	0.04	0.05	0.04	0.04	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.05
94	Philippines	0.03	0.04	0.03	0.02	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.04	0.05	0.03	0.03
95	Poland	0.29	0.23	0.20	0.17	0.19	0.24	0.26	0.30	0.38	0.36	0.46	0.44	0.48	0.56	0.57
96	Portugal	0.69	0.60	0.49	0.41	0.40	0.36	0.40	0.41	0.44	0.46	0.45	0.52	0.58	0.56	0.63
97	Qatar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
98	Romania	0.14	0.09	0.06	0.05	0.05	0.06	0.06	0.11	0.18	0.37	0.52	0.59	0.72	0.68	0.56
99	Russian Fed.	0.11	0.06	0.06	0.07	0.05	0.04	0.03	0.03	0.03	0.04	0.05	0.05	0.06	0.05	0.09
100	Rwanda	0.00	0.00	0.02	0.04	0.02	0.04	0.06	0.07	0.05	0.02	0.03	0.12	0.02	0.01	0.01
101	Saint Lucia	0.02	0.07	0.02	0.08	0.07	0.16	0.29	0.06	0.09	0.07	0.08	0.09	0.08	0.09	0.00
102	St Vincent&The G	0.03	0.00	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
103	Samoa	0.00	0.00	0.02	0.03	0.03	0.07	0.05	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.00
104	Saudi Arabia	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.01	0.01	0.03	0.03	0.03	0.04	0.04
105	Senegal	0.12	0.12	0.11	0.09	0.16	0.16	0.35	0.29	0.24	0.20	0.18	0.18	0.21	0.17	0.18
106	Seychelles	0.72	0.51	0.32	0.46	1.94	1.34	0.07	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00
107	Singapore	0.44	0.43	0.29	0.23	0.22	0.49	0.75	0.79	0.56	0.61	0.57	0.62	0.81	0.70	0.69
108	Slovak Republic	0.37	0.34	0.27	0.20	0.24	0.29	0.26	0.21	0.21	0.19	0.24	0.23	0.17	0.21	0.24
109	Slovenia	2.72	2.37	2.25	2.59	2.42	2.26	2.45	2.40	2.60	2.37	2.54	2.79	3.05	3.29	3.02
110	South Africa	0.21	0.12	0.13	0.11	0.10	0.10	0.09	0.08	0.09	0.09	0.15	0.16	0.17	0.17	0.17
111	Spain	1.09	0.98	1.05	1.04	1.01	1.34	1.38	1.46	1.55	1.39	1.54	1.62	1.66	1.59	1.44
112	Sri Lanka	0.00	0.01	0.01	0.01	0.08	0.15	0.06	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02
113	Suriname	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
114	Swaziland	0.03	0.06	0.02	0.01	0.01	0.04	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
115	Sweden	2.67	2.57	2.15	2.39	2.17	2.11	2.29	1.94	1.91	1.95	1.91	1.73	1.78	1.87	1.81
116	Switzerland	7.41	7.37	6.57	6.46	6.85	7.40	8.02	7.78	8.28	7.40	8.28	8.93	6.84	6.34	7.44
117	Syrian Arab Rep	0.04	0.01	0.03	0.05	0.06	0.13	0.22	0.37	0.49	0.65	0.23	0.26	0.29	0.25	0.24
118	Tanzania	0.05	0.07	0.02	0.04	0.04	0.03	0.02	0.05	0.05	0.08	0.03	0.03	0.02	0.02	0.02
119	Thailand	0.10	0.09	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.07	0.08	0.07
120	The Gambia	0.01	0.05	0.02	0.00	0.01	0.03	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
121	Trinidad&Tobago	0.02	0.07	0.02	0.05	0.04	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
122	Tunisia	0.05	0.05	0.04	0.04	0.06	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.09	0.11	0.10
123	Turkey	0.32	0.23	0.18	0.17	0.17	0.16	0.16	0.14	0.14	0.13	0.18	0.17	0.17	0.19	0.19
124	Uganda	0.13	0.14	0.10	0.03	0.12	0.07	0.06	0.08	0.09	0.07	0.09	0.07	0.14	0.16	0.15
125	Ukraine	0.17	0.15	0.09	0.09	0.08	0.09	0.10	0.10	0.09	0.11	0.13	0.11	0.14	0.15	0.17
126	United Arab Em	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.02	0.02	0.02	0.02
127	United Kingdom	2.24	2.18	2.09	2.36	2.42	2.20	2.20	2.49	2.59	2.58	2.73	2.62	2.82	2.23	2.36
128	United States	1.00	0.99	0.91	0.98	1.10	1.10	1.10	1.10	1.14	1.20	1.15	1.05	1.05	1.02	1.04
129	Uruguay	0.82	0.69	0.57	0.49	0.55	0.58	0.58	0.62	0.67	0.61	0.51	0.59	0.57	0.57	0.58
130	Venezuela	0.10	0.12	0.09	0.07	0.05	0.03	0.03	0.01	0.01	0.01	0.03	0.02	0.00	0.00	0.00

Source: Author's own calculations based on WTO merchandise trade statistics.