EXPORT PRODUCTIVITY AND SPECIALIZATION PATTERNS OF LITHUANIA

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Abstract
This paper investigates the patterns of export productivity and specialization in Lithuania. The paper analyses the basic methods of export productivity and specialization measurement; the pattern of Lithuanian; export composition; the importance of export productivity and specialization on Lithuanian economy. For measurement the patterns of export productivity and specialization of Lithuania in the paper two approaches are adopted. First export specialization index and trade dissimilarity index are used to predict structural changes in Lithuanian exports. Secondly, export productivity is used to determine the patterns of Lithuanian export productivity. Using standard international trade classification (SITC) trade dissimilarity index was determined the nature and patterns of export specialization of Lithuania. It was found that the biggest flows from Lithuania to the EU are in such groups: food, drink and tobacco; raw materials; mineral fuels, lubricants and related materials. Using the export specialization index and export productivity index was determined the patterns of export specialization and productivity in trade between Lithuania and the EU. Research indicates that the highest comparative advantage Lithuania has in trade with the EU in mineral products. Such situation shows that Lithuania has comparative advantages in the trade with low-added value commodities.

Keywords: international trade; export, export specialization; export productivity, trade dissimilarity index; export productivity index.

JEL Classification: F1.

Introduction
The global trade environment has changed in three major ways in recent decades. International trade has grown rapidly in value and volume, the composition of trade has altered significantly, and trade flows have been extensively liberalised. Increasing international trade is crucial to the continuance of globalization. The globalization and integration processes are having a major impact on the international trade system. International trade practice shows that economic instability of countries and lack of trust for foreign trade partners are the main factors impeding the development of export. For various countries, exports are a major source of foreign exchange, a way to maximize economies of scale and specialization and a channel to new technologies and knowledge spillovers (Lall, 2000; Santos-Paulino, 2002). Specialization patterns and an increasing higher value added of country’s exports have important implications for productivity and economic growth. A country’s specialization pattern should reflect structural phenomena such as its factor endowments, economies of scale, relative gap of factor productivity, or specific advantages of firms and industries (Santos-Paulino, 2010). Existing research shows that the variety of goods that a country produces and exports is affected by specialization, which in turn affects economic growth (Amable, 2000; Rodrik, 2006; Hausman et al., 2007).

Traditional trade theories such as D. Ricardo’s theory of comparative advantage and Heckscher-Ohlin theory of factor endowments state that countries with different resources or factor endowments will trade with each other (Husted, Melvin, 2004). This traditional approach emphasizes the role of specialization in international trade which increases operating efficiency and thus totals productivity.

Recent empirical studies confirm the argument that in which products economies specialize and what they export matters for economic performance (Lever & Van den Berg, 2003; Hausman et al., 2007). Today specialization is a dynamic process and its effect on productivity depends on the circumstances in which industries operate (Bagci, 2010).

EU enlargement creates a wider single market, which stimulates structural adjustment and economic specialization. This implies an increasing interest in analysing export specialization patterns within the EU market. Several studies have assessed the evolution of the export patterns in the transition economies (Bernatonyte & Normantiene, 2009). The attention was given especially to the so-called accession patterns, i.e. transition countries currently seeking EU accession (Aturupane et al., 1997; Kaitila, 1999). It is possible to state that the entry of the extra small economy to the economically integrated area of EU can lead by market structure transitions to consolidation of economic prosperity of such small country (Kraft, 2008).

Lithuanian integration into the EU opened huge possibilities for country’s international trade. While demand in Eastern markets is shrinking, export conditions to EU countries are getting more attractive. This
encourages Baltic States exports to the EU (Snieska, 2008). The Baltic States are considered as attractive recent entrants of the EU demonstrating high growth and representing new unsaturated market (Tvasonaviciene, Grybaite et al., 2008). It was determined that in recent years export of Lithuanian goods into EU countries and import from the EU comprised the biggest share of all export and import. Researches show that it has influence on changes of export specialization and productivity. However, researches investigating such changes are missing. For this reason actual problem arises – to estimate the patterns of export productivity and specialization of Lithuania under existing conditions.

The object of this research: export productivity and specialization of Lithuania.

The aim of research: to analyze the patterns of export productivity and specialization of Lithuania under existing conditions. Seeking for this aim, the following research tasks to be accomplished:

- to present the basic methods of export productivity and specialization measurement;
- to perform the comparative analysis of Lithuanian export composition;
- to calculate the export productivity and specialization indices;
- to estimate the importance of export productivity and specialization on Lithuanian economy.

Methodology of the research: in order to examine the patterns of export productivity and specialization of Lithuania under existing conditions two approaches are adopted. First, export specialization index and trade dissimilarity index are used to predict structural changes in Lithuanian exports. Secondly, export productivity index is used to determine the patterns of Lithuanian export productivity.

The methods of research are: analysis and synthesis of the scientific literature discussing the problems of export productivity and specialization measurement; the systematic statistical data analysis of the EU and Lithuanian international trade.

Methods of measurement of export specialization and productivity

In order to understand the nature and pattern of export specialization and productivity it is necessary to analyze the problem of their measurement.

Researches have employed a number of measures of export specialization. They are used for studying the structure and determinants of country’s export and to identify the basis on which to build competitive advantages (Bernatonyte & Normantiene, 2009). The concept of comparative advantage is widely used in modern economic literature to evaluate the patterns of trade and specialization of countries in commodities which have a competitive advantage (Saboniene, 2009). The indicator of the revealed comparative advantage provides a more concise picture of export specialization. The concept of revealed comparative advantage was introduced by Liesner (1958), but refined and popularized by Bela Balassa and known as the ‘Balassa index’ (Balassa, 1965). It is widely used empirically to identify a country’s weak and strong export sectors. Michael Porter uses it to identify strong sectoral clusters (Porter, 1990). Balassa (1965) explored the possibility of relying on various theoretical explanations of international trade to determine the patterns of comparative advantage. The revealed comparative advantage (RCA) index is defined by Balassa (B) (1965) as follows:

\[ B_{ij} = \frac{X_{ij}/X_i}{(X_{wj}/X_w)} \]  (1)

Where: \( X_{ij} \) is country’s i export of sector j; \( X_i \) – total export of country i; \( X_{wj} \) – world export of sector j; \( X_w \) – total world export.

If the share of sector j in total exports of country j is higher than the equivalent share of sector j in world exports, then \( B_{ij} > 1 \) and country j is classified as having a revealed comparative advantage in sector j. A value of less than unity implies that the country has a revealed comparative disadvantage in the sector j (Trade indicators & indices, 2003).

The export specialization index (ES) is a slightly modified RCA index, in which the dominator is usually measured by specific markets or partners. It provides product information on revealed specialization in the export sector of a country and is calculated as the ratio of the share of a product in a country’s total exports to the share of this product in imports to specific markets or partners rather than its share in world exports:

\[ ES = \frac{X_{ij}/X_i}{(m_{kj}/M_{kt})} \]  (2)

Where \( X_{ij} \) is the value of country’s i export of product j; \( X_i \) – total export of country i; \( m_{kj} \) – the value of import of product j in market k; \( M_{kt} \) – total import in market k.
The ES is similar to the RCA in that the value of the index less than unity indicates a comparative disadvantage and a value above unity represents specialization in this market (Trade indicators & indices, 2003).

A common measure for export specialization in the literature is the herfindahl index on exports (Sapir, 1996). The evolution of the herfindahl index of export specialization might reveal to what extent a given country is becoming more specialized or diversified, regardless of how the economic structures of other countries are evolving. A higher index indicates that the country exports in a smaller range of sectors and hence is more specialized (Bagci, 2010).

Santos-Paulino (2008) used the trade dissimilarity index to illustrate how specialization might affect a country’s export productivity. Trade dissimilarity index reflects the adequacy of a country’s trade pattern or specialization, that is, it considers the uncertainty in the real growth of exports. The indicator tries to predict structural changes in a country’s exports. Also, it evaluates if a change in the behaviour of exports is oriented towards more dynamic products demanded by the rest of the world, or by the main trade partners of a country. It is calculated as follows:

$$A_j = \frac{1}{2} \sum_{k} \left| \frac{X_{jk}}{X_j} - \frac{X_k}{X} \right|,$$  

Where k is the product and j is the country. X represents total exports.

Trade dissimilarity index ranges from zero to one, with higher values indicating higher dissimilarity. This indicator is higher when a country exports commodities in an industry with relatively low international demand. Lower dissimilarity index means higher diversification and diversification into new export products protects economies against unstable price and terms of trade shocks. As indicated by empirical exercise in Amable (2000), a decrease in trade dissimilarity index has a potential positive impact on the trade pattern of growth.

The estimation of the export productivity was developed by Hausmann, Hwang and Rodrik in 2007. They introduced the export productivity index, a quantitative indicator which sorts traded goods in terms of their implied productivity. It represents an improvement in the traditional measures of country’s revealed comparative advantage. Export productivity index encompasses a weighted average of the per capita incomes (GDP) of the countries exporting a commodity, where the weight reflects the revealed comparative advantage of each country in that product; that is, an income-productivity level that corresponds to a country’s export basket (Santos-Paulino, 2010).

Export productivity (EXPY) for country i is given by:

$$\text{EXPY}_i = \frac{\sum x_{jl}}{X_j} \text{PRODY}_l,$$  

Where \( \sum \frac{x_{jl}}{X_j} \) is the value share a commodity l in the country j total exports in a given year.

\( \text{PRODY}_l \) is an income-productivity measure associated to each good, defined as the weighted sum of the per capita GDP of countries (\( Y_j \)) exporting a given product (k), and thus represents the income level associated with each of these goods. It is calculated as follows:

$$\text{PRODY}_k = \sum \left[ \frac{x_{jk}}{X_j} / \sum \frac{x_{jk}}{X_j} \right] Y_j$$  

As explained by Hausmann, Hwang and Rodrik, using export shares instead of export volumes as weights, tries to assure that an adequate weight is given to exports that are important to smaller poorer countries (i.e., countries with lower per capita incomes (Hausman et al., 2007).

To measure export specialization in trade between Lithuania and the EU, this study uses export specialization index (ES) and trade dissimilarity index (TDI). However export productivity index is used to determine the patterns of Lithuanian export productivity.

**Lithuanian export specialization and productivity: empirical results**

Development of Lithuanian economy depends on foreign trade to a great extent. Development of foreign trade encourages structural changes of economy, helps to make close economic contracts to
businessmen of other countries and to adjust to market conditions better. Lithuanian, Latvian and Estonian integration into the EU opened huge possibilities for their foreign trade. Regional integration oriented transformations in the Baltic region (Melnikas, 2008). Formation of the unified social, economic and technological space in the Baltic region could be comprehend as a successful case of the regional integration oriented transformations in the European Union (Melnikas, 2008). It was determined that in recent years export of Lithuanian goods into EU countries and import from the EU comprised the biggest share of all export and import. In 2009 export of Lithuanian goods to the EU comprised 64.3 % and import from the EU –59.1 % (Statistics department of Lithuania, 2011).

Table 1. Export specialization indices of Lithuanian trade with the EU in 2002-2009

<table>
<thead>
<tr>
<th>SITC</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food, drink and tobacco (SITC 0+1)</td>
<td>1.71</td>
<td>1.86</td>
<td>2.13</td>
<td>2.05</td>
<td>2.67</td>
<td>3.19</td>
<td>3.31</td>
<td>3.23</td>
</tr>
<tr>
<td>Raw materials (SITC 2+4)</td>
<td>3.13</td>
<td>3.01</td>
<td>2.79</td>
<td>2.42</td>
<td>1.99</td>
<td>1.94</td>
<td>2.02</td>
<td>1.99</td>
</tr>
<tr>
<td>Mineral fuels, lubricants and related materials (SITC 3)</td>
<td>6.77</td>
<td>6.44</td>
<td>7.22</td>
<td>6.21</td>
<td>4.69</td>
<td>2.62</td>
<td>2.64</td>
<td>2.60</td>
</tr>
<tr>
<td>Chemicals and related products (SITC 5)</td>
<td>0.45</td>
<td>0.46</td>
<td>0.50</td>
<td>0.55</td>
<td>0.32</td>
<td>0.84</td>
<td>0.83</td>
<td>0.85</td>
</tr>
<tr>
<td>Machinery and transport equipment (SITC 7)</td>
<td>0.58</td>
<td>0.58</td>
<td>0.48</td>
<td>0.46</td>
<td>0.52</td>
<td>0.53</td>
<td>0.55</td>
<td>0.54</td>
</tr>
<tr>
<td>Other manufactured goods (6+8)</td>
<td>1.19</td>
<td>1.15</td>
<td>1.10</td>
<td>1.04</td>
<td>1.05</td>
<td>1.13</td>
<td>1.16</td>
<td>1.16</td>
</tr>
</tbody>
</table>

Source: Author’s calculation, Eurostat Comext database, January, 2011.

The analysis of Lithuanian export specialization is based on export specialization index and trade dissimilarity index. Using export specialization index (ES) and standard international trade classification (SITC) are calculated the nature and pattern of export specialization in trade between Lithuania and the EU (Table 1).

Figure 1. The trade dissimilarity indices of Lithuania, Latvia and Estonia in 2002-2009
Source: Author’s calculation, Eurostat Comext database, January, 2011.

The export specialization index presented in Table 1 indicates that in 2002-2009 Lithuania has achieved comparative advantage in trade with the EU in: food, drink and tobacco, raw materials, other manufactured goods. 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 in 2005, increased consumption and import thereof. On the other hand, during the examined period from 2002 to 2009 export of the said goods increased.

Data of Table 1 show that Lithuania has the highest comparative advantage compared with other countries in trade with the EU in mineral fuels, lubricants and related materials. Such situation shows that Lithuania has comparative advantages in the trade with low-added value commodities.
Using the trade dissimilarity index and standard international trade classification (SITC) are calculated the pattern of export specialization between Lithuania and the EU. For comparative analysis of Lithuanian export specialization was examined Latvian and Estonian trade dissimilarity indices (Figure 1).

Empirical results indicate a large variation in the trade dissimilarity index (Figure 1). The trade dissimilarity index is higher in 2002 compared to 2009. Such situation shows that Lithuanian, Latvian and Estonian exports commodities in an industry with relatively low international demand. Results presented in Figure 1 reveal that the trade dissimilarity index is lower in 2009. This situation is connected with trade structure of Lithuanian, Latvian and Estonian (i.e. their trade structure is rather similar to the EU trade).

EU trade policy and implementation of its principles had influence to new members of EU export and import marketable structure. It should be noted that since the Baltic States becoming the members of the EU common custom tariff of the EU is valid in Lithuania, Latvia and Estonia. This means that the same customs are applied for goods which are imported to the territory of Lithuania, Latvia and Estonia from the third countries as importing goods to any other EU country. In order to make solid foreign trade policy Lithuania and other members of EU applies custom tariffs, quantitative limitations, tariff quotas and other means of foreign trade regulation to the third countries, which EU applies. Lithuania have applied other means of EU foreign trade regulation: antidumping, protective, compensatory, reciprocal means, quantitative limitations, non-tariff limitations (veterinary and other standards), and means, introduced as sanctions according to the decisions of the United Nations.

To measure export productivity in trade between Lithuania and the EU, this study uses export productivity index. Using the export productivity index are determined the patterns of Lithuanian export productivity. For comparative analysis of Lithuanian export specialization was examined Latvian and Estonian export productivity index (Figure 2).

![Figure 2. Export productivity in Lithuania, Latvia and Estonia](source: Author’s calculation, Eurostat Comext database, January, 2011.)

Data of Figure 2 show that Estonia has the highest export productivity index compared with Lithuania and Latvia. This pattern of export productivity is showed that Estonian exports are more manufactures and technology-intensive than Lithuanian and Latvian export.

Thus, the analysis of export specialization and productivity reveals that after Lithuania becoming the member of the EU, having national economics under development, structural changes of its economy takes place. Having Lithuania trade with the EU in a free trade regime influences the increase in the volumes of import and export. A country can simultaneously decrease the amount of produced goods and to increase the range of goods useful to the consumers. 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. It was found that export specialization evolves over time, bringing with it patterns of economic development that vary from country to country and from region to region within countries. Therefore, the nature and pattern of export specialization and productivity has been the subject of much study.

2. In order to understand the nature and pattern of export specialization and productivity of Lithuania, it was examined the methods of assessment of export specialization and on these grounds were selected the best of their.

3. Researches have employed a number of measures of export specialization. They are used for studying the structure and determinants of country’s export and to identify the basis on which to build competitive advantages. It was determined that export specialization index (ES) is the best of measuring export specialization in trade between Lithuania and the EU. This index helps to estimate a sector in which the country is relatively more competitive in terms of trade.

4. On the basis of study many methods of export specialization was determined that the most appropriate method for measuring how specialization might affect a country’s export productivity is trade dissimilarity index. Trade dissimilarity index reflects the adequacy of a country’s trade pattern or specialization, that is, it considers the uncertainty in the real growth of exports. The indicator tries to predict structural changes in a country’s exports.

5. It is shown that Lithuanian, Latvian and Estonian integration into the EU opened huge possibilities for their foreign trade. On the basis of standard international trade classification (SITC) and export specialization index was determined the nature and pattern of export specialization in Lithuania. It is found that the biggest flows from Lithuania to the EU are in such groups: food, drink and tobacco; raw materials; mineral fuels, lubricants and related materials. 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 in 2005, increased consumption and import thereof. On the other hand, during the examined period from 2002 to 2009 export of the said goods in Lithuania increased.

6. On the basis of standard international trade classification (SITC) and the trade dissimilarity index are calculated the pattern of export specialization between Lithuania, Latvia, Estonia and the EU. It was determined a large variation in the trade dissimilarity index. The trade dissimilarity index is higher in 2002 compared to 2009. Such situation shows that Lithuania, Latvia, Estonia exports commodities in an industry with relatively low international demand. The trade dissimilarity index is lower in 2009. This situation is connected with similar to the EU trade structure of the Baltic States.

7. On the basis of standard international trade classification (SITC) and the export productivity index are calculated the pattern of export productivity between Lithuania, Latvia, Estonia and the EU. Analysis shows that Estonia has the highest export productivity index compared with Lithuania and Latvia. This pattern of export productivity is showed that Estonian exports are more manufactures and technology-intensive than Lithuanian and Latvian export.

8. Thus the analysis of export specialization reveals that after Lithuania becoming the member of the EU, having national economics under development, structural changes of its economy takes place. Having Lithuania trade with the EU in a free trade regime influences the increase in the volumes of import and export. The Baltic States can simultaneously decrease the amount of produced goods and to increase the range of goods useful to the consumers. 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.

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