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THE INTERNATIONAL COMPETITIVENESS OF THE PHARMACEUTICAL INDUSTRY WITHIN 21 OECD COUNTRIES

Abstract

This research consists of the results of 21 pharmaceutical OECD industries in the period between 2004 and 2009. The main objective of this paper is to measure international trade and competitiveness of the pharmaceutical industry within the observed OECD countries. The methodology in the paper is based on the application of various indicators which include intra-industry trade, trade balance, the import penetration indicator, composition of manufacturing exports and other relevant indicators. The main research results include facts from measuring international trade and competitiveness, as well as an estimation of the position of the pharmaceuticals of the observed OECD countries, especially on the external market, and recommendations and proposals for reaching a higher level of international competitiveness.

Keywords: International competitiveness, international trade, OECD countries, pharmaceutical industry

1. Introduction

The pharmaceutical industry represents a capital intensive sector whose competitiveness is mostly based on technology, which is a characteristic for segments of the high-technology industry. Although the pharmaceutical industry is based on production innovation and high level of R&D activity like other high-technology industries, there are certain evident particularities (Bezić and Galović, 2013). In other words, the pharmaceutical industry invests, by far, the largest amount in research and development (R&D) (as a proportion of sales) of any industry.

Generally speaking, the pharmaceutical industry is under the influence of two main factors: large pharmaceutical companies and state legislation. State legislation covers the safety, effectiveness, and price of the pharmaceutical products, but it also devotes attention to the importance of R&D and innovative policy. The world's supply of the pharmaceutical industry is characterized by a small number of industrial economies on a high-technology and product innovation level (Karn, 1997). World demand for pharmaceutical products mostly records a growing trend. The demand can be determined by income level as well as price movements, distribution, age of the population, health care system, etc.

One of the main threats to the competitiveness of pharmaceutical companies, among other things, is reflected in the inability to maximize benefits from knowledge and innovation, in other words, the so-called "technological spillovers". Namely, if pharmaceutical companies produce innovation accepted by competitive companies without any costs, they can face the loss of their competitiveness (Bezić and Galović, 2013).

Products of the pharmaceutical industry are continuously placed on the market with the objective to sustain and prolong human life. Taking into consideration that health is a basic human need, pharmaceutical products have a significant social impact in relation to other industries. Pharmaceutical products are chemical and biological substances used in therapies and prevention of illnesses. The pharmaceutical industry may be viewed from the aspect of consumers. Namely, the pharmaceutical industry comprises a group of companies which sell and distribute medicaments as final products. From the manufacturers' point of view, the pharmaceutical industry is defined in a narrower sense which implies manufacturing and processing activities (Reekie, 1975: 1). Multinational corporations and foreign direct investments are a driving force behind the world pharmaceutical manufacturing and trade. In general, pharmaceutical products have been classified by the distribution channels and choice of use into two main groups: over-the-counter (OTC) and prescription (ethical) products. The first group (OTC) consists of drugs which have small market shares, but their importance is growing. The second group (ethical) accounts for the bulk of medicines sold on prescription. In many countries, prescription drugs are available only through retail pharmacies or hospitals. Therefore, pharmacists and physicians are important parts of the distribution channel. Price competition is often more aggressive. Generic drugs are out-of-patent products which may be produced by more than one company because their patents have already expired. These types of drugs are price-competitive since they contain the same active ingredient as the original brand. Generic drugs may be substituted for the prescribed brand name if they are cheaper (Prasit, 1997).

In this paper several indicators of export and import of pharmaceuticals in the OECD countries are analyzed in order to measure international trade and competitiveness.

Moreover, definitions of competitiveness by the OECD and DTI (Department of Trade and Industry) point out the significance of technological factors in the creation of competitiveness. DTI (DTI, 1994) defines competitiveness of firms as a possibility for manufacturing of adequate goods and services, at the right time and at the right price. The definition by the OECD (OECD, 1992), from the micro aspect, includes competitiveness which refers to a firms' ability to compete, to maximize profit and realize growth based on costs and prices by using technology, improvement of quality, and maximization of the effect of its products. Many scientists explore the relationship between competitiveness and technological possibilities. Scientists like Kaldor (1971), Porter (2001), Lall (2001), and Wignaraja (2003), and institutions like the OECD challenged in an argumented manner the opinions of other scientists who tried to define competitiveness only from the aspect of price-based factors with emphasis on non-price factors such as technology.

The discussion led to the revision of traditional theories in the framework of the problem of competitiveness. There are two aspects which clarify the term "competitiveness" in more detail. The general macroeconomic aspect presents international competitiveness in the framework of price-based factors. On the other hand, the microeconomic aspect tries to define competitiveness on the firm level with the factors which are not price-based and emphasis is placed on analysis of the rivalry between firms.

The macroeconomic aspect is accompanied by internal and external balance of economies where special attention was devoted to effects of price-based factors on the competition. The microeconomic aspect analyzed internal company dynamics which makes companies strong or weak in relation to influences (Wignaraja, 2003).

The microeconomic aspect refers to presentation of competitiveness on the firm level. Perspective as such includes rivalry among firms and their strategies. In the past few years, the microeconomic aspect implies new dimensions: the impact of technology and innovation. Lall (2001) criticizes the neoclassical theory, whose hypotheses are based on the thesis that technology is available to all firms which are able to use technology at technically "high" levels. However, this long learning process starts by import of technology followed by innovation.

Most experts are partly or completely familiar with two theoretical frameworks from trade based on comparative advantages: Ricardo's theory and Heckscher-Ohlin (H-O) theory. Ricardo's theory covers comparative advantages achieved on the basis of different technologies, while the H-O theory uses as an example the equal level of technology in all countries. The H-O theory at the same time points out the significance of comparative advantages in relation to different levels of costs derived from unequal prices of the manufacturing factors in the analyzed countries. Postulates of traditional trade theories are based on the principle of relative prices of comparative advantages, i.e. inequalities in prices which are under the influence of supply and demand factors (Bezić and Galović, 2013).

According to the H-O theory, a comparative advantage of an economy is defined by the relative scarcity factor. However, irregularities in measuring of comparative advantages and verifying of the Heckscher-Ohlin theory were discovered by empirical analysis because of the inability to observe relative prices under the influence of autarky (Balassa, 1989: 42). Bearing in mind these insights, Balassa (1965) suggested avoiding full inclusion of all the components which affect the comparative advantages of different economies. Instead, it is pointed out in Balassa's analysis that "revealed" comparative advantage is in accordance with the theoretical postulates, except for one exception, which is the inability to analyse relative prices. Deriving conclusions from the analyzed data, Balassa called the results of his research revealed comparative advantage, i.e. RCA (Revealed Comparative Advantage). RCA is, at the same time, an accepted method in the analysis of trade in the observed countries. Furthermore, Balassa created an index (known as Balassa's Revealed Comparative Advantage Index) whose main objective is measuring comparative advantages of countries. It should be pointed out that Balassa's index is reflected in the identification of revealed comparative advantages instead of revealing "hidden" elements of economic advantages of an economy (Bezić and Galović, 2013).

However, the initial version of Balassa's Revealed Comparative Advantage Index was modified and revised, so that, presently, there are different indices for measuring comparative advantages. In some research, the RCA is measured on the global level (Vollrath, 1991), while in other studies, the RCA is measured on the regional level. There are also cases in which Balassa's Revealed Comparative Advantage Index was used as a measure for bilateral trade (Dimelis and Gatsios, 1995).

According to Krugman (1985), trade models have given a precise description of the pattern of trade in goods. In traditional theory, the answer emerges from the explanation of trade itself: countries produce goods that would have been relatively cheap in the absence of trade. The comparative advantage may arise from a variety of sources, but in any case the attributes of a country determine what it produces. Krugman (1996) claims that traditional theory is the usual basis for advocating free trade, one of the most strongly held positions in the economics profession (although actually even in traditional theory a second-best case can be made for protection as a corrective for domestic market failures). The new trade theory suggests a more complex view. The potential gains from trade are even larger in a world of increasing returns, and thus, in a way, the case for free trade is all the stronger. New trade models show that it is possible (not certain) that such tools as export subsidies, temporary tariffs, and so on, may shift world specialization in a way favourable to the protecting nation.

The basic scientific hypothesis of the paper is set up, namely, that it is possible to estimate the international competitiveness of the pharmaceutical industry within 21 OECD countries (including several EU Member Countries) by using various international trade and competitiveness indicators.

In this relation, the basic objective of the research is to measure international competitiveness, objectively estimate international trade of the pharmaceuticals of 21 OECD countries, and to propose measures and activities for the improvement of their international trade competitiveness in accordance with the results.

The paper consists of five systematically interrelated parts. After the Introduction, the second part of the paper presents the research methodology. The third part includes the analytical framework and results of international competitiveness based on the analysis of foreign trade activity and export competitiveness of the OECD pharmaceutical industry. The final part comprises proposals, recommendations and conclusions.

2. Methodology

The analytical aspect is based on scientific results of several indicators that show the level of international competitiveness of the pharmaceutical industry which includes 21 OECD countries. Implemented indicators have been frequently used in contemporary economic research, which evaluates the economy's structural strengths and weaknesses *via* the composition of international trade flows (Bezić and Galović, 2013). In other words, these indicators address the question of trade specialization and performance in international markets. The purpose of the methodology used in this study also implies the importance of the foreign market for pharmaceuticals in a country and what degree of domestic demand is satisfied by imports. Furthermore, the most commonly used indicators, indices, and ratios are implemented to assess trade patterns and characteristics, and changes in them. Besides elementary and well-known indicators, this research uses basic indicators that are suggested by the OECD Statistical Database (2014) and World Bank (2014). These indicators were used in previous studies (Bezić and Galović, 2013; Bezić and Galović, 2013; Kandžija et al., 2014, Bezić and Galović, 2014) of other manufacturing sectors which have provided objective results of international trade and international competitiveness.

Some analyses of factors influencing the success or failure of efforts to promote industrialization and growth conclude that a growing level of intraindustry trade (plays an important positive role (World Bank, 2014). Intraindustry exchange produces extra gains from international trade over and above those associated with comparative advantage because it allows a country to take advantage of larger markets.

Intra-industry trade (IITR) represents the value of total trade remaining after subtraction of the absolute value of net exports or imports of pharmaceuticals. For comparison between countries and industries, the measures are expressed as a percentage of each industry's combined exports and imports. Intra-industry trade represents one of the key empirical reasons for emphasizing the role of increasing returns and imperfect competition in the world economy. According to the OECD Statistical Database (2014), intra-industry trade of pharmaceuticals is calculated as follows:

$$\mathrm{IITR}_i = \left(1 - \frac{\left|expo_i - impo_i\right|}{expo_i + impo_i}\right) \times 100 \qquad (1)$$

wherein:

$expo_i$ - export activity of sector "*i*"

$impo_i$ - import activity of sector "*i*"

This index varies between 0 and 100. If a country exports and imports roughly equal quantities of a certain product, the index value is high. Whereas if trade is mainly one-way (whether exporting or importing), the index value is low.

The "contribution to the trade balance" or "CMTB" makes it possible to identify an economy's structural strengths and weaknesses *via* the composition of international trade flows (OECD Statistical Database, 2013). It takes into account not only exports, but also imports, and tries to eliminate business cycle variations by comparing an industry's trade balance with the overall trade balance. It can be interpreted as an indicator of "revealed comparative advantage" (Balassa, 1965: 93; Balassa, 1978: 203) as it indicates whether an industry performs relatively better or worse than the manufacturing total, no matter whether the manufacturing total itself is in deficit or surplus. The "contribution to the manufacturing trade balance" is the difference between the actual and this theoretical balance:

$$\mathrm{CMTB}_i = \left[\frac{\left(expo_i - impo_i\right) - \left(expo_{manuf} - impo_{manuf}\right)\dfrac{expo_i + impo_i}{expo_{manuf} + impo_{manuf}}}{expo_{manuf} + impo_{manuf}}\right] \times 100 \qquad (2)$$

wherein:

$expo_i$ - export activity of sector "*i*"

$impo_i$ - import activity of sector "*i*"

$expo_{manuf}$ - export activity of total manufacturing sectors

$impo_{manuf}$ - import activity of total manufacturing sectors

A positive value for an industry indicates a structural surplus and a negative one a structural deficit. The indicator is additive and individual industries can be grouped together by summing their respec-

tive values: by construction, the sum over all industries is zero. The next indicator called "Export import ratio" shows exports as a percentage of imports. The EXIM ratio can be calculated as follows:

$$\mathrm{EXIM}_i = \frac{expo_i}{impo_i} \times 100 \quad (3)$$

wherein:

$expo_i$ - export activity of sector "*i*"

$impo_i$ - import activity of sector "*i*"

Another simple indicator is used within this paper. Hence, this indicator (TBAL) is calculated in real numbers of national currencies and highlights the trade pattern of each industry. It can be seen in the following formula:

$$\mathrm{TBAL}_i = expo_i - impo_i \quad (4)$$

Trade balance is one of the macroeconomic indicators which are used to gauge the competitiveness of a sector at the national level. When exports exceed imports, the balance is in surplus, and when imports exceed exports, the balance is in deficit.

Furthermore, composition of manufacturing exports of goods indicator (XSHM) shows the exports in a given manufacturing industry (in this case the OECD pharmaceutical industry) as a percentage of total manufacturing exports. The XSHM indicator is calculated as follows:

$$\mathrm{XSHM}_i = \frac{expo_i}{expo_{manuf}} \times 100 \quad (5)$$

wherein:

$expo_i$ - export activity of sector "*i*"

$expo_{manuf}$ - export activity of total manufacturing sectors

Finally, the import penetration (MPEN) indicator can be calculated as a ratio of imports to the sector's production adjusted for the foreign trade balance (difference between exports and imports) according to the following formula:

$$\mathrm{MPEN}_i = \frac{impo_i}{prod_i - expo_i + impo_i} \times 100 \quad (6)$$

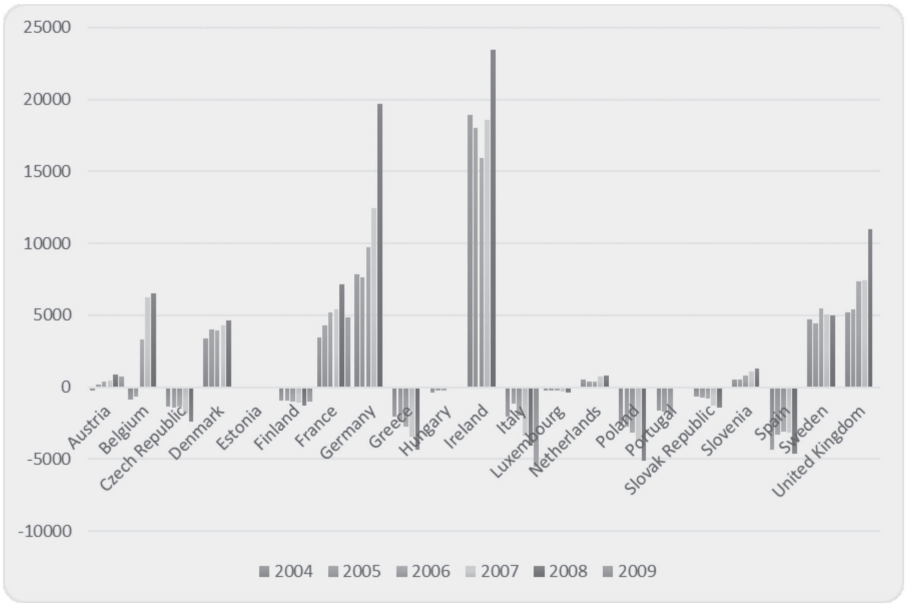
For a given country, a value close to 100 in a certain industry, implies that domestic demand is mainly fulfilled by imports and domestic production tends to be exported (the OECD Statistical Database, 2013). A value close to 0 means self-sufficient, i.e. domestic demand is mainly satisfied by domestic production. A value above 100 illustrates measurement problems that may occur when combining production and trade data. It is important to bear in mind that exports can exceed production.

3. Results

In the analysis of the outlined problem, the starting point is to identify the international competitiveness of the pharmaceutical industry of 21 OECD countries in the period between 2004 and 2009. One of the main reasons of choosing this period and number of observed countries lies in the limited availability of data and observations for a specific subsector (in this case pharmaceuticals – code C2423) which were found in the OECD Statistical Database (2014). Observed countries are classified as a group of developed economies according to the UN Classification (United Nations, 2013) prepared by the Development Policy and Analysis Division (DPAD) of the Department of Economic and Social Affairs of the United Nations Secretariat (UN/DESA). In order to analyze pharmaceuticals, it is important to consider ongoing trade within examined countries. Several indicators, which are based on export and import, can be used to measure the performance and competitiveness of a certain sector for each country.

In a given year, the values of an indicator can differ between countries, which allow an international comparison. The value of an indicator may also differ between different years, within a different country. In this particular study, six indicators will be calculated for the 21 OECD member countries: IITR, CMTB, EXIM, TBAL, XSHM and MPEN. The data is extracted from the OECD Statistical Database. Values can be found within Appendix I.

Figure 1 Trade balance (TBAL) indicator from 2004 to 2009

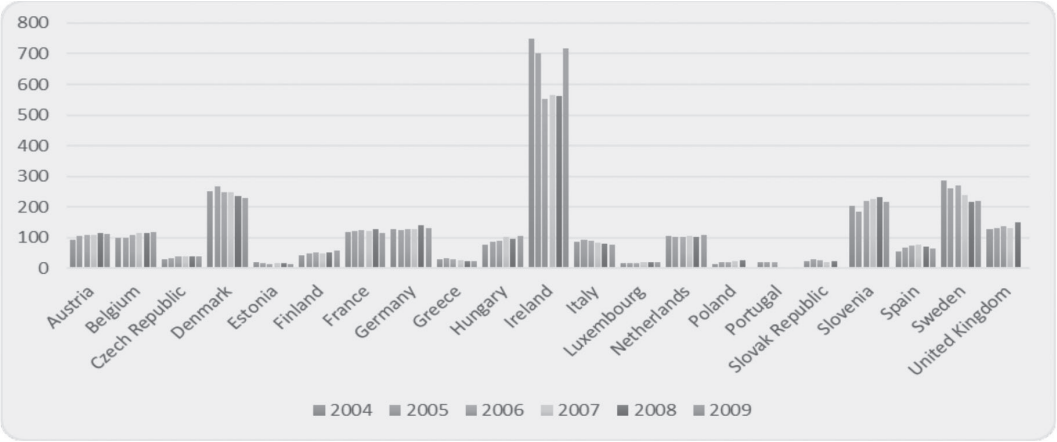


Source: OECD Database, 2014

The trade balance is the difference between exports and imports in the specified sector. This indicator shows the competitiveness of a certain sector at the national level. It is shown in real number and in national currencies, so when comparing the countries the size of the company is important. The larger the economy, the higher the trade balance will be. Obvious positive scores are found in Germany, Ireland and the UK. Ireland creates a great surplus on the trade balance of pharmaceuticals. One of the reasons are Ireland's intellectual property laws which provide companies with generous incentives to innovate, the Irish tax system that offers huge support to turn brilliant ideas into the finished product, a highly competitive corporate tax rate, which is a major incentive, and no tax is paid on earnings from intellectual property where the underlying R&D work was carried out in Ireland. Furthermore, pharmaceuticals are a major contributor to the Irish economy. Ireland is the No. 1 European location for international pharmaceutical investment as well. 9 out of the top 10 pharmaceutical companies are located in Ireland, 7 out of 10 pharmaceutical blockbusters are produced in Ireland, which is home to over 100 companies engaged in pharmaceutical and chemical related activities.

Because of its highly advanced incorporation of the latest technology and the strict quality control procedures, this country creates a wide range of products and services. Hereby it is not only the largest net exporter of pharmaceuticals in Europe, but in the whole world as well. Germany also shows rising figures, mainly because of the great competitiveness of the country. The chemical and pharmaceutical industry is Germany's third-largest industrial sector in terms of revenues. It is characterized by an extensive and comprehensive infrastructure that integrates state-of-the-art transportation networks with high-quality communication and energy infrastructure. Pharmaceutical companies in Germany benefit from the close proximity of leading machine and equipment manufacturers. This guarantees continuous production and short downtimes. Luxembourg notes the biggest deficit. Being one of the smallest countries in Europe and being orientated towards the service and financial sector this country imports far more pharmaceuticals than it imports. The biggest deficits of the OECD pharmaceutical industry were recorded in Spain, Luxembourg, Greece and the Czech Republic. Furthermore, the final results of the export import ratio are presented in Figure 2.

Figure 2 Export import ratio indicator from 2004 to 2009 (EXIM)

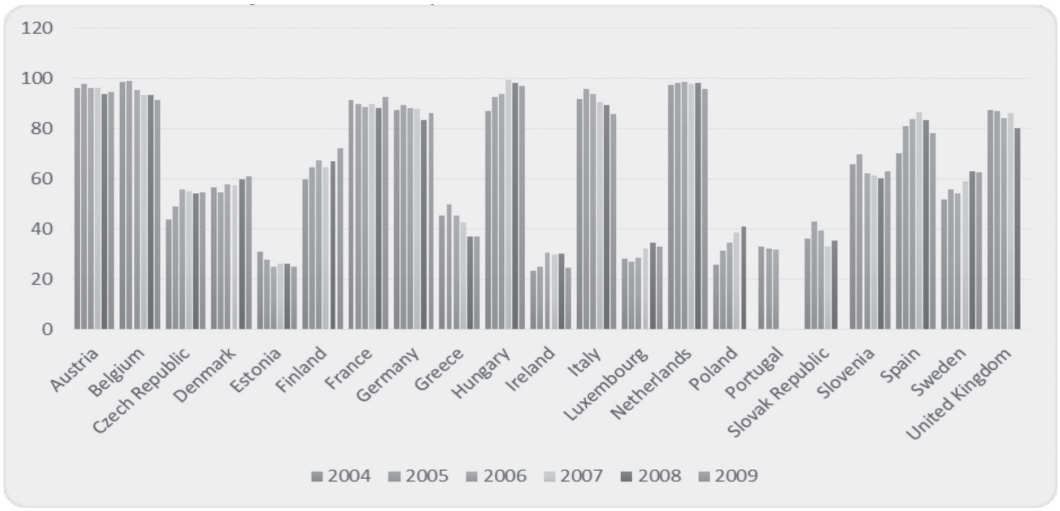


Source: OECD Database, 2014

The export-import ratio identifies the exports as a percentage of imports. A percentage higher than one hundred means that exports are higher than imports and will consequently create a surplus on the national trade balance.

In this figure the exports as a percentage of imports in the pharmaceutical industry are shown. It must be noticed that Denmark, Slovenia and Sweden obtain generally higher scores but the most remarkable is Ireland. Ireland is a market leader in the pharmaceutical industry, with over 120 overseas companies having their plants there including 9 of the 10 largest pharmaceutical companies in the world. This explains the rising export import ratio of 718% implying that Ireland exports seven times more pharmaceuticals than it imports. This indicator also shows the worst performers which include

Figure 3 Intra-industry trade indicator (IITR) from 2004 to 2009



Source: OECD Database, 2014

Poland, Greece, Estonia, the Czech Republic and the Slovak Republic. In addition, Figure 3 shows the intra-industry trade of the pharmaceutical industry of 21 OECD countries in the period between 2004 and 2009.

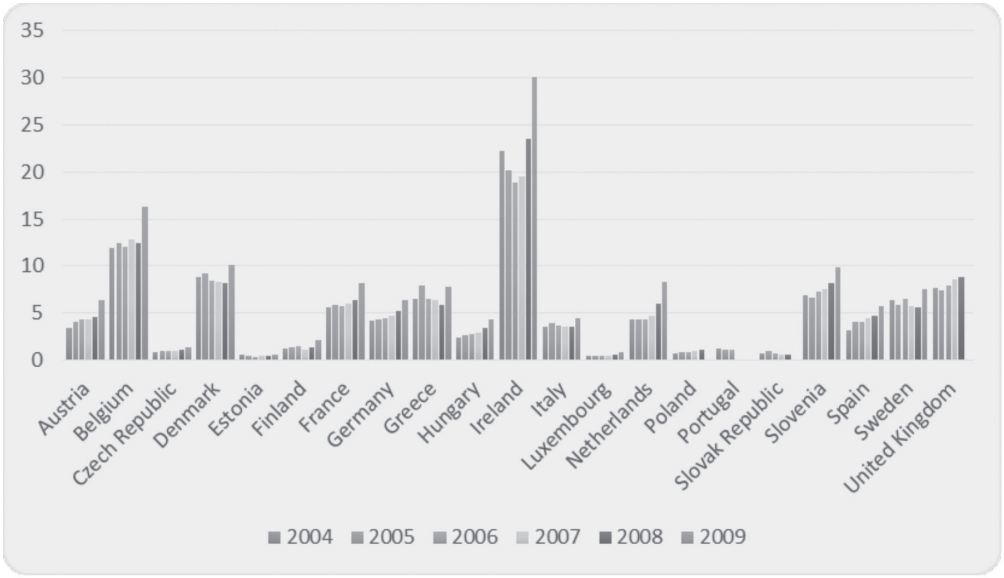
This indicator shows the value of total trade remaining after subtraction of the absolute value of net exports or imports of pharmaceuticals in Europe. In this figure, high scores are obtained by some well-developed and industrialized EU countries. In 2009, Austria gets a score of 95% followed by Belgium with 91%. France, Germany, Hungary, Italy and the Netherlands all vary in score between 86% and 96%.

High percentages imply that these entities export and import roughly equal quantities of pharmaceuticals, whereas lower scores imply a one-way trade (import or export). Lower percentages are found in countries such as Estonia, Ireland, Luxembourg and Poland, varying in scores between 24% and 35% which could indicate the possible existence of one-way trade or a lower level of trade. This means that the export and import in these countries form a significant part of the total traded goods.

The logic of this outcome becomes clear as Belgium and the Netherlands are smaller countries and thus have an entire export- and import-based economy with a much more diversified product portfolio. Germany is one of the most powerful economies of the EU, which produces and trades a lot of different goods across Europe. Portugal and Ireland on the other hand score lower, implying that the share of pharmaceuticals to the total amount of traded goods is more significant. Figure 4 represents the composition of manufacturing exports of pharmaceuticals of 21 OECD countries in the period between 2004 and 2009.

This indicator shows the proportion of export for a specific sector compared to the total export of the manufacturing sector. This will thus identify how important this sector is in the outflow of manufactured products to other countries. In this figure the share of the pharmaceutical industry in comparison to the total manufacturing exports are revealed by the composition of manufacturing exports of goods. Ireland achieves an increasing percentage of pharmaceutical -goods compared to all exported goods, reaching 30% of the total. It has to be pointed out that the pharmaceutical industry in Ireland is highly advanced. It incorporates the latest technology, state of the art equipment and strict quality control procedures.

Figure 4 Composition of manufacturing exports of goods indicator from 2004 to 2009 (XSHM)



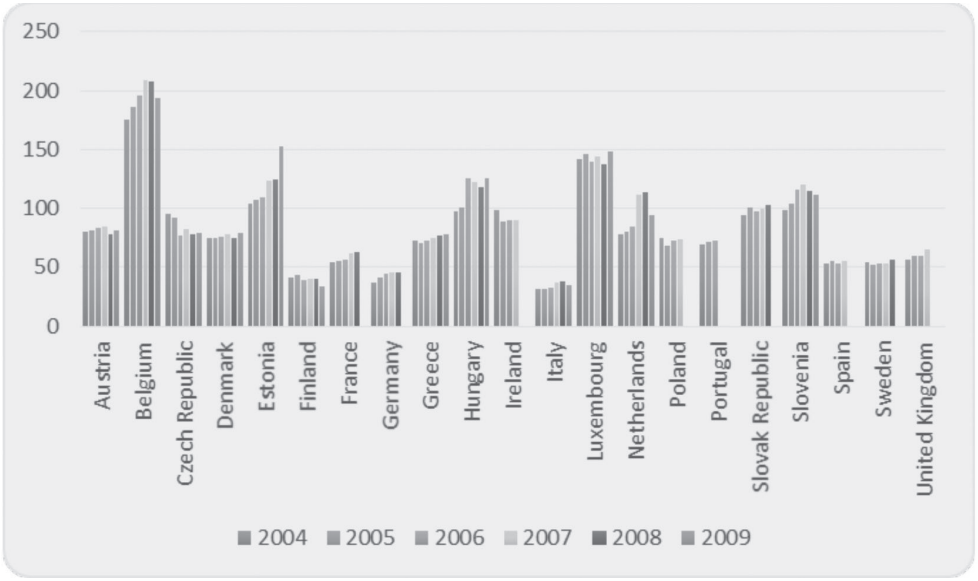
Source: OECD Database, 2014

Ireland's pharmaceutical industry consists of a wide range of products and services, from research and development for new medicines to the manufacturing and marketing of new medicines for humans and animals. An important aspect in the development of the sector, which has helped to significantly boost its contribution to the Irish economy, has been the success of the sector in diversifying the nature of its investment in Ireland from the original bulk active plants to higher value activities. The maintenance of a culture of support for innovation is significant to the success of such a move up the value chain. The other major impacts come from the fiscal environment of Ireland. Belgium is the second best country in this chart with an approximate gap of 15% between first and second place, however pharmaceuticals are taking an increasing part of the total exports. Moreover, the final results of import penetration indicator are presented in Figure 5.

Import penetration shows how dependant domestic demand in a certain sector is relying on foreign producers rather than on domestic production. It is defined as the ratio between the values of imports as a percentage to domestic demand for this specific sector. Smaller countries usually have higher ratios as they have smaller economies and will rely more heavily on foreign producers. The ratio of imports to the sector's production adjusted to the foreign trade balance gives more insight in the import penetration. In other words, this is the percentage of total demand for pharmaceuticals that is covered by import. Belgium stands out in this graph, as it is a small country living from the import and export, especially of pharmaceuticals. Due to very high figures in export, this rate exceeds the 100% mark. Italy, Finland and Germany achieve the lowest scores, which implies that these countries are most self-sufficient. Finally, the results of the contribution to the trade balance are presented within Figure 6.

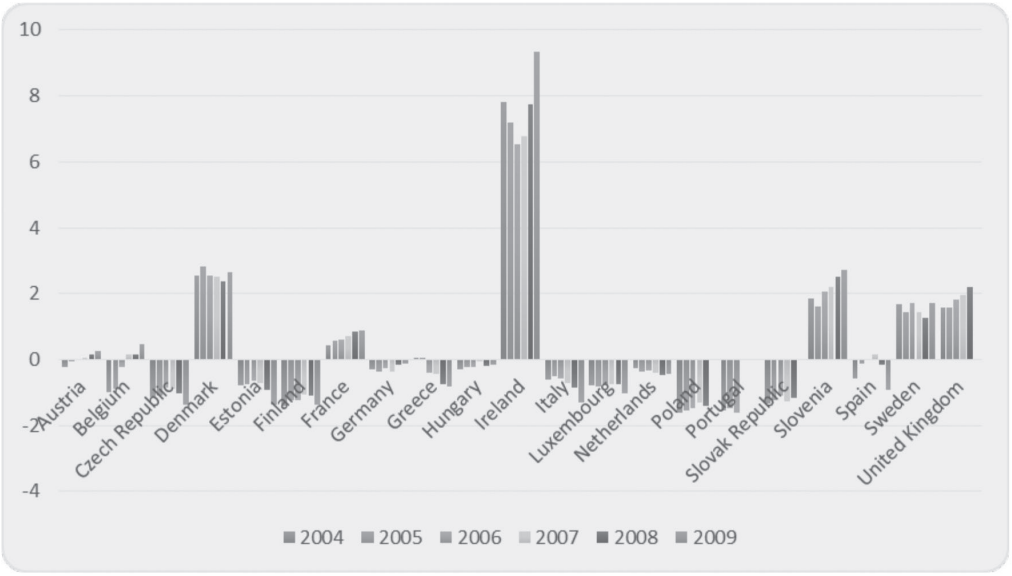
The contribution to the trade balance identifies the competitive advantage of a country in the specified sector. As it is compared to the total manufacturing in this country, the indicator will then show how important the specific sector is for the country. The higher the value of this indicator the more important this sector is for the manufacturing sector as a whole.

Figure 5 Import penetration of the OECD pharmaceutical industry from 2004 to 2009 (MPEN)



Source: OECD Database, 2014

Figure 6 Contribution to the trade balance indicator from 2004 to 2009 (CMTB)



Source: OECD Database, 2014

The composition of international trade flows makes it easier to visualize an economy's structural strengths and weaknesses. The contribution to the trade balance compares the pharmaceutical industry's trade balance with the overall trade balance. First of all, in this graph a few remarkably high results are visible in Denmark, Ireland, Slovenia, Sweden and UK with a positive score between 1.7% and 9.4%. This makes sense because the previous graphic indicated that pharmaceuticals are a significant part of the total export of these countries.

There are, on the other hand, many countries obtaining an extremely low sore such as the Czech Republic, Estonia, Finland and Luxembourg. These countries import more pharmaceuticals then they export and thus create a negative effect on the total trade balance. Finally, yet importantly, there are a few countries such as Austria, Belgium, France and Spain which recorded results around the zero mark. The indicator of revealed comparative advantage shows whether the pharmaceutical industry performs relatively better or worse than the manufacturing total (independent of whether this total is in deficit or surplus). Projecting this on the obtained results, high scores are translated in structural surpluses and negative on structural deficits.

4. Conclusion

Aggregation of the results of the calculated indices leads to a series of interesting insights related to international competitiveness of the OECD pharmaceutical industry. When it comes to the OECD intra-industry trade of pharmaceuticals, older European member states got higher scores. The logic of this outcome becomes clear as Belgium and the Netherlands are smaller countries and thus have an entire export- and import-based economy with a much more diversified product portfolio. Germany is one of the most powerful economies of the EU, which produces and trades many different goods across Europe. Portugal and Ireland on the other hand score lower, implying that the share of pharmaceuticals to the total amount of traded goods is more significant.

The composition of international trade flows makes it easier to visualize an economy's structural strengths and weaknesses. Remarkably high results are visible in Denmark, Ireland, Slovenia, Sweden and the UK. This makes sense because the results of several indicators indicated that pharmaceuticals are a significant part of the total export of these countries. As a market leader in the pharmaceutical industry, Ireland includes 9 of the 10 largest pharmaceutical companies in the world. This explains

the highest export-import ratio of 718% implying that Ireland exports seven times more pharmaceuticals than it imports. It has to be pointed out that most of the above-mentioned countries are characterized by above-average share of R&D activity and innovation, which enables faster adjustment to new conditions on the international market and an increase in international competitiveness.

Ireland also creates a great surplus on the trade balance of pharmaceuticals. Because of its highly advanced incorporation of the latest technology and the strict quality control procedures, this country creates a wide range of products and services. Germany as well shows rising figures, mainly because of the great competitiveness of the country. Luxembourg has recorded the biggest deficit. Being one of the smallest countries in the EU, this country imports far more pharmaceuticals than it exports. Ireland achieves an increasing percentage of pharmaceutical goods compared to all exported goods, reaching 30% of the total. In terms of the trade balance indicator, Belgium is the second best country with an approximate gap of 15%. However, pharmaceuticals are taking an increasing role of the total export's activity. Overall, the leading position of Ireland as a global market player is shown in all indicators. The main reason for this is the establishment of the most important players in the pharmaceutical sector in that country. Furthermore, the majority of the implemented indicators also pointed to the vital role Germany and France as powerful European and OECD countries. Finally, yet importantly, the smaller member states show differences in export- and import-figures. States such as Belgium and the Netherlands live from import and export, which becomes visible in the analysis of the pharmaceutical sector. On the other hand, countries like Luxembourg have lower percentages concerning pharmaceuticals, as they do not imply a great part of total industry in that country.

Generally, the conclusion is derived that most highly developed countries with their propulsive pharmaceutical sectors have preconditions for improvement of international competitiveness and development of revealed comparative advantages, while other countries have smaller possibilities for reaching this scenario. Concerning the results, the basic hypothesis is confirmed. In other words, the level of international trade and competitiveness of the pharmaceutical industry within 21 OECD countries (including several EU Member Countries) is shown. Hereby, the main objective and purpose of this research are validated.

Consequently, in order to improve international competitiveness and comparative advantages of firms, the branch of medical and pharmaceutical products should invest in:

- creating business strategies which increase the market share after the introduction of generic medicines,
- marketing and other promotional activities,
- R&D activities and innovation activities, and continuous engagement and training of researchers and R&D staff in firms.
- raising the firms' awareness of growing markets and expansion to growing markets,
- more detailed identification of activities of the growing competition, especially from Asian countries,
- revision and conversion of the export expansion programme,
- establishing of stronger partnerships with large clients,
- openness to "joint venture" i.e. common investments in order to supply new technology.

Besides those propositions, the observed countries should provide an adequate and company-friendly fiscal environment in order to achieve a higher level of competitiveness. Application of the results of this research may contribute to the improvement of international competitiveness in the OECD pharmaceutical industry, but this implies undertaking measures within the pharmaceutical firms. Therefore, in order to overcome the problems of international competitiveness, a comprehensive approach is necessary on the level of macro-environment and on the level of micro-environment. In other words, firms should ensure all the necessary preconditions for adjustment to a competitive environment. Adoption of the above-mentioned measures would provide the OECD pharmaceutical industry with a greater possibility to take and keep a competitive position on the market. Adequate transfer of knowledge and technology may, of course, result in growth of export activity of the pharmaceutical firms in the OECD. Opening room for investments also plays a significant role in the stimulation of export expansion of pharmaceutical firms.

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Appendix I. The detailed results of included indicators for 21 OECD pharmaceuticals from 2004 till 2009

Industry		C2423 Pharmaceuticals					
Time		2004	2005	2006	2007	2008	2009
Variable	Country						
Intra-industry trade	Austria	96,332413	97,891587	96,135589	96,163133	93,737946	94,836733
	Belgium	98,731271	99,093075	95,708512	93,343513	93,497901	91,493544
	Czech Republic	43,840516	49,021207	56,068877	55,229044	54,114993	54,592337
	Denmark	56,801376	54,69424	57,705537	57,528698	59,893096	60,88576
	Estonia	30,964052	27,668888	24,830374	26,052788	26,226789	24,949941
	Finland	59,935994	64,620522	67,340924	64,634528	67,133336	72,271478
	France	91,373408	90,091383	88,815406	89,90317	88,433875	92,593369
	Germany	87,492617	89,556185	88,42365	87,880071	83,654374	86,178373
	Greece	45,34683	49,812018	45,495801	42,494785	37,065878	36,906089
	Hungary	87,156539	92,576501	94,11188	99,589304	98,301952	97,131534
	Ireland	23,578479	24,90645	30,689244	30,023706	30,175557	24,443152
	Italy	92,071229	96,049321	93,733356	90,777906	89,716083	86,096415
	Luxembourg	28,245361	27,046128	28,640471	32,092271	34,826136	33,027388
	Netherlands	97,687787	98,291193	98,582342	98,062261	98,39685	95,978668
	Poland	25,679919	31,473032	34,470826	38,808856	41,043749	..
	Portugal	32,930086	32,219881	31,848216	..	..	..
	Slovak Republic	36,157942	43,207791	39,457484	33,106683	35,52927	..
	Slovenia	66,079077	69,9613	62,373673	61,479797	60,321347	63,008001
	Spain	70,359497	81,024032	83,785583	86,541423	83,615784	78,478495
	Sweden	52,009968	55,679726	54,137112	59,141154	63,161405	62,764432
	United Kingdom	87,618965	87,059332	84,25828	86,358402	80,259844	..
Contribution to manufacturing trade balance	Austria	-0,2322723	-0,0445316	-0,0199465	0,0105917	0,1412318	0,257773
	Belgium	-1,0053981	-0,8897019	-0,2398772	0,1424674	0,1567182	0,4654558
	Czech Republic	-1,1254839	-1,080932	-0,865182	-0,9037473	-1,0101975	-1,3673808
	Denmark	2,5591065	2,821932	2,5426936	2,5052254	2,3651546	2,6623976
	Estonia	-0,795995	-0,7440493	-0,6335228	-0,7124736	-0,9058308	-1,3591204
	Finland	-1,4063437	-1,2328366	-1,2364241	-1,055522	-1,1070553	-1,355168
	France	0,420156	0,5670528	0,6138547	0,7000527	0,8387718	0,8936619
	Germany	-0,2940933	-0,3592537	-0,2618166	-0,360714	-0,1432429	-0,1367789
	Greece	0,0495501	0,0072663	-0,3955968	-0,452799	-0,7326636	-0,8211778
	Hungary	-0,2897914	-0,233209	-0,2377204	-0,0627967	-0,1917351	-0,1730119
	Ireland	7,8291417	7,1882269	6,53515	6,7855706	7,7338923	9,3464578
	Italy	-0,6198078	-0,4984774	-0,5656408	-0,7101634	-0,8570462	-1,3062802
	Luxembourg	-0,7973062	-0,8171161	-0,7566005	-0,7618185	-0,7556456	-1,027607
	Netherlands	-0,2572794	-0,3494683	-0,3471602	-0,3923161	-0,4539914	-0,4470973
	Poland	-1,6093499	-1,5540985	-1,4606183	-1,2876828	-1,415548	..
	Portugal	-1,5564948	-1,4757322	-1,6028704	..	..	..
	Slovak Republic	-1,3416036	-1,2432833	-1,1000549	-1,2524576	-1,1529711	..
	Slovenia	1,8520279	1,6153854	2,0698708	2,1823799	2,5100071	2,7133828
	Spain	-0,5835452	-0,1404999	-0,000794	0,1407937	-0,1445892	-0,9068881
	Sweden	1,6941162	1,4455599	1,7228068	1,4492543	1,24835	1,7015988
	United Kingdom	1,5814102	1,5672127	1,8027248	1,9688954	2,2038529	..

Export import ratio	Austria	92,924332	104,30765	108,0395	107,97991	113,36077	110,88875
	Belgium	97,494332	98,202452	108,96783	114,26235	113,90854	118,59466
	Czech Republic	28,074194	32,468936	38,955353	38,149257	37,09428	37,544333
	Denmark	252,10415	265,66922	246,58719	247,65257	233,9283	228,48403
	Estonia	18,318028	16,055654	14,175045	14,977411	15,092539	14,253032
	Finland	42,791861	47,732879	50,762395	47,748165	50,526847	56,582099
	France	118,88206	121,99681	125,18616	122,46157	126,15768	115,99819
	Germany	128,59072	123,32349	126,18383	127,58288	139,07895	132,07679
	Greece	29,32163	33,166447	29,44632	26,979923	22,748996	22,628735
	Hungary	77,236677	86,179003	88,878601	100,82478	96,660608	105,90635
	Ireland	748,23113	703,00485	551,69413	566,14029	562,7881	718,22508
	Italy	85,3074	92,398936	88,205811	83,113134	81,350106	75,587098
	Luxembourg	16,445181	15,637769	16,713673	19,11304	21,084532	19,780123
	Netherlands	104,73388	103,47703	102,87609	103,95206	103,25854	108,37964
	Poland	14,731475	18,675368	20,824623	24,076295	25,820783	..
	Portugal	19,710363	19,203635	18,94016	..	..	..
	Slovak Republic	22,068779	27,557359	24,577592	19,837034	21,602184	..
	Slovenia	202,66767	185,87233	220,64811	225,31012	231,55758	217,42001
	Spain	54,272774	68,101174	72,095687	76,275787	71,844608	64,579923
	Sweden	284,54167	259,19717	269,43234	238,17399	216,64907	218,65181
	United Kingdom	128,26109	129,72839	137,3654	131,59298	149,19062	..
Trade balance	Austria	-271,73536	187,29508	408,03489	468,31762	863,3299	764,46069
	Belgium	-852,03035	-680,9595	3314,2865	6267,7875	6496,763	..
	Czech Republic	-1374,7979	-1432,4225	-1374,5271	-1850,7123	-2392,5141	..
	Denmark	3394,5853	4022,3864	3907,0876	4320,665	4610,5016	..
	Estonia	-9,4226667	-10,41075	-11,907	-15,205524	-19,604399	..
	Finland	-955,25823	-963,87556	-1043,3112	-1093,4107	-1265,3268	-993,93229
	France	3461,1484	4282,4948	5171,6719	5422,1209	7173,5029	4833,3459
	Germany	7846,1399	7636,925	9745,01	12455,82	19686,165	..
	Greece	-2046,6393	-2382,3543	-2737,1946	-3482,3163	-4333,1659	..
	Hungary	-365,398	-249,456	-246,468	21,093	-118,488	..
	Ireland	18910,724	18034,104	15910,144	18592,239	23426,441	..
	Italy	-2060,6667	-1144,1652	-1993,0105	-3363,3286	-4063,9084	-5544,5844
	Luxembourg	-252,88894	-272,13712	-273,47506	-316,41228	-367,68698	..
	Netherlands	501,28971	407,92917	398,41822	713,63938	831,75762	..
	Poland	-2610,4024	-2758,1546	-3178,6425	-3725,848	-5157,5773	..
	Portugal	-1651,4289	-1708,4839	-1942,2356	..	..	..
	Slovak Republic	-655,08877	-711,20712	-815,92784	-1307,3758	-1414,4358	..
	Slovenia	541,45011	530,01058	799,66479	1066,7578	1308,8113	..
	Spain	-4382,2976	-3309,4916	-3070,0965	-3186,2705	-4642,9891	..
	Sweden	4696,8288	4437,0885	5505,7784	5089,4979	4971,6277	..
	United Kingdom	5166,9091	5405,1535	7346,9234	7401,3148	10949,43	..

Composition of manufacturing exports of goods	Austria	3,3602985	4,0611058	4,3500914	4,2589687	4,4959659	6,3203286
	Belgium	11,890738	12,3607	12,088439	12,871015	12,402626	16,324377
	Czech Republic	0,8487294	0,9220194	0,9647549	0,9854232	1,0339446	1,3621462
	Denmark	8,7651013	9,1373737	8,4579723	8,2456379	8,1416989	10,053718
	Estonia	0,5670414	0,4316542	0,344325	0,4056118	0,4539459	0,495726
	Finland	1,2031303	1,377723	1,43141	1,1394164	1,3716263	2,1321065
	France	5,6069574	5,8306581	5,7247107	5,9439442	6,3664269	8,2111309
	Germany	4,1847066	4,3117746	4,3949992	4,6872605	5,1704257	6,3327019
	Greece	6,5271921	7,9427664	6,4611993	6,3290818	5,8396033	7,7532019
	Hungary	2,3234544	2,6002465	2,7596097	2,8678822	3,3624976	4,3214155
	Ireland	22,201398	20,134074	18,872872	19,475337	23,49595	30,105889
	Italy	3,503831	3,8658226	3,7013098	3,470842	3,4613307	4,4781054
	Luxembourg	0,4305985	0,4163386	0,4067767	0,4850034	0,5839305	0,7652098
	Netherlands	4,3280992	4,246244	4,3488661	4,7482332	5,9382847	8,2831096
	Poland	0,6475239	0,7638996	0,8101326	0,8995384	1,1056484	..
	Portugal	1,1734024	1,1386412	1,1232905	..	..	..
	Slovak Republic	0,6971882	0,8855558	0,6596338	0,5834908	0,5830177	..
	Slovenia	6,9227407	6,6352015	7,2894653	7,4957014	8,1899714	9,831477
	Spain	3,1301537	4,0063759	4,0417508	4,415705	4,6715543	5,6939694
	Sweden	6,3739892	5,8701954	6,5203746	5,7242003	5,5842459	7,5410643
	United Kingdom	7,6410784	7,4227127	7,8885386	8,5106994	8,8503199	..
Import penetration	Austria	130,41857	149,31524	176,59609	159,57167	..	..
	Belgium	312,27321	339,13296	449,94391	601,32819	..	..
	Czech Republic	82,456038	81,305613	84,231725	91,031041	..	..
	Denmark	88,582863	80,889904	83,088777	87,628105	..	..
	Estonia	..	..	..	..	..	..
	Finland	97,034344	104,51986	106,85902	99,520579	..	..
	France	44,603422	47,389148	48,155658	51,199115	54,25987	..
	Germany	95,771697	99,623784	108,90869	106,6316	..	..
	Greece	91,277748	99,559991	97,52258	96,588739	..	..
	Hungary	64,579693	70,484082	77,601123	89,992041	..	..
	Ireland	-24,791718	-28,01127	-43,893388	-91,544217	..	..
	Italy	48,40405	57,395532	56,098006	55,848434	..	..
	Luxembourg	..	..	..	..	..	..
	Netherlands	118,1272	188,05371	213,47399	247,45511	..	..
	Poland	64,30995	63,524783	65,661744	67,823274	..	..
	Portugal	70,170043	68,646244	71,272406	..	..	..
	Slovak Republic	93,804241	98,969796	97,801917	97,744132	..	..
	Slovenia	71,972969	85,21837	98,250006	..	..	..
	Spain	54,230354	62,2493	63,403033	67,320046	..	..
	Sweden	52,717373	52,32	59,232236	60,046639	..	..
	United Kingdom	92,102384	84,336676	90,148518	97,20358	..	..

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Tomislav Galović

Međunarodna konkurentost farmaceutske industrije 21 OECD zemlje

Sažetak

Rad uključuje rezultate farmaceutske industrije 21 zemlje OECD-a u razdoblju od 2004. do 2009. godine. Temeljni je cilj istraživanja izmjeriti međunarodnu trgovinu i konkurentnost farmaceutske industrije zemalja OECD-a. Metodologija rada zasniva se na primjeni različitih pokazatelja koji uključuju intraindustrijsku trgovinu, trgovinsku bilancu, penetracije uvoza, udjela u industrijskom izvozu i ostalih važnih pokazatelja. Glavni rezultati istraživanja uključuju činjenice koje proizlaze iz mjerenja međunarodne trgovine i konkurentnosti te daju procjenu položaja farmaceutske industrije analiziranih OECD zemalja osobito na vanjskom tržištu, kao i preporuke i prijedloge radi dosega više razine međunarodne konkurentnosti.

Ključne riječi: međunarodna konkurentnost, međunarodna trgovina, zemlje OECD-a, farmaceutska industrija