

CHANGES OF LITHUANIAN INTRA-INDUSTRY TRADE IN LIGHT OF THE ECONOMIC CRISIS

Dalia Bernatonyte

Kaunas University of Technology, Lithuania, dalia.bernatonyte@ktu.lt

crossref <http://dx.doi.org/10.5755/j01.em.17.1.2258>

Abstract

This paper investigates the changes of Lithuanian intra-industry trade in light of the economic crisis. The paper analyses the basic theories and methods of intra-industry trade measurement; the influence of this form of trade on the changes of international trade structure. For measurement the changes of intra-industry trade in light of the economic crisis in the paper two approaches are adopted. The Grubel-Lloyd index is used to calculate the intensity of intra-industry trade and thus to determine its relative importance compared to inter-industry trade. Secondly, the index of intra-industry trade is used to calculate proportion of trade in each product involves both imports and exports. Using these methods of measurement and standard international trade classification (SITC) was established the importance of intra-industry trade on the changes of international trade structure in light of economic crisis. It was found that the biggest flows from Lithuania to the EU are in such groups: food, drink and tobacco; other manufactured goods. It was determined that Lithuanian intra-industry trade decreased in 2009. The researches show that the EU has advantages in trade with goods induced in group's mineral fuels, lubricants and related materials, machinery and transport equipment.

Keywords: intra-industry trade; international trade; Grubel-Lloyd index; index of intra-industry trade; economic crisis.

JEL Classification: F1.

Introduction

The globalization and integration processes opened additional possibilities for development of intra-industry trade. Intra-industry trade today is an important and constantly growing modern international sector. Under current conditions it constitutes approximately one fourth of global trade, more that 60 % of European trade and 20 % of Japan trade (Bernatonyte & Normantiene, 2007). Increasing part of intra-industry trade in the volume of global trade is of importance to the changes of economy of separate countries. The higher the intra-industry trade, the more similar and higher developed are the trading partners. The scale of such having trade increased the volumes of production, export and import in various sectors of economy of such countries change. This leads to changing nature of international trade and its structure of goods (Bernatonyte & Normantiene, 2009). The emergence and growth of intra-industry trade, defined as the exchange of broadly similar goods, has been one of the most important trends in world trade over the past few decades and has gained increasing attention in the economic literature.

A number of questions concerning intra-industry trade have been discussed: causes, significance, its implications for structural adjustment and the gains from trade. Many studies emphasize that with intra-industry trade exists an additional potential source of gain – increased variety, the exchange the scale economies and pro-competition effects (Ruffin, 1999; Greenaway & Milner, 1994). According to alternative theories, monopolistic competition and economies of scale encourage intra-industry between similar countries with equal possibilities, consumer tastes and priorities because it provides additional motivation for specialization of production. Effect of economies of scale helps to explain the trade in similar goods the comparative part of which in the total volume of trade is big enough and still has the tendency of growth (Volgina, 2006). Most of researches show that the more developed a country is the more specialized is the structure of international trade and, therefore, a large part of intra-industry trade dominates in the total scope of international trade (Ruffin, 1999; Mc Aleese, 2004). Many studies suggest that industries with high levels of intra-industry trade undergo less structural change – and less adjustment costs – in response to trade liberalization than industries with low levels of intra-industry trade. The reason for this is that it is easier to transfer and adapt resources within firms or industries than from one industry to another (Krugman, 1981; Mc Aleese, 2004). At present, there are an increasing number of studies of intra-industry trade between separate countries and its groups.

Although the intra-industry trade is wide-spread, economic literature has numerous discussions regarding importance thereof. While analyzing the importance of this trade it is necessary to measure the part of intra-industry trade in the international trade. It is especially urgent problem for Lithuania because in this point there are no studies.

The following are the dominating approaches of measurement of importance of intra-industry trade: The Balassa index, Grubel-Lloyd index, The Aquino formula, The Bergstrand method, index of marginal intra-industry trade and etc. (Aquino, 1978; Balassa, 1966; Bergstrand, 1990; Grubel & Lloyd, 1975; Hamilton & Kniest, 1991).

Current economic integration processes expanded the boundaries of the European Union thus influencing tendencies of changes of intra-industry trade. Globalization and economic integration to the EU has highlighted problems of Lithuanian industry and the whole economy competitiveness (Snieska, 2008). The global financial and economic crisis had a huge impact on the changes of intra-industry trade. Analysis shows that in 2009 intra-industry trade between members states of the EU decreased. However, presently researches investigating such changes are missing. Therefore, actual problem is to estimate the changes of Lithuanian intra-industry trade in light of the economic crisis.

The object of this research: Lithuanian intra-industry trade.

The aim of research: to analyze the changes of Lithuanian intra-industry trade in light of the economic crisis. Seeking for this aim, the following research tasks to be accomplished:

- to perform the analysis of the basic theories of intra-industry trade;
- to analyze the basic methods of intra-industry trade measurement;
- to present comparative analysis of changes of intra-industry trade between Lithuania and member states of the EU;
- to estimate the importance of intra-industry trade on the changes of international trade structure.

The methods of research are: analysis and synthesis of the scientific literature analyzing problems of intra-industry trade, systematic statistical data analysis of the EU and Lithuanian international trade.

Methodology of the research: in order to examine the changes of intra-industry in light of the economic crisis two approaches are adopted. The Grubel-Lloyd index (1975) is used to calculate the intensity of intra-industry trade and thus to determine its relative importance compared to inter-industry trade. Secondly, the index of intra-industry trade is used to calculate proportion of trade in each product involves both imports and exports.

Theoretical analysis of intra-industry trade

Many studies suggest that more developed countries and more specialized trade structure lead to higher intra-industry trade. Most of researches show that industries with high levels of intra-industry trade undergo less structural change – and less adjustment costs – in response to trade liberalization than industries with low levels of intra-industry trade. The reason for this is that it is easier to transfer and adapt resources within firms or industries than from one industry to another (Krugman, 1981; Mc Aleese, 2004). At present, there are an increasing number of studies of intra-industry trade between separate countries and its groups.

Classical approaches to international trade and specialization, such as David Ricardo's theory on relative comparative advantage provided the fact that different countries have comparative advantage in different production branches, and individual regions or countries should specialize in production and export of goods which can be produced comparatively cheaper than in other countries. Thus the goods that can be produced by other countries more effectively shall be imported. D. Ricardo provided the main principle of this theory: goods are more mobile between different regions than resources (work, capital, land). This assumption describes the theory of intra-industry trade. However, D. Ricardo's trade model is unable to explain the influence of trade on distribution of income within a country or what can be described by a comparative advantage. Thus trade theorists turn their attention to the Hecksher-Ohlin trade model.

In Hecksher-Ohlin model country exports goods, production of which consumes more relatively abundant resources of that country, and imports the goods, production of which consumes more relatively scarce resources of that country. Yet the empiric researches of Hecksher-Ohlin model failed. The reason was that the researched models failed to provide the fact that international trade has great influence on distribution of income. The main reason why international trade fails to provide the influence on distribution of income is that most international trade is intra-industry trade. When international trade takes places there is not massive redistribution of production factors from labour-intensive industries to capital-intensive industries. On the contrary, the production factors are redistributed within industries and this does not have the same impact as inter-industry trade.

Thus, the said theories analyzed the trade between countries with different provision of production factors. However, majority of global trade is conducted between the developed countries having similar economic structure and endowment of production factors (Bernatonyte & Normantiene, 2009).

During the 1980s, new trade theory models were developed to explain high levels of intra-industry trade and the large proportion of world trade between very similar countries (Amiti, 1998). New trade theory models challenged the traditional theories and provided a simple explanation for the observed intra-industry trade patterns. They emphasized the gains to trade associated with intra-industry trade in horizontally differentiated products based on imperfect competition, consumer preferences and other features of industrial organization. Theory of intra-industry was developed by a number of authors who found in recent developments in monopolistic competition theory the modelling techniques needed. In models of monopolistic competition, the preference for variety on the demand side combined with the preference of economies of scale on the production side play a crucial role in the increase of intra-industry trade. Consumers have a preference for the variety. However, only a small number of them are domestically produced. This happens because of increasing returns to scale, which favours the concentration of production by limiting optimal number of varieties that may be produced in each country. Intra-industry trade is prevalent in regions and industries where increasing return to scale in production, monopolistic competition and product differentiation play an important role, although endowments do not differ significantly between them. The new trade models postulates that increasing returns to scale and trade costs will induce activities to locate in regions with good market access away from remote areas, this will translate in inter-industry specialization between the core regions. Besides, scale economies will lead to intra-industry trade across companies, which will concentrate in the production of a unique differentiated product (Brühlhart, 1998).

In order to understand the influence of the economic crisis on the changes of Lithuanian intra-industry trade it is necessary to analyze the problem of its measurement.

Methods of assessment of intra-industry trade

Various methods are used for measuring intra-industry trade. Several alternative measures have been developed in the literature to assess the degree of intra-industry trade (Grubel-Lloyd index, The Aquino index, The Bergstrand method etc (Grubel, Lloyd, 1975; Aquino, 1978; Bergstrand, 1990). The index most often used to assess the importance of intra-industry trade was introduced by Grubel and Lloyd in 1975. Herbert Grubel and Peter Lloyd when examining the trade of the countries of the Organization for Economic Cooperation and Development (OECD) suggested the following formula to measure the importance of intra-industry trade:

$$GL_i = [(X_i + M_i) - |X_i - M_i|] / (X_i + M_i) \cdot 100 \%, \quad (1)$$

Where GL_i – index of intra-industry trade for industry i ;

X_i – value of export in industry i ;

M_i – value of import in industry i ;

$X_i + M_i$ – total value of trade;

$|X_i - M_i|$ – trade balance industry i .

The value of GL_i ranges from 0 to 100. Thus the closer the GL_i value is to 100, the more important is intra-industry trade and vice versa, the closer the value GL_i is to 0, the more important is inter-industry trade. If X_i or M_i equal to 0, there is no intra-industry trade, and this index equals 0 because the country is only exporting or importing the products of a given branch. When $GL_i = 100$, two-sided trade is conducted: the country exports as much as it imports. In other words, the closer the value of GL_i is to 100 the larger the volume of intra-industry trade is (Grubel & Lloyd, 1975). In order to establish an average level of intra-industry trade, Grubel and Lloyd proposed the weighted index to arrive at an overall measure of intra-industry trade. They noticed that GL_i is characterized by the tendency of reduction when the trade in goods is not balanced. Limitation of using this index is related to the reason that the value thereof is highly dependent on whether the branch of group of goods is defined. The wider the definition the larger the possibility that the countries trade in certain amount of differentiated goods within the limits of the groups of goods (branches) and, therefore, the value of this index is larger.

The traditional measure of intra-industry trade is used and the Grubel–Lloyd index calculated as:

$$GL_i = 1 - [|X_i - M_i| / (X_i + M_i)], \quad (2)$$

Where X_i is the export in a certain line of goods and M_i – import in the same commodity group.

The value of GL_i index can vary between 0 and 1, whereas the former denotes zero intra-industry trade and the latter corresponds to the situation where all trade is intra-industry. One should also note that trade imbalance between trading partners leads to downward deviation of the value of the GL_i index, i.e. the theoretical maximum value 1, which corresponds to hundred-percent intra-industry remains unachievable. A series of low GL_i index of one region or country reflect a centripetal process of industrial agglomeration and high specialization, while a series of high GL_i index values reflect a centrifugal process of industrial dispersion.

Robert C. Feenstra and Alan M. Taylor established index of intra industry trade (Feenstra & Taylor, 2008). They suggested the following formula:

$$\text{Index of intra-industry trade} = (\text{minimum of imports and exports}) / \frac{1}{2} (\text{imports} + \text{exports}) \quad (3)$$

In the opinion of Robert C. Feenstra and Alan M. Taylor the index of intra-industry trade tell us what proportion of trade in each product involves both imports and exports: a high index (up to 100 %) indicates that an equal amount of the good is imported and exported, whereas a low index (0 %) indicates that the good is either imported or exported but no both (Feenstra & Taylor, 2008).

Regarding the fact that Grubel-Lloyd index is widespread and used for the analysis of intra-industry trade specialization in separate countries, it will be used in this study to analyze the importance of this kind of trade to the changes of nature and pattern of international trade.

Lithuanian intra-industry trade: empirical results

Using the Grubel and Lloyd index and standard international trade classification (SITC) is calculated intra-industry trade index between Lithuania and its main partners during the 2005-2011 (Table 1). For comparative analysis of Lithuanian intra-industry trade was selected EU countries which are the main partners of country's export and import (Figure 1).

Table 1. Intra-industry trade between Lithuania and its trading partners in 2005-2011

Countries	Year						
	2005	2006	2007	2008	2009	2010	2011
EU	0.91	0.85	0.80	0.89	0.99	0.98	0.99
Latvia	0.67	0.74	0.75	0.74	0.83	0.87	0.84
Estonia	0.77	0.79	0.93	0.80	0.59	0.78	0.64
Germany	0.64	0.59	0.65	0.63	0.87	0.91	0.92
Poland	0.67	0.64	0.59	0.61	0.79	0.87	0.81
Netherlands	0.77	0.97	0.66	0.85	0.94	0.95	0.95
United Kingdom	0.77	0.91	0.94	0.70	0.59	0.54	0.59
Sweden	0.95	0.98	0.83	0.93	0.91	0.98	0.97

Source: Author's calculation, Eurostat Comext database, January, 2012.

Results presented in Table 1 reveal that generally intra-industry trade in Lithuania consist the majority part of total trade. A high level of intra-industry trade is usually attributed to a number of country specific factors, including its close geographical proximity, similar level of development, similar consumer tastes, culture, institutional, political and transport links. The analysis of intra-industry trade between Lithuania and the EU shows that the value of GL_i index is close to 1 (Table 1). This is related to the fact that the EU is the main Lithuanian trading partner: share of export of goods to the EU in the total export during 2005–2011 were the largest. This was also characteristic to the import from EU. Such a tendency remained through 2004, when Lithuania became a member of the EU. In 2011 export of Lithuanian goods to the EU comprised 61.4 % of total export and import from the EU –55.9% of total import (Foreign trade in 2011, 2012). As we can see from Table 1, growth tendency is characteristic to Lithuanian intra-industry trade with Latvia, Germany, Poland and Netherlands, but in 2008 these indices –decrease (Table 1). It is connected with economic recession in all countries of the EU.

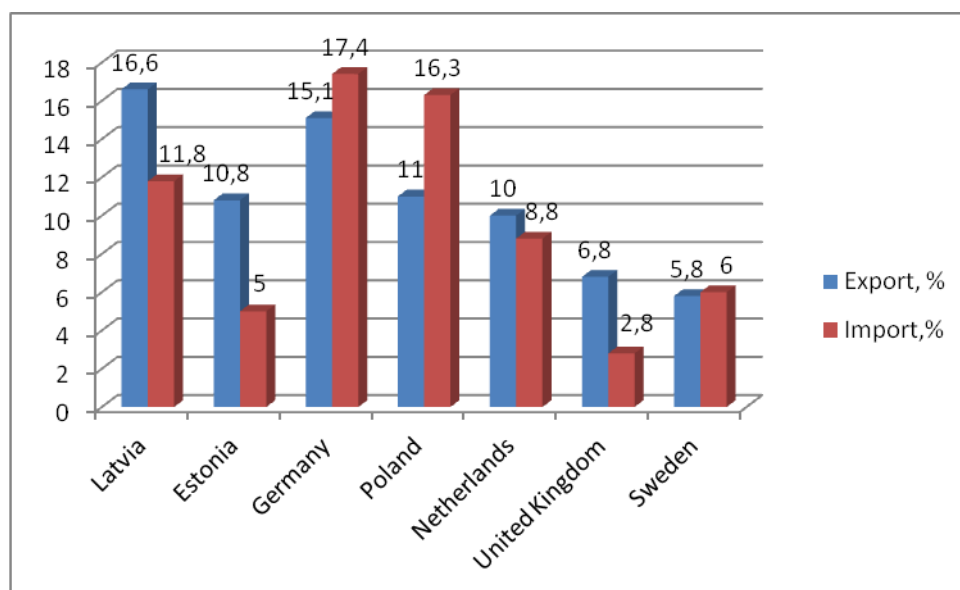


Figure 1. The share of export and import between Lithuania and member states of the EU in 2011, %
Source: Author's calculation, Statistics database of Lithuania, January, 2012.

The analysis shows that in 2011 the share of Lithuanian export to Latvia, Germany, Poland and Netherlands was the largest. This was also characteristic to the import from these countries (Figure 1).

When analyzing intra-industry trade between Lithuania and EU according to SITC we see that huge differences in separate groups prevail (Table 2).

Data of Table 2 show that trading in food products drinks, tobacco; chemicals, related products and other manufactured goods during 2010 not only increased if compared to 2005 but also were the largest (Table 1). Such situation was determined by many reasons, mainly, abolition of customs taxes for food products and alcoholic drinks from the EU States. This reduced the prices of these products, increased consumption and import thereof. On the other hand, during the examined period of time from 2005 to 2010 export of the said goods increased (Foreign trade in 2011, 2012). Thus, the changes of index of intra-industry of this branch show not only the increased level of specialization of this branch but also the ability of manufacturers to compete under more open trading conditions when Lithuania became the member of the EU. After Lithuania became a member of the EU, the consumption of manufactured goods (especially long-term ones) increased. However, having the trading regime with EU and other countries changed Lithuania exports most of manufactured goods, thus, index of trade in these goods are close to 100 % (Table 2).

Table 2. The changes of intra-industry trade between Lithuania and the EU according to SITC in 2005-2010

SITC	Year					
	2005	2006	2007	2008	2009	2010
Food, drink and tobacco (SITC 0+1)	0.94	0.97	0.99	0.86	0.95	0.95
Raw materials (SITC 2+4)	0.79	0.81	0.73	0.83	0.80	0.76
Mineral fuels, lubricants and related materials (SITC 3)	0.08	0.14	0.20	0.08	0.11	0.20
Chemicals and related products (SITC 5)	0.64	0.64	0.77	0.86	0.81	0.82
Machinery and transport equipment (SITC 7)	0.49	0.47	0.41	0.41	0.62	0.56
Other manufactured goods (6+8)	0.92	0.81	0.85	0.84	0.97	0.97
Total product	0.91	0.85	0.80	0.89	0.99	0.98

Source: Author's calculation, Eurostat Comext database, January, 2012.

As we can see from the data in the Table 3, the changes of index of intra-industry show that trading in machinery and transport equipment, other manufactured goods, raw materials, food products, drinks and tobacco increased in Latvia, Poland and Germany.

Table 3. The changes of intra-industry trade between the EU and some member states according to SITC in 2005-2010

SITC	Year	Latvia	Estonia	Germany	Poland	Netherlands	United Kingdom
Food, drink and tobacco (SITC 0+1)	2005	0.65	0.73	0.92	0.84	0.63	0.60
	2010	0.72	0.70	0.96	0.88	0.65	0.64
Raw materials (SITC 2+4)	2005	0.32	0.54	0.80	0.94	0.54	0.72
	2010	0.48	0.47	0.86	0.97	0.90	0.91
Mineral fuels, lubricants and related materials (SITC 3)	2005	0.85	0.86	0.62	0.73	0.67	0.45
	2010	0.68	0.80	0.59	0.80	0.65	0.63
Chemicals and related products (SITC 5)	2005	0.39	0.45	0.94	0.46	0.76	0.99
	2010	0.62	0.45	0.93	0.61	0.72	0.90
Machinery and transport equipment (SITC 7)	2005	0.33	0.84	0.78	0.93	0.70	0.82
	2010	0.68	0.90	0.85	0.96	0.68	0.83
Other manufactured goods (6+8)	2005	0.88	0.97	0.89	0.96	0.83	0.87
	2010	0.96	0.98	0.91	0.97	0.78	0.88

Source: Author's calculation, Eurostat Comext database, January, 2012.

Thus, the analysis of intra-industry trade reveals that after Lithuanian becoming the member of the EU, having national economics under development, structural changes of Lithuanian economics takes place. Having Lithuania trade with numerous foreign countries in a free trade regime influences the increase in the volumes of import and export. This is also characteristic to the examined members of EU. Due to that the share of intra-industry trade importance thereof has increased. Intra-industry trade provides more additional benefits from international trade than comparable advantage because trade within a branch enables the countries to gain benefit from larger markets. Thus, the nature of international trade is changing as well as its structure of goods due to increasing specialization within a branch and the variety of produced goods increases.

Conclusions

1. The globalization and integration processes opened additional possibilities for development of intra-industry trade. Lithuanian integration into EU had an influence on the changes of intra-industry trade between Lithuania and the members of EU. It was determined that in recent years export of Lithuanian goods into EU countries and import from EU comprised the biggest share of all export and import. Analysis shows that the global financial and economic crisis had a huge impact on the changes of intra-industry trade and intra-industry trade between Lithuania and member states of the EU decreased.
2. The analysis of the basic theories of intra-industry trade shows that traditional theories cannot provide a proper understanding of intra-industry trade. These theories explained the international trade among countries using differences in resources and availability of production factors, using thereof. However, intra-industry trade fails to reflect the comparative advantage. Therefore, a new approach to intra-industry trade was provided. According to its intra-industry trade is of two kinds: horizontal and vertical.
3. The analysis of the basic methods of measurement of intra-industry trade shows that various methods are used for measuring intra-industry trade. To examine the changes of intra-industry between Lithuania and its trading partners in light of economic crisis is used Grubel–Lloyd index. This index as an indicator of the degree of industrial specification helps to study Lithuanian ability to compete in a more open trade setting. The index of intra-industry trade is used to calculate proportion of trade in each product involves both imports and exports.
4. On the basis of SITC is determined concentration of intra-industry trade flows to the groups of countries. Analysis shows that growth tendency of intra-industry trade is characteristic between Lithuania and Latvia, Poland, Germany and Netherlands and tendency of reduction with Estonia and United Kingdom. Researches indicate that regarding economic recession in all countries of the EU Lithuanian intra-industry trade with analyzing countries decreased. However intra-industry trade of all examined countries with EU is predominant if compares to inter-industry trade. This is

related to the fact that all examined countries are of similar economic development, capital-labour ratio, qualification level.

5. On the basis of standard international trade classification (SITC) are determined that Lithuanian intra-industry trade is the most important and constantly increasing sector of international trade. The analysis of the calculated intra-industry indexes of Lithuania and EU using SITC shows that Lithuania has advantages in such SITC groups as food, drink and tobacco, other manufactured goods. EU has advantages in trade with goods induced in group's mineral fuels, lubricants and related materials, machinery and transport equipment. Researches of changes of intra-industry trade indicate that trading in machinery and transport equipment, other manufactured goods, raw materials, food products, drinks and tobacco increased in Latvia, Poland and Germany.
6. Thus, the analysis of intra-industry trade reveals that after Lithuanian becoming the member of the EU, having national economics under development, structural changes of Lithuanian economics takes place. The calculation results show the main directions of nature and pattern of international trade development. Thus, the nature of international trade is changing as well as its structure of goods due to increasing specialization within a branch and the variety of produced goods increases.

References

1. Amity, M. New Trade Theories and Industrial Location in the EU: A Survey of Evidence. *Oxford Review of Economic Policy*, 1998, 14 (2), 45-53.
2. Aquino, A. (1978). Intra-industry trade and inter-industry specialization as concurrent sources of international trade in manufactures. *Weltwirtschaftliches Archiv*, 114(2), 275-295.
3. Balassa, B. (1966). Trade Liberalization and Revealed Comparative Advantage. *The Manchester School of Economics and Social Sciences*, 33, 35-55.
4. Bernatonyte, D., & Normantiene, A. (2007). Estimation of Importance of Intra-industry Trade. *Inzinerine Ekonomika-Engineering Economics*, (3), 25-34.
5. Bernatonyte, D., & Normantiene, A. (2009). Estimation of Trade Specialization: the Case of The Baltic States. *Inzinerine Ekonomika-Engineering Economics* (2), 7-17.
6. Bergstrand, J. (1990). The Heckscher-Ohlin-Samuelson model, the Linder hypothesis and the determinants of bilateral industry trade. *The Economic Journal*, 100, 110-119.
7. Brulhart, M. (1994). Marginal intra-industry trade: Measurement and relevance for the pattern of industrial adjustment. *Weltwirtschaftliches Archiv*, 130, 600-613.
8. Eurostat Comext database// <http://fd.comext.eurostat.cec.eu.int/xtweb/>
9. Feenstra, R.C, Taylor, A, M. (2008) *International trade*. New York: Worth Publisher.
10. Foreign trade in 2011//<http://www.stat.gov.lt/lt/pages/view/?id=3484>.
11. Greenaway, D., & Milner, C. (1986). *The economics of intra-industry trade*. Oxford: Basil Blackwell.
12. Grubel, H.G., Lloyd, P.J. (1975). *Intra-industry trade: the theory and measurement of international trade in differentiated products*. London: Macmillan.
13. Hamilton, C., & Kniest, P. (1991). Trade liberalization, structural adjustment and intra-industry trade. *Weltwirtschaftliches Archiv*, 127, 365-367.
14. Husted, S., & Melvin, M. (2004). *International economics*. 6 th ed. New York: Addison-Wesley.
15. Kalbasi H. Modelling and patterns of intra-industry trade//http://www.ecomod.net/conferences/ecomod2003/ecomod2003_papers/.
16. Krugman, P. (1981). Intraindustry Specialization and the Gains from Trade. *Journal of Political Economy*, 89 (5), 959-974.
17. McAleese, D. (2004). *Economics for business*. 3 th ed. UK: Prentice Hall.
18. Ruffin, R.J. The nature and significance of intra-industry trade // <http://www.dallasfed.org/research/efr/1999/ /html>.
19. Snieska, V. (2008). Research into International Competitiveness in 2000-2008. *Inzinerine Ekonomika-Engineering Economics* (4), 29-41.
20. Statistics department of Lithuania (2012). //<http://www.stat.gov.lt/lt/pages/view/?id=2639>.
21. Tiits, M., & Juriado, J. Intra-industry trade in the Baltic Sea region // <http://www.ibs.ee/component/option.com/docman/task.doc.view/gid.14/temid39/html>
22. Volgina, N.A. (2006). *Meždunarodnaja ekonomika*. Moskva: Eksmo.