THE ECONOMIC IMPORTANCE AND DETERMINANTS OF LITHUANIAN RE-EXPORTS

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This study focuses on Lithuanian re-exports, which are goods previously imported from one country and exported to a third country without further processing. Lithuanian companies have been involved in re-exporting activities since regaining independence, but after joining the European Union in 2004, re-exports have grown explosively, making up almost 40 per cent of exports of goods revenue in 2013. The product mix of Lithuanian re-exports follows a global pattern with a high share of machinery, computers, electronic devices and their parts. Other important categories are used passenger cars and vegetables and fruits. The majority of re-exports originate from Western Europe with CIS countries as the main destination market. The main drivers of Lithuanian re-exports are the vast market potential for Lithuanian trading companies in CIS countries, Lithuania's competitive transport and logistics sector as well as Lithuanian intermediate traders' special knowledge about demand in CIS countries (asymmetric information). Re-exporting activities are less important for the Lithuanian economy than domestically produced exports. In 2010, re-exports generated 1.7 per cent of GDP. Re-export volumes are determined by the level of economic activity in re-export markets and prices for re-exports relative to competitor prices. Re-export prices are mainly dependent on import prices for re-exports.*
Keywords: re-exports, cumulative production structure matrix, structural breaks, ARDL bounds testing.

Introduction

Lithuanian re-exports have recently come to the foreground in policy discussions as a result of import restrictions on food products imposed by the Russian Federation. The majority of Lithuanian food exports to Russia was made up of products not produced in Lithuania but previously imported from third countries (where these products were not necessarily produced either). Exported goods produced in Lithuania have a lower import content than re-exported goods, thereby adding more value to the local economy and creating more job places locally. Whether exported products are produced in Lithuania or elsewhere has a profound impact on their economic importance. But that does not mean that re-exporting activities do not add any value to the Lithuanian economy. One of the aims of this study is to quantify the added value of re-exports.

A previous study concluded that exports produced in Lithuania are determined by both demand and supply factors (Notten 2012). Given that the majority of added value from re-exports is generated abroad, it is likely that supply factors do not play a prominent role in the determinants of Lithuanian re-exports. By definition, supply factors in re-exports are limited to margin effects mainly captured by the Lithuanian wholesale trade and transportation and logistics sectors, because the re-exported good is produced, grown or extracted abroad. The second aim of this study is to identify the determinants of re-exports.

The paper is structured as follows. Section 1 gives a theoretical background for the concept of re-exports and puts the phenomenon in a wider international context. A closer look at Lithuanian re-exports is taken in Section 2, focusing on composition, countries of origin and destination countries. In Section 3 the economic importance of re-exports is determined. In Section 4 the framework for empirical analysis is discussed, focusing on practical issues such as data and econometric methodology. Section 5 reports the empirical results of the econometric estimations.

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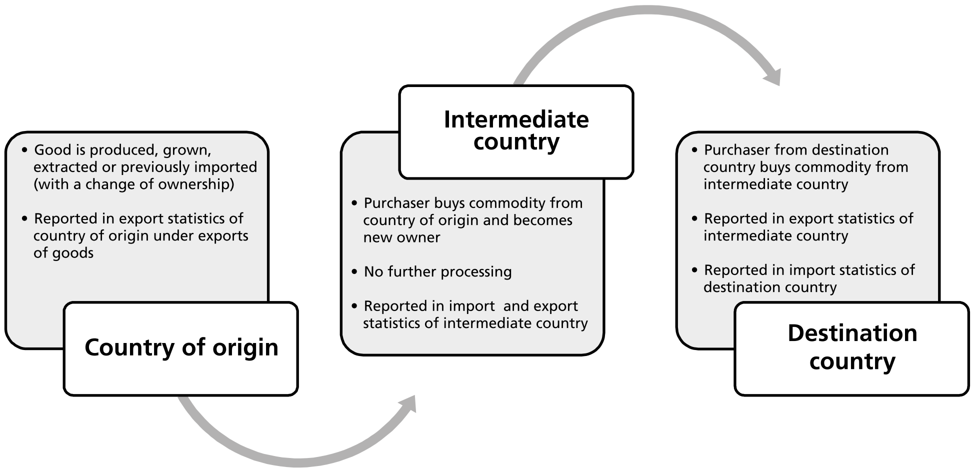
1. The phenomenon of re-exports

There is no standardised definition of re-exports. The United Nations (2010) defines re-exports as "exports of foreign goods in the same state as previously imported". In re-exports, commodities are produced or previously imported in one country and sold to a purchaser from an intermediate country. The new owner, in turn, sells those commodities onwards to a third country without further processing. Figure 1 provides a schematic overview of the concept of re-exports.

Fig. 1. Schematic overview of the concept of re-exports



Source: formed by the author.

Re-exports are distinct from transit trade, where the ownership of the product is not shifted to a purchaser in an intermediate country but directly to a purchaser in a destination country. In transit trade, the commodity transfers physically through an intermediate country but is excluded from the intermediate country's trade statistics. Re-exports are therefore included in national account statistics as well, while transit trade is excluded. In some cases there are several intermediate countries, all together forming a re-export chain.

Statistics Lithuania publishes detailed statistics on import and export of goods by commodity and destination country. In addition, the statistical office reports domestically produced exports of goods by commodity and destination country as well. Subtracting data entries for domestically produced exports from the corresponding entries for (total) exports gives detailed re-export statistics by commodity and destination country. A data entry qualifies as domestic export when the respondent in the export declaration, required by the customs authorities, fills in Lithuania as the country of origin. Export declaration forms not having Lithuania as the country of origin are excluded from the domestically produced export statistics.

An approximation for re-exports can also be derived from input-output tables. Numerical data for re-exports are enclosed in the column "exports" in the import matrix of the input-output table. However, estimations for re-exports based on input-output tables are substantially lower than re-export figures derived from customs data. This discrepancy is partially accounted for by the allocation of wholesale trade and transportation margins which are included in re-export data provided by the customs authorities but excluded from the import matrix of the input-output table.*

*In 2010, re-exports (including energy products) derived from customs data amounted to EUR 5 billion, while re-exports (factually imports for re-exports) from input-output tables were EUR 3.4 billion.

Geographical location and logistical efficiency is usually mentioned as the main motive for both re-exports and transit trade. With the development of large oceangoing container vessels, shipping costs have strongly reduced in previous decades, leading to the emergence of a global hub-and-spoke system of transport routes. Cargo to a region is delivered first to a primary hub port by large oceangoing container vessels and is then further transported to its final destination (spokes) by smaller ships, trains or trucks

(Andriamananjara *et al.* 2004). These hubs provide trading companies with low-cost goods delivery.

Another often mentioned motive for re-exports is asymmetric information. As a result of asymmetric information, intermediate traders have better knowledge about source or destination markets. It is easier and more efficient for buying and selling parties to pay middlemen specialised in finding them the appropriate product, supplier and customer. The concept of asymmetric information mainly applies to differentiated products, where characteristics are more difficult to determine for outsiders. Re-exports are therefore often differentiated products such as machinery, computers and electronic devices (Hanson, Feenstra 2004).

Tariffs, quotas and taxation provide additional motivations for re-exports. Discriminative tariffs or quotas for different countries by the destination country provide an incentive for firms in the country of origin to use an intermediate country to export products to bypass these measures. Tax breaks or tax avoidance are other incentives for re-exports by multinational companies. Re-exports combined with transfer pricing can be used to globally optimise taxes, costs and income. Intra-firm re-exports can be used to transfer income to a unit located in an intermediate country with a lower taxation rate (Mellens *et al.* 2007).

Re-exports might also be the result of carousel trade and tax fraud. Carousel trade occurs when goods imported into a European Union (EU) country from another EU country are reported as being exported to a non-EU country in order to claim a VAT refund. In reality, goods never cross the border to a non-EU country but are traded on black markets within the EU (Ollus, Simola 2007).

The Lithuanian practise of separately reporting domestically produced exports — from which re-exports can be derived if data for totals is available — is not common in most countries. Only a few countries gather data on re-exports on a systematic basis. Moreover, there is no international agreement on the definition of re-exports. This means that even when figures on re-exports are available, it is not clear whether these can be compared properly with the Lithuanian definition of re-exports, due to differences in definitions and statistical methods. Comparisons therefore need to be interpreted with caution.

Based on the limited data that are available, several earlier studies concluded that global re-exports have been rapidly expanding during recent decades (Andriamananjara *et al.* 2004; Mellens *et al.* 2007). Many countries nowadays are heavily involved in re-exporting activities, with some of them being hubs in multilateral trade, while others concentrate on a single large market. There are also trade flows in which there are several intermediate countries that form a re-export chain. Usually, re-exports consist of high-valued differentiated goods, which are easy to transport, such as machinery, computers, electronic devices and parts thereof. Other significant categories — depending on the country — include chemicals, transport equipment as well as textile and apparel (Mellens *et al.* 2007).

Hong Kong, Singapore and the Netherlands are major re-export hubs due to their geographical location and historical cultural traditions as trading nations. Lithuania can be hardly compared to these countries and is better compared with re-exporting countries that concentrate on a single large market. Table 1 shows the values gathered from input-output tables for re-exports (excluding energy products) for the years 2000 and 2010 for a selection of EU countries. Unfortunately, comparable input-output tables are not available for all EU countries and the figures are not very recent either.* Actual re-export turnover is higher than the reported numbers, because the numbers in the table are imports for the purpose of re-exports, which exclude trade and transportation margins. Nevertheless, these figures do give an impression of the importance of re-exports. Note that total exports include exports of services. Lithuanian data in Table 1 is based on input-output tables to allow comparison with other EU countries.

*EU Member States are required to compile input-output tables only once every five years. Eurostat requires these tables to be available within three years after the end of the reporting year. A new table for Lithuania is therefore not expected before 2018.

Table 1

Re-exports in selected EU countries in 2000 and 2010

	2000			2010		
	Re-exports, current EUR billion	Total exports, current EUR billion	Re-export share, %	Re-exports, current EUR billion	Total exports, current EUR billion	Re-export share, %
Belgium	53.1	206.2	25.7	80.2	276.7	29.0
Estonia	0.1	4.7	2.5	1.1	10.5	10.4
Finland	0.7	56.5	1.2	1.7	70.6	2.5
France	23.5	380.7	6.2	23.9	463.6	5.2
Germany	94.0	669.8	14.0	230.5	1,165.5	19.8
Lithuania	0.7	5.1	14.1	3.5	18.8	18.4
Netherlands	81.9	272.0	30.1	176.0	465.0	37.9
Poland	2.0	48.8	4.0	11.9	144.6	8.2
Sweden	2.6	124.1	2.1	12.0	158.7	7.6
United Kingdom	...	...	...	31.8	521.4	6.1

Source: Eurostat input-output tables.

From the data available, it can be concluded that with the exception of France, re-exports gained in importance between 2000 and 2010. Germany is likely to be the largest re-exporter in the EU, followed by the Netherlands and Belgium. Germany's leading position might be explained by its central position in Europe. Mellens *et al.* (2007) explain the large growth of German re-exports by the 2004 expansion of the EU with central and eastern European countries. Re-exports by the Netherlands and Belgium are explained by their geographical location and the presence of Europe's largest seaports (Rotterdam and Antwerp). These ports (hubs) are connected to river, road and railway networks (spokes) that provide excellent access to the western European hinterland. The geographical location and technically advanced nature of their transport and logistics infrastructure make the Netherlands and Belgium attractive for international distribution centres that serve clients across Europe.

Finland and Estonia are re-exporting countries that focus on one large market. As for Lithuania, Russia is the most important re-export destination (Ollus, Simola 2007). Unfortunately, no suitable input-output table is available for Latvia. Estonia and Finland are both situated in the north-eastern part of Europe and with the presence of a large neighbour, Russia, there is not much choice for both countries to specialise in another market. Table 2 provides an overview of the composition of re-exports of Estonia, Finland, Poland and Lithuania. For comparative purposes, Lithuanian data is derived from input-output tables.

The largest category in Estonian re-exports is transport equipment, which is mainly composed of used passenger cars. The product mix of Estonia's re-exports is further dominated by typical re-export products such as machinery and electronic devices. Other categories with a considerable share are chemicals and metals. The bulk of Finnish re-exports consist of electronic devices and used passenger cars. Other categories with considerable shares are food products, machinery and furniture. The most important category of Polish re-exports is computers and electronic devices. Re-exports of used transport equipment is the second largest category, while machinery, textiles and clothing and metals also have substantial shares.

Although the composition of Estonian, Polish and Finnish re-exports differ, the incentives for re-exporting to Russia are likely to be similar. A study by Ollus and Simola (2007) into Finnish re-exports to Russia identified the incentives for re-exporting to Russia. Besides Finland's geographical location, the authors refer to the technically advanced nature of Finnish logistics and traditionally large trade flows through Finland to Russia. Other incentives for re-exports include Russia's enormous market potential for Finnish traders and their special knowledge about Russian demand (asymmetric information), transfer pricing and grey schemes.

Estonia, Finland, Poland and most likely, as well as Latvia are Lithuania's main competitors in the region in re-export markets. Lithuania competes with Poland and, to a lesser extent, Finland in re-exports of vegetables and fruits to Russia. In transport equipment, Lithuania competes with all countries (including Latvia), since they all re-export considerable amounts of used passenger cars to Commonwealth of Independent States (CIS) markets. The same is the case for typical re-export goods such as machinery, computers, electronic devices and parts thereof.

Table 2

Composition of re-exports in selected EU countries in 2010

	Estonia		Finland		Poland		Lithuania	
	current EUR million	Share, %	current EUR million	Share, %	current EUR million	Share, %	current EUR million	Share, %
Agricultural and food products, beverages and tobacco	35.0	3.5	147.1	8.5	411.2	3.5	444.8	12.9
Mining and quarrying products	0.5	0.1	7.5	0.4	140.4	1.2	47.5	1.4
Textiles, clothing and leather products	87.8	8.8	2.6	0.1	1,161.8	10.0	186.8	5.4
Chemicals and chemical products	111.4	11.1	99.8	5.7	244.2	2.1	351.4	10.2
Basic metals and fabricated metal products	108.8	10.8	0.0	0.0	1,041.7	8.9	170.5	4.9
Computer, electronic and optical products	68.1	6.8	585.6	33.7	3,797.5	32.6	292.1	8.5
Electrical equipment	155.3	15.5	14.7	0.8	562.6	4.8	167.6	4.9
Machinery and equipment	119.9	12.0	226.9	13.1	1,068.4	9.2	511.0	14.8
Transport equipment	189.5	18.9	491.9	28.3	2,431.4	20.9	811.1	23.5
Furniture	40.5	4.0	162.6	9.4	447.0	3.8	109.2	3.2
Other products	86.1	8.6	0.0	0.0	341.4	2.9	360.2	10.4
Total	**1,003.1**	**100**	**1,738.8**	**100**	**11,647.5**	**100**	**3,452.2**	**100**

Source: Eurostat input-output tables.

2. Lithuanian re-exports

The composition or product mix of a country's exports is an important factor for determining its export performance. Lithuania's share in world trade will increase under stable price competitive conditions, if the markets for goods which Lithuania exports grow faster than markets for goods which Lithuania does not export. Table 3 shows the composition of domestically produced exports and re-exports (excluding energy products). Energy products are excluded due to their different market structure.

Table 3

Composition of domestically produced exports and re-exports in 2013 (excluding energy products)

	Domestic exports		Re-exports		Exports	
	EUR million	Share, %	EUR million	Share, %	EUR million	Share,%
Products of agriculture, forestry and fishing	1,040	10.6	927	10.1	1,967	10.3
Mining and quarrying products	103	1.1	20	0.2	123	0.6
Food products	1,721	17.5	529	5.7	2,250	11.8
Beverages and tobacco products	438	4.5	233	2.5	671	3.5
Textiles	274	2.8	154	1.7	428	2.2
Wearing apparel	388	4.0	392	4.3	780	4.1
Wood and products of wood	549	5.6	132	1.4	681	3.6
Paper and paper products	192	2.0	192	2.1	384	2.0
Chemical products	1,608	16.4	684	7.4	2,292	12.0
Pharmaceutical products	16	0.2	375	4.1	391	2.1
Rubber and plastic products	483	4.9	338	3.7	821	4.3
Basic metals	87	0.9	205	2.2	292	1.5
Fabricated metal products	302	3.1	359	3.9	662	3.5
Computer, electronic and optical products	177	1.8	661	7.2	838	4.4
Electrical equipment	262	2.7	509	5.5	770	4.0
Machinery and equipment	271	2.8	1,257	13.6	1,528	8.0
Transport equipment	230	2.3	1,311	14.2	1,541	8.1
Furniture	965	9.8	159	1.7	1,124	5.9
Other products	709	7.2	778	8.4	1,487	7.8
Total	**9,814**	**100**	**9,217**	**100**	**19,032**	**100**

Source: Statistics Lithuania; author's calculations.

The table reveals that the composition of re-exports is substantially different from exports of domestically produced goods. Domestically produced exports are dominated by chemical products, food products, agricultural products, and furniture and wood products.* By contrast, typically differentiated re-export products such as machinery, computers and electronic devices dominate re-exports. The large share of transport equipment in re-exports is mainly due to large numbers of re-exported used passenger cars. Agricultural products also play a major role. Re-exports of agricultural products are mainly fresh vegetables and fruits previously imported from Western Europe and re-exported to Russia. Chemical products, pharmaceuticals and wearing apparel also play a role.

As one of the few countries in the world, Lithuania reports data for domestically produced exports at a disaggregated level, from which the destination of re-exports can be easily derived. Table 4 shows the destinations of domestically produced and re-exported manufactures. The export geography for Lithuanian re-exports substantially differs from the export geography for domestically produced exports. More than 70 per cent of domestically produced exports are destined for EU countries, while CIS countries have a share of only 11.3 per cent.

Re-exported products, on the other hand, have CIS countries as their main market with more than 66 per cent of total re-exports, while EU countries are the destination for only 31 per cent of re-exports. Very few re-exports have other countries as their destination. Measured by individual countries, Russia is by far the largest market for re-exports with a share of more than 45 per cent, followed by Belarus with almost 12 per cent, Latvia with almost 11 per cent and Estonia with 5 per cent. Re-exports to Latvia, Estonia and also Poland might as well be part of a re-export chain with CIS markets as final destination.**

*Detailed data for domestically produced exports classified by 8-digit Combined Nomenclature has been converted to CPA/NACE classification with the use of a Eurostat RAMON conversion table: http://ec.europa.eu/eurostat/ramon/other_documents/index.cfm?TargetUrl=DSP_OTHER_DOC_DTL.

**The recent collapse of re-exports of food products to Latvia, Estonia and Poland after the Russian embargo is indirect evidence for the existence of such re-export chains with CIS countries as final destination.

Table 4

Structure of export categories by country in 2013 (excluding energy products)

(per cent)

	Domestic exports	Re-exports	Total exports
Germany	14.1	3.2	8.9
Latvia	6.4	10.7	8.5
Estonia	2.8	5.0	3.9
Netherlands	4.4	0.7	2.6
France	4.0	0.6	2.4
Italy	3.4	0.7	2.1
Finland	2.5	0.9	1.7
Belgium	2.5	0.4	1.5
Rest of euro area	4.2	1.4	2.8
Euro area total	**44.3**	**23.6**	**34.4**
Poland	6.7	3.4	5.1
Sweden	7.2	1.1	4.3
United Kingdom	5.1	1.0	3.1
Denmark	4.3	0.9	2.7
Rest of EU	2.8	1.4	2.1
EU total	**70.4**	**31.3**	**51.7**
Russia	7.1	45.9	25.7
Belarus	2.2	11.6	6.7
Kazakhstan	0.5	4.2	2.3
Ukraine	1.1	1.9	1.4
Rest of CIS	0.4	2.8	1.6
CIS total	**11.3**	**66.4**	**37.7**
Norway	5.0	0.4	2.8
United States	2.1	0.2	1.2
Rest of the world	11.2	1.7	6.6
Total	**100**	**100**	**100**

Source: Statistics Lithuania; author's calculations.

Most Lithuanian re-exports, then, are destined for CIS countries. But from where are these goods imported? There are no statistics available on the countries of origin for re-exports. But these can be indirectly approximated from import and re-export figures in foreign trade statistics. Imports for re-exports by country are approximated as:

$$m_j^{rx} = \sum_{i=1}^{9265} x_i^r \cdot \left(\frac{m_{ij}}{\sum_{j=1}^{245} m_i} \right), \quad (1)$$

where: m_j^{rx} is imports for re-exports from country j, x_i^r — re-exports of commodity i, m_{ij} imports of commodity i from country j and $\sum_{j=1}^{245} m_i$ — total imports of commodity i from all countries. The calculations included 9,265 commodities and 245 countries.

Table 5 shows the origin of imports for the purpose of re-export and the origin of imports destined for the Lithuanian market, the so-called retained imports. The majority of imports for both the Lithuanian market and re-exports are sourced from Western Europe, while imports from CIS countries are mainly for domestic use. Lithuanian re-export flows are therefore mainly from Western Europe to CIS countries and not vice versa.

Table 5

Structure of import categories by country in 2013 (excluding energy products)

(per cent)

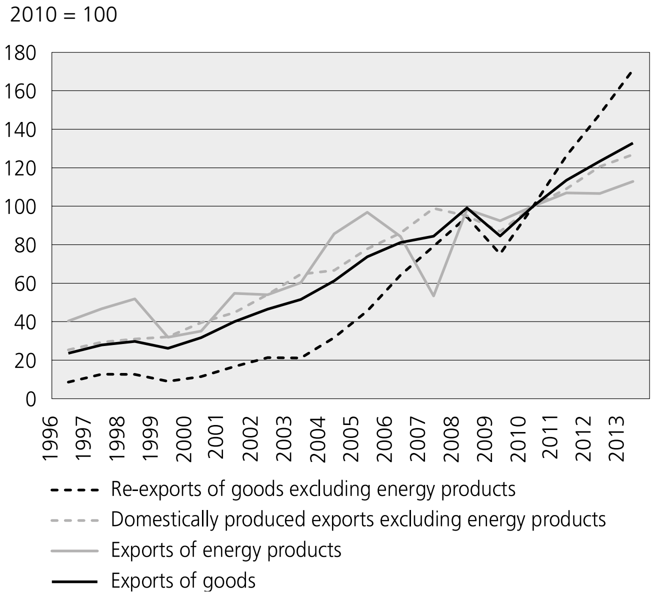
	Retained imports	Imports for re-exports	Total imports
Germany	14.0	15.9	14.9
Latvia	9.3	6.2	7.9
Netherlands	4.6	10.5	7.4
Italy	3.8	8.2	5.9
Belgium	5.8	3.3	4.6
France	2.3	5.9	4.0
Estonia	4.3	2.6	3.5
Spain	1.4	3.6	2.4
Finland	2.4	2.3	2.4
Austria	1.2	1.2	1.2
Rest of euro area	2.1	1.8	1.8
Euro area total	**51.2**	**61.5**	**56.0**
Poland	14.5	11.4	13.1
Sweden	5.0	3.7	4.4
United Kingdom	2.5	4.3	3.4
Czech Republic	2.3	2.2	2.2
Denmark	2.3	2.0	2.2
Hungary	1.0	1.1	1.0
Rest of EU	0.7	0.4	0.5
EU total	**79.4**	**86.6**	**82.8**
Russia	5.6	2.1	3.9
Belarus	2.4	1.7	2.1
Ukraine	1.6	0.6	1.2
Rest of CIS	0.3	0.4	0.3
CIS total	**9.9**	**4.8**	**7.5**
China	3.0	3.2	3.1
United States	1.3	1.8	1.5
Rest of the world	6.3	3.5	5.0
Total	**100**	**100**	**100**

Source: Statistics Lithuania; author's calculations.

In 1996, the value of re-exports (excluding energy products) came to around EUR 328 million; by 2013 this figure has soared to more than EUR 9 billion, which amounts to an average annual increase of 21.5 per cent. Domestically produced exports of goods increased by an average of 13.5 per cent per year over the same period. In volume terms, the difference in growth rates is even larger, because on average prices of goods produced in Lithuania increased faster than prices of re-exports. The slower growth of re-export prices is explained by world prices of many typical re-export goods, such as computers and electronic devices, which were under downward during the sample period.

Re-export volume growth fell sharply during the Russian financial crisis of 1998–1999 and the global financial crisis in 2009 (see Fig. 2). There was a smaller decrease in 2003, when the Russian federal government increased import duties on used passenger cars. Re-export volume growth has accelerated in particular since 2004 as a result of Lithuania's EU accession. Since Lithuania became a member of the single market, borders checks for imports from other EU countries were completely abolished, forming an important push factor for re-exporting. In addition, Lithuania benefited from impressive economic growth figures in its main re-export markets (Russia, Belarus and Latvia).

Fig. 2. Export volume indices



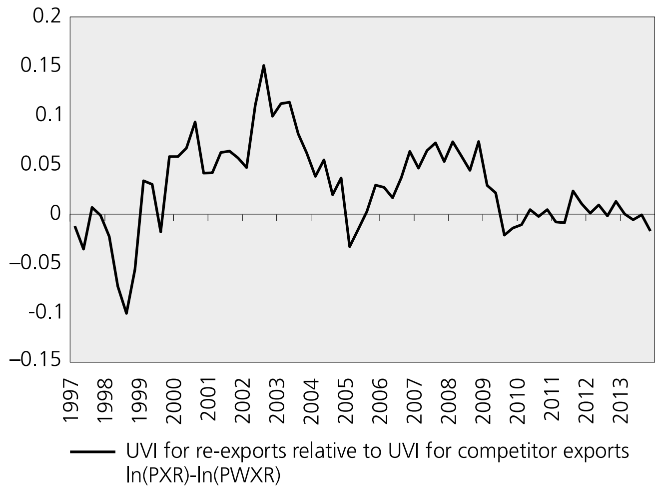
Sources: Ministry of Economy of the Republic of Lithuania, Statistics Lithuania; author's calculations.

The incentive for Lithuanian companies to re-export is somewhat different from countries heavily involved in re-exporting. Unlike Hong Kong and the Netherlands, Lithuania is not a global re-export hub, although Lithuania might be considered a transport and logistics spoke that forms a corridor between Western Europe and Eastern Europe. Lithuanian re-exporters mainly concentrate on providing goods for consumer markets in CIS countries, among which the Russian market is the most prominent.

As for transit, an important motive for re-exporting to CIS markets can be found in Lithuania's competitive transport and logistics sector. Ollus and Simola (2007) give possible explanations for the reasons why in Finland re-exporting might be preferred over transit. Given that re-exports are declared to Finnish customs as normal imports, there is no necessity to report a final destination as is the case with transit. Goods in transit are usually stored at customs warehouses and re-packaged into smaller cargo loads before being shipped to Russia. Regular warehouses can be cheaper than customs warehouses and might provide better re-packaging opportunities. Given that there are no customs duties on goods imported from other EU countries, re-exports can be an attractive, flexible alternative to transit. These arguments are likely to be valid for Lithuania as well.

Figure 3 shows a competitiveness indicator for re-exports. Competitiveness is measured by a unit value index for re-export relative to a unit value index for competitor's exports. Table 1 of the Appendix provides a complete listing of data sources and construction of variables used in this paper. The indicator can be considered a real effective exchange rate for re-exports. Lower relative prices indicate higher competitiveness of Lithuanian re-exports. The Netherlands Bureau of Economic Analysis found much lower price elasticities for Dutch re-exports than for Dutch domestically produced exports. They argue that the price sensitivity of re-exports manifests itself in a very different manner, because relative prices are an indicator of international demand for re-export products, rather than of the competitiveness of the re-export sector in the Netherlands. They justify their argument by the fact that re-export prices contain a much smaller part of domestic costs because one unit of re-export contains very few value-added that is created in the Netherlands (SAFE 2003).

Fig. 3. Re-export prices relative to competitor export prices



Source: formed by the author.

However, competitiveness alone cannot account for all re-exports through Lithuania. Re-exporting activities are mainly conducted by companies registered as wholesale or retail traders.* These intermediate traders are likely to exploit asymmetric information by having better knowledge about source or destination markets. It is easier and more efficient for buying and selling parties to pay an intermediate trader specialised in finding them the appropriate product, supplier and customer. Historically, Lithuanians have experience in trading with CIS countries and many trading companies involved in re-exporting are in fact owned by Russian nationals, giving them an advantage over their competitors because they know the local Russian market. The concept of asymmetric information mainly applies to differentiated products, where characteristics are more difficult to determine for outsiders. Therefore, re-exports are often differentiated products, such as machinery and electronic devices (Hanson, Feenstra 2004).

3. Economic importance of re-exports

Traditionally, export revenue is registered by commodity, using the combined nomenclature classification for the most detailed levels and which can be converted to industry classifications such as NACE/CPA. Since the majority of exports consist of goods, most exports are registered for the manufacturing industry. However, the manufacturing industry also uses inputs from other sectors. These can be intermediate goods and services imported from abroad or supplies from other sectors in Lithuania. The Lithuanian sectors that supply intermediate goods and services to other Lithuanian sectors that are exporting contribute to the added value of exports as well.

Input-output tables are used to calculate the contribution of supplying sectors to the added value of exports. An input-output table provides a detailed description of the link between production in a country, foreign trade (imports and exports) and domestic expenditures. The input-output table also shows the intermediate deliveries among different sectors. The 2010 input-output table for Lithuania distinguishes 64 sectors. A row in the table shows where output is supplied to: either to other sectors or to final demand categories (consumption, investment or exports). From the columns in the table, the origin of produced output can be determined. After all, purchases of inputs from other sectors, imports of raw materials, semi-manufactures and services and taxes and subsidies are part of output as well. The difference between output and costs of inputs makes up the added value of a sector. This added value consists of compensation of employees, operating surplus and consumption of fixed capital. The input-output table also shows which share of the final demand categories was not produced in Lithuania, but directly imported from abroad.

In the calculation of the share of the various expenditure categories in gross domestic product (GDP) total imports have to be assigned to all expenditure categories. This can

*On a list provided by the State Tax Inspectorate, 84 out of the largest 100 re-exporting companies in 2013 were registered as wholesale and retail trade companies.

be done with the so-called Cumulative Production Structure (CPS) matrix (Kranendonk, Verbruggen 2008). This matrix indicates for the various expenditure categories the composition of output by gross value-added components (such as salaries, profits and depreciation allowances) and (final and intermediary) imports. The CPS matrix is calculated by substituting out domestic intermediary demand in the input-output table. The CPS matrix provides a direct link between primary inputs and final demand. The matrix shows how much of each primary input category is needed, both directly and indirectly (through the use of intermediaries), to produce each category of final output. To develop this matrix, consider the following input-output table:

$$\begin{array}{cccc} & (n) & (f) & (1) \\ (n) & A & F & z \\ (p) & P & W & \times \\ (1) & z' & y' & \end{array} \tag{2}$$

where:

A = n by n matrix of domestically produced intermediary demand
F = n by f matrix of domestically produced final demand
z = n by 1 vector of domestically produced final demand
P = p by n matrix of primary inputs used by domestic firms
W = p by f matrix of primary inputs that are at the same time final demand
$\times$ = p by 1 vector of total primary inputs
y = f by 1 vector of total final demand
n = number of sectors
f = number of categories of final demand
p = number of primary input categories

In the first step, the matrices A^* and P^* are defined by dividing the column entries of A and P by the corresponding entry in z'. A^* is the matrix of intermediary input coefficients and P^* is the matrix of primary input coefficients. The entries A_i^{*j} and P_i^{*j} indicate the amounts of intermediary input of sector i and of primary input of category i that is needed to produce one unit of gross output of sector j.

In the second step, the n by f matrix X is defined as: $X = \left(I - A^*\right)^{-1} \cdot F$. Each column in X is the vector of total demand (by sector) generated by the corresponding column vector of final demand in F.

The p by f matrix CPS' is formed as follows:

$$CPS' = P^* \cdot X;$$

$$CPS' = P^* \cdot \left(I - A^*\right)^{-1} \cdot F. \tag{3}$$

Each entry CPS'_{ij} represents the total or cumulated amount of primary input of category i that is required to produce the j^{th} column vector of final demand in F. Remember that W_{ij} is the amount of primary input of category i that is at the same time a component of final demand of category j. $CPS_{ij} + W_{ij}$ is therefore the total amount of primary input of category i that is required to produce the total final demand of category j. The CPS matrix is then calculated as follows:

$$CPS = CPS' + W;$$
$$CPS = P^* \cdot \left(I - A^*\right)^{-1} \cdot F + W. \tag{4}$$

The column totals of this CPS matrix are the total value of the primary inputs needed, both directly and through intermediaries, to produce the corresponding category's final demand. Since total cost must be equal to total production, these column totals must be the same as the entries of vector y'. The row totals are the total amounts of primary inputs that are used, thus forming the column vector $\times$. The full CPS matrix looks as follows:

$$\begin{array}{ccc} & (f) & (1) \\ (p) & CPS & \times \\ (1) & y' & \end{array} \qquad (5)$$

Dividing the CPS matrix by its column totals produce the standardised CPS, whose columns are made up of the cumulative cost shares of the primary input categories for each final demand category (among which are exports).

From standard input-output tables only the import content of re-exports can be derived, which is enclosed in the column "exports" in the import matrix. Standard input-output tables also do not differentiate between exports of goods and exports of services. Therefore, an extra column in the input-output table is added in which "exports" are divided into "domestically produced exports", "exports of energy products", "re-exports" and "exports of services". The entries for exports of services are sourced from an unpublished export matrix provided by Statistics Lithuania. The distinction between domestically produced exports and re-exports is not available from existing matrices. Only the imports for re-exports which can be found in the import matrix under the column header "exports" are available. These data entries enter the fourth quadrant as totals under the column header "re-exports" and row header "use of imported products".

However, the added value from re-exports cannot be estimated yet, since the second quadrant is empty. To arrive at an approximation of this re-export margin, wholesale trade and transportation margin matrices have been used. Like the export matrices, wholesale trade and transportation matrices are unpublished as well and were provided on request by Statistics Lithuania. Re-export margins are approximated as following. First, re-export data classified in the Combined Nomenclature are converted to NACE/CPA using Eurostat RAMON conversion tables. Second, the converted data are used to calculate re-export shares classified by NACE/CPA. Third, these shares are then multiplied with the sectoral wholesale trade and transportation margins for exports to obtain re-export margins. Fourth, the re-export margins by sector are accumulated and added in the second quadrant for the appropriate wholesale trade and transportation sector rows under the "re-exports" column. Fifth, with data for re-exports in the second and fourth quadrants, the CPS matrix with a separate column for re-exports can be calculated.

According to the calculated CPS matrix, the added value of re-exports — i.e. after deduction of the purchase price on the foreign market — is estimated at only EUR 473 million in 2010. The contribution of re-exports to the Lithuanian economy equalled 1.7 per cent of GDP. The economic importance of re-exports increased significantly in recent years: from 0.7 per cent of GDP in 2000 to the aforementioned 1.7 per cent of GDP in 2010.

Table 6

Cumulative Production Structure matrix for the Lithuanian economy in 2010

(EUR billion)

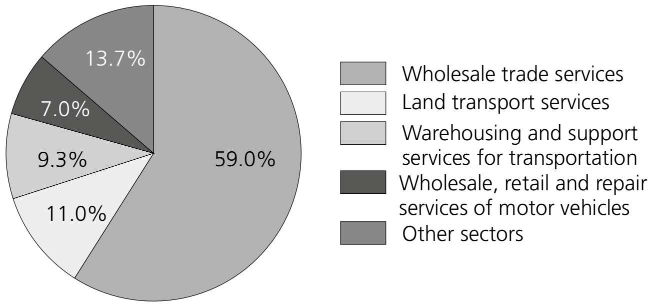
	Domestically produced exports	Exports of energy products	Re-exports	Exports of services	Domestic expenditures+	Total
Gross value added	5.18	0.67	0.47	2.08	16.48	24.88
Intermediate imports	3.24	2.49	0.07	0.43	4.19	10.43
	+ ---------	+ ---------	+ ---------	+ ---------	+ ---------	+ ---------
Domestic production	8.42	3.17	0.54	2.52	20.66	35.31
Final imports	0.00	0.00	3.45	0.00	5.10	8.55
Taxes minus subsidies	0.28	0.02	0.00	0.03	2.49	2.83
	+ ---------	+ ---------	+ ---------	+ ---------	+ ---------	+ ---------
Final use	8.71	3.18	4.00	2.55	28.26	46.69
Total imports	3.24	2.49	3.52	0.43	9.29	18.98
	– ---------	– ----------	– ---------	– ---------	– ---------	– ---------
Gross domestic product	5.46	0.69	0.47	2.11	18.97	27.71

Note: +includes changes in inventories and acquisitions less disposables of valuables.

Source: author's calculations.

Derived from the CPS matrix, the added value of re-exports is approximated at an average 9 cents for every re-exported euro in 2010, compared to an average of 58 cents for every euro of domestically produced exports. The relatively low added value per euro re-export does not mean that re-exports are economically unimportant. If re-exporting were considered as a sector, it would be of similar size as the furniture industry and considerably larger than for example the accommodation and food services sector. Figure 4 shows that the majority of added value from re-exports is contributed by wholesale trade with a share of 59 per cent, with smaller shares for land transport services and warehousing and support services for transportation.

Fig. 4. Structure of added value from re-exports by activity in 2010



Source: author's calculations.

Most re-exporting activities are conducted by small companies. In many cases these companies have only a single employee. Re-exports generate little employment for the Lithuanian economy. Few employees are needed for trading, since there are no production activities. Re-exporters are therefore often wholesale trading companies. In economic terms, re-exporting companies differ substantially from traditional export producing companies. Turnover, added value per employee, the share of trading activities in turnover and imports and exports are all considerably higher.

4. Data and econometric methodology

Due to the usual lack of time-series data on re-exports, just a few econometric studies on the phenomenon of re-exports are found in literature. Where re-export data were available, models were estimated for Hong Kong (Cheung 2005; Liu *et al.* 2007), Singapore (Abeysinghe, Keen 2007) and the Netherlands (see: SAFE 2003; Kranendonk, Verbruggen 2007; DNB 2011). For Lithuania, Rudzkis and Kvedaras (2003) estimated a re-export demand equation.

Cheung (2005) estimates a demand function for Hong Kong re-exports. He finds evidence that Hong Kong re-exports are determined by demand factors, such as re-export prices relative to foreign prices and the level of foreign economic activity. A proxy for re-export margins is given by import prices from mainland China relative to re-export prices, which turn out to be negative and significantly different from zero. In addition, the effects of supply factors are investigated. Besides re-export margins, wages in manufacturing are significant as well. Liu *et al.* (2007) confirm that Hong Kong re-export volumes are sensitive to foreign economic activity and relative prices. They also find evidence of a negative impact of relative prices on export margins, the latter of which is proxied by re-export volumes minus imports for the purpose of re-exports. Abeysinghe and Keen (2007) estimate an equation for re-exports of Singapore, in which they regress re-export volumes (excluding energy products) on foreign income and global semiconductor sales. In their tests, relative price variables turned out to be insignificant and were therefore excluded from their final model.

In macro-econometric models for the Netherlands developed by the CPB Netherlands Bureau for Economic Policy Analysis (see: SAFE 2003; Kranendonk, Verbruggen 2007), re-exports (excluding energy products) are modelled separately from domestically produced exports. Using a traditional Armington set-up, re-export volumes (excl. energy products) are regressed on world trade volumes and re-export prices relative to world prices. The estimation results reveal that Dutch re-exports are price inelastic. In addition, global semiconductor sales are included in the re-export volume equation. The rationale for including global semiconductor sales is that most re-export products such as electronic equipment, mobile phones, computers and machinery contain semiconductors. The model of the Dutch central bank (DNB 2011) uses import prices for re-exports relative to re-export prices as competitiveness indicator. The difference between the Dutch investment to GDP ratio and the Organisation for Economic Co-operation and Development (OECD) investment to GDP ratio serves as a non-price competitiveness indicator. Again, global sales of semiconductors are included.

Using a very small sample size, Rudzkis and Kvedaras (2003) estimates an equation for Lithuanian re-exports by regressing Lithuanian re-exports (excluding energy products as well) on Russian import volumes. According to their estimates, in the case of a Russian import volume increase of 1 per cent, Lithuanian re-exports increased 0.78 per cent. Their equation does not contain a competitiveness indicator for re-exports.

Formulating a time-series model requires either a re-export series in volume terms, or a price or unit value index which can be used to deflate re-export values. Unfortunately, no such indicator is readily available for re-exports. The required deflator is acquired by calculating a unit value index, constructed from data on values and quantities at the most detailed level, that is by CN 8-digit and by partner country, supplied by the Ministry of Economy of the Republic of Lithuania (from 1997 until 2007) and Statistics Lithuania (since 2008). Unit value indices of the chained Fisher type have been compiled based on a modified version of the methodology used by Eurostat (2000).* This methodology is chosen because competitor unit value indices are compiled by the same method. A detailed technical discussion on the construction of the unit value indices is provided in Notten (2012).

The dataset used in the present study is quarterly and ranges from 1997 to the second quarter of 2014, providing a total of 70 observations. Nominal variables and unit value indices are denominated in euro. Series have been rebased to 2010 = 100 when necessary. Series showing a seasonal pattern have been seasonally adjusted with the Demetra+ package. The following conventions are followed: lower-case letters denote the natural logarithm of the corresponding variables and Δk defines the k^{th} difference, i.e., $\Delta_k x_t = x_t - x_{t-k}$. The Appendix provides a complete listing of data sources and construction of the other variables.

The existence of cointegration is a prerequisite for a long-run relationship between variables. Variables are cointegrated if the residuals of a linear combination of I(1) series are I(0). With only 68 observations, the sample is too short for safely using the maximum likelihood systems-based approach, such as the Johansen (1995) method, because the maximum likelihood estimator has a fat-tailed distribution and no finite moments in small samples (Phillips 1994). As a result, single equation cointegration techniques will be used.

The most commonly used single equation cointegration technique is the static two-step Engle-Granger procedure (Engle 1987). In the first step, the long-run relationship is estimated with the I(1) variables denoted in levels using Ordinary Least Squares (OLS). In the second step, the variables are denoted in first differences I(0). The second step is the short-run equation with variables denoted in first differences I(0) and the lagged residuals of the long-run equation serving as error-correction parameter. However, OLS is subject to a non-normal distribution and small-sample bias when applied to non-stationary data. Inference is therefore not possible, since standard t-statistics in the long-run estimation are not asymptotically valid.

This problem is circumvented by embedding the long-run equation into the short-run equation. The long-run parameters are estimated by a conditional (or unrestricted) ECM in which the first difference of the dependent variables is regressed on the lagged dependent variable and lagged independent variable in levels. Short-run dynamics are

*Eurostat uses monthly unit value links, while we are employing quarterly unit value links. Eurostat also uses a different outlier detection and replacement procedure. See: Eurostat (2000).

captured by lagged differences of the dependent variable and independent variables. Serial correlation is removed through an appropriate chosen lag length of the short-run dynamic structure. Cointegration is then tested by an ECM-test, in which the t-statistic of the lagged dependent variable is compared with the corresponding critical value. A survey of Monte Carlo studies revealed that the unconditional ECM performs well in finite samples (Maddala, In-Moo Kim 1998). As in the conventional restricted ECM, the level variables are required to be I(1) in order to render the cointegration test valid (Banerjee *et al.* 1998).

The ARDL bounds testing approach allows the conditional ECM to contain a mixture of I(1) and I(0) long-run level variables (Pesaran et al. 2001). The presence of cointegration is tested by a standard Wald or F-statistic which has a non-standard distribution under the null hypothesis of no cointegration between the long-run variables, regardless whether these are I(0), I(1) or fractionally integrated. The bounds testing approach has favourable finite sample properties, making it suitable for the present study. The appropriate modification of the lag orders of the ARDL model is sufficient to simultaneously correct for residual serial correlation and the problem of endogenous regressors. However, the presence of variables that are I(2) renders the computed F-statistic spurious.

Unit root tests still need to be conducted prior to estimation to avoid the use of variables with a double unit root. Lithuania was struck by two deep recessions and several institutional changes during the period over which the sample is estimated. These events might have caused structural breaks in the data series. To determine whether the order of integration of the data series does not exceed I(1) the Zivot-Andrews unit-root test and the Perron unit root test, allowing for an endogenous structural break, are used. Zivot and Andrews (1992) propose a modified augmented Dickey-Fuller test where the break date is endogenously determined using the full sample. Under the null hypothesis, the time series contain a unit root with drift against the alternative hypothesis of a trend stationary process with an endogenously determined structural break occurring at time T_B. In contrast to Zivot and Andrews (1992), Perron (1997) also allows an endogenous structural break under the null of a unit root process with drift. In addition, Perron (1997) advances a class of test statistics that allows for two different kind of endogenously determined structural breaks. The innovational outlier (IO) class is designed to identify structural breaks that occur gradually over time, while the additive outlier (AO) class allows the structural break to happen instantaneously. Possible dummy variables are added to the list of regressors based on the results from the Zivot-Andrews and Perron unit root tests. Technical details for these unit root tests that allow for a structural break are outlined in Section 1 of the Appendix in Notten (2012).

With the aim of implementing the bounds testing approach, y_t is defined as a I(1) dependent variable and z_t as a vector of I(d) regressors, where $0 \le d \le 1$. The conditional ECM is then formulated as:

$$\Delta y_t = c_o + c_1 t + \pi_y y_{t-1} + \pi_z z_{t-1} + \sum_{i=1}^{p-1} \varphi_i \Delta y_{t-i} + \sum_{j=1}^{q-1} \delta_j^{'} \Delta z_{t-j} + \gamma^{'} \Delta z_t + \varepsilon_t , \quad (8)$$

where c_o and c_t represent a constant and a trend, and π_y and π_z are the long-run coefficient matrices for y_{t-1} and z_{t-1}. The short-run dynamic structure is captured by Δy_{t-i}, Δz_{t-j} and Δz_t to ensure that the residuals ε_t are not serially correlated. In the original paper by Pesaran *et al.* (2001), the lag order for p and q is specified by the Bayesian Information Criterion (BIC). This procedure of going from specific-to-general has often been criticised in the context of unit root tests (Maddala, In-Moo Kim 1998). We therefore use a general-to-specific approach, starting with a large number of lags k_{max}, after which the significance of the last coefficient is tested and k is iteratively reduced until a significant statistic is encountered.

The conditional ECM in equation (8) is estimated by OLS. The bounds testing procedure determines if a long-run relationship between y_t and z_t is absent by an F-test with null hypothesis $H_0 : \pi_y = \pi_z = 0$ against the alternative hypothesis $H_1 : \pi_y \ne \pi_z \ne 0$. The asymptotic distribution of the test statistic is non-standard even in the case when all regressors are I(0), I(1) or mutually cointegrated. Pesaran et al. (2001) provide lower and upper bounds on the critical values for the F-test. If the test statistic is smaller than the lower bound, variables are I(0) and in that case there is no cointegration possible by definition. If the test statistic exceeds the upper bound, the variables are cointegrated. Finally, if the test statistic falls within the bounds, the test is inconclusive. The critical values provided by Pesaran *et al.* (2001) are generated for large samples and are therefore unsuitable for the present study.* Instead, the test statistics in this study are compared with critical value bounds specifically calculated for small samples by Narayan (2005). The finite sample critical value bounds can be found in Tables 2 and 3 of the Appendix in Notten (2012).

5. Empirical results

The test results for the Zivot-Andrews test are summarised in Table 7. The unit root null hypothesis is rejected for four out of five level series. The Zivot-Andrew test detected a structural break in both the mean and the slope in two out of six level series (Model C). Three out of six level series have a mean shift and no trend shift (Model A), while only one series has a trend shift and no mean shift (Model B). The unit root tests employed on the differenced series reveal breaks in both the intercept and the slope for two series (Model C), while in the remaining four series only a break in the intercept was detected (Model A). The test results indicate that it is likely that none of the series is I(2).

Table 7

Zivot-Andrews unit root test allowing for an endogenous structural break+

	Level					First difference				
Series	Model	k	t	$\hat{\alpha}$	$\hat{T}_B$	Model	k	t	$\hat{\alpha}$	$\hat{T}_B$
x_t^r	A	0	2.629*	–3.371	2004 Q1	A	0	–1.157	–8.336***	1999 Q3
p_t^{xr}	C	5	3.347***	–4.626	2003 Q2	A	0	–1.863*	–8.706***	2005 Q2
p_t^{wxr}	A	1	4.403***	–3.920	2002 Q2	C	0	–0.203	–6.873***	2010 Q1
$\left(p_t^{xr} - p_t^{wxr}\right)$	B	2	3.118***	–3.664	2002 Q3	C	1	–1.969	–8.178***	2000 Q4
y_t^{wxr}	C	2	6.302***	–6.188***	2008 Q4	A	0	1.119	–5.130*	2008 Q2
p_t^{mxr}	A	4	6.548***	–6.785***	2003 Q3	A	7	–1.470	–3.334	2005 Q4

Notes: k – lag length, t – t-statistic for deterministic trend, $\hat{\alpha}$ – test statistic, $\hat{T}_B$ – break date.
+Model A critical values for $t_{\hat{a}}$ at 10%, 5% and 1% are –4.58, –4.80 and –5.34 respectively; Model B critical values for $t_{\hat{a}}$ at 10%, 5% and 1% are –4.11, –4.42 and –4.93 respectively; Model C critical values for $t_{\hat{a}}$ at 10%, 5% and 1% are –4.82, –5.08 and –5.57 respectively; * and *** denote rejection of H_0 at the levels of significance 10% and 1% respectively.
Source: critical values obtained from Zivot and Andrews (1992); author's calculations.

Table 8 contains the results of the Perron test. The Perron test identified a structural break in the mean in four out of six level series (Model 1), while one series has a break only in the trend function (Model 3) and one in both the mean and the trend (Model 2). Analysis conducted on the differenced series reveals that none of the series is likely to be I(2), at least on the 10 per cent level of significance. Among the differenced series, four series have a break only in the mean (Model 1), while one series has a break only in the slope (Model 3).

*Narayan (2005) gives critical values for finite samples calculated specific for sample sizes ranging from 30–80 observations.

Table 8

Perron unit root test allowing for an endogenous structural break[+]

	Level					First difference				
Series	Model	k	t	α	T_B	Model	k	t	α	T_B
x_t^r	1	4	3.923***	–4.318	Q3 2003	1	7	2.287**	–5.221*	Q3 2008
p_t^{xr}	3	6	3.874***	–5.085***	Q1 2002	3	0	–0.5187	–8.670***	Q2 2009
p_t^{wxr}	1	6	4.843***	–4.069	Q4 2009	1	0	1.895*	–6.318***	Q4 2000
$\left(p_t^{xr} - p_t^{wxr}\right)$	1	8	5.399***	–5.201*	Q1 2002	1	1	2.143**	–8.341***	Q4 1998
y_t^{wxr}	1	8	3.707***	–3.212	Q3 2008	1	7	2.723***	–5.960***	Q2 2008
p_t^{mxr}	2	8	4.729***	–4.809	Q1 2003	1	0	0.374	–8.626***	Q1 2000

Notes: k – lag length, t – t-statistic for deterministic trend, α – test statistic, T_B – break.
[+]Model 1 critical values for t_a at 10%, 5% and 1% are –4.92, –5.23 and –5.92 respectively; Model 2 critical values for t_a at 10%, 5% and 1% are –5.29, –5.59 and –6.32 respectively; Model 3 critical values for t_a at 10%, 5% and 1% are –4.48, –4.83 and –5.45 respectively; *, **, *** denotes rejection of H_0 at the levels of significance 10%, 5% and 1% respectively.

Source: critical values obtained from Perron (1997); author's calculations.

From the Zivot-Andrews and Perron unit root tests it can be concluded that the order of integration of our dataset is likely to be a mix of I(0) and I(1) trend and difference stationary processes, which justifies the use of the bounds testing approach. There are no significant break dates that characterise all series, although the majority of break dates are roughly clustered around the switch in currency regime in 2002 and the global financial crisis in 2008 and 2009. The reported t-statistics for the deterministic trend coefficients indicate that a deterministic might be incorporated in the conditional ECM of re-export volumes. Adding a deterministic trend to the conditional ECM for re-export prices might be justified based on results from both the Zivot-Andrews and Perron tests.

After systematically testing with mean shift and trend shift dummy variables corresponding to the events around which structural breaks were identified, impulse and shift dummy variables were added to the dataset. The critical values of the bounds test are likely to be biased if the fraction of the period in which the dummy variable is non-zero does not lead to zero with the sample size T (Pesaran *et al.* 2001). Now that we have both established that none of the variables are likely to be I(2) and identified the events that are possible causes of the detected structural breaks, the bounds testing procedure can be employed.

Based on the outcomes of the unit root tests and previous findings and theory, the re-export volume equation contains the following independent variables: relative re-export prices $\left(p_t^{xr} - p_t^{wxr}\right)$, the level of economic activity in re-export markets $\left(y_t^{wxr}\right)$ and an impulse dummy for the second quarter of 2002, which is possibly related to a shock caused by the currency regime switch. The final model looks as follows:

$$\Delta x_t^r = \underset{(-6.13)}{-5.952} - \underset{(-5.90)^{***}}{0.399 x_{t-1}^r} - \underset{(-4.93)^{***}}{1.619\left(p_{t-1}^{xr} - p_{t-1}^{wxr}\right)} + \underset{(6.10)^{***}}{1.739 y_{t-1}^{wxr}} - \underset{(-3.74)^{***}}{1.395\Delta\left(p_t^{xr} - p_t^{wxr}\right)}$$
$$+ \underset{(3.46)^{***}}{2.121\Delta y_t^{wxr}} + \underset{(4.39)^{***}}{0.354 DI_{02Q2}} \quad (9)$$

$Adj.\ R^2 = 0.492 \quad SE = 0.076 \quad F_{bounds}(2) = 12.726 \quad Sample: 1997\ Q2 - 2014\ Q2$
$F_{AR}(5,57) = 0.478(p = 0.79) \quad F_{ARCH}(4,61) = 0.323\ (p = 0.86) \quad \chi_{nd}^2(2) = 0.633(p = 0.73)$
$F_{het}(10,57) = 0.999(p = 0.46) \quad F_{RESET}(2,62) = 0.442(p = 0.64)$

Note: t-statistics in parentheses; $Adj.\ R^2$ – adjusted coefficient of determination; SE – standard error; $F_{bounds}(k)$ – F-statistic for bounds test with k independent variables; F_{AR} – F-test for autocorrelation (Godfrey 1978); F_{ARCH} – F-test for autoregressive conditional heteroskedasticity (Engle 1982); $\chi_{nd}^2(2)$ – chi-square test for normality (Doornik, Hansen 2008); F_{het} – F-test for heteroskedasticity (White 1980); F_{RESET} – F-test for functional form misspecification (Ramsey 1969); *** denotes rejection of H_0 at the level of significance 1%.

The diagnostic tests reveal that the model is well specified. There are no signs of serial correlation, heteroskedasticity and ARCH and the residuals are normally distributed. Applying the bounds test generates an F-statistic of 12.726. The 1 per cent upper critical value bound for a model with an intercept, two independent variables (k = 2) and 65 observations equals 6.853 (Narayan 2005). This implies that the null of no cointegration can be rejected. With –4 and –1.4, Lithuanian re-exports are price elastic both in the long-run and short-run, which contradicts the findings by the Netherlands Bureau for Economic Policy Analysis of inelastic Dutch re-exports. A possible explanation for this difference is the market power of Dutch re-exporting companies acting to a certain degree as price setters, contrary to the price-taking behaviour of Lithuanian re-exporters. Another explanation might be found in the difference of composition of Lithuanian and Dutch re-exports. This explanation would imply that Lithuania re-exports more price-elastic goods and the Netherlands — more goods that are price inelastic. The income elasticity of Lithuanian re-exports far exceeds unity both in the long-run and in the short-run. This is explained by the product mix of Lithuanian re-exports which is dominated by consumer goods that can arguably be considered luxury goods in Lithuania's re-export markets. Examples of such goods are laptops, exotic fruits, mobile phones and used passenger cars. Given that Lithuania's main re-export markets have shown impressive growth figures in income and purchasing power over the sample period, the high income elasticity provides the most likely explanation for the explosive growth of re-export volumes in the past decade.

The results for the price equation are less satisfactory and need to be interpreted with caution due to the necessity of two shift dummy variables correcting for structural breaks as a result of the Russian financial crisis and the currency regime switch. Two additional impulse dummies are included to correct for additive outliers. Re-export prices are mainly determined by import for re-exports prices $\left(p_t^{mxr}\right)$ both in the long-run and short-run and to a lesser extent by re-export volumes $\left(x_t^r\right)$ only in the short-run. The re-export price equation includes a linear trend:

$$\Delta p_t^{xr} = \underset{(-1.79)}{-0.493} - \underset{(-6.57)^{***}}{0.003T} - \underset{(-10.43)^{***}}{0.762 p_{t-1}^{xr}} + \underset{(8.29)^{***}}{0.906 p_{t-1}^{mxt}} + \underset{(11.36)^{***}}{1.201 \Delta p_t^{mxr}} - \underset{(-2.94)^{***}}{0.056 \Delta x_t^r}$$

$$- \underset{(-10.10)^{***}}{0.125 DS_{98Q3}} - \underset{(-6.21)^{***}}{0.056 DS_{02Q1}} + \underset{(4.15)^{***}}{0.075 DI_{97Q4}} - \underset{(-3.68)^{***}}{0.057 DI_{05Q1}} \qquad (10)$$

$Adj.\ R^2 = 0.759$ $\quad SE = 0.015$ $\quad F_{bounds}(1) = 54.525$ $\quad$ *Sample*: 2002 Q2–2014 Q2
$F_{AR}(5,54) = 1.352(p = 0.26)$ $\quad F_{ARCH}(4,61) = 0.941(p = 0.45)$
$\chi^2_{nd}(2) = 0.905(p = 0.64)$ $\quad F_{het}(12,54) = 0.903(p = 0.55)$
$F_{RESET}(2,57) = 0.220(p = 0.80)$

Notes: see notes for equation (9).

The bounds test rejects the null hypothesis of no cointegration at the 1 per cent significance level, because the F-test statistic of 54.525 exceeds the upper critical value bound of a model with a constant and a trend, 65 observations and one independent variable (k = 1) which equals 10.515 (Narayan 2005). However, the test results are possibly biased because of the inclusion of two shift dummy variables, one of which has a relatively large share of non-zero observations.* Therefore, the sample has been shortened to exclude the shift dummies:

$$\Delta p_t^{xr} = \underset{(-1.94)^{**}}{-0.522} - \underset{(-7.78)^{***}}{0.004T} - \underset{(-9.64)^{***}}{0.917 p_{t-1}^{xr}} + \underset{(9.21)^{***}}{1.073 p_{t-1}^{mxr}} + \underset{(5.64)^{***}}{0.815 \Delta p_t^{mxr}} - \underset{(-2.73)^{***}}{0.055 \Delta x_t^r}$$

$$- \underset{(-4.56)^{***}}{0.060 DI_{05Q1}} \qquad (11)$$

$Adj.\ R^2 = 0.761$ $\quad SE = 0.013$ $\quad F_{bounds}(1) = 48.383$ $\quad$ *Sample*: 2002 Q2–2014 Q2
$F_{AR}(4,38) = 1.701(p = 0.17)$ $\quad F_{ARCH}(4,41) = 1.095(p = 0.37)$
$\chi^2_{nd}(2) = 1.506(p = 0.47)$ $\quad F_{het}(10,37) = 1.470(p = 0.19)$
$F_{RESET}(2,40) = 2.922(p = 0.07)$

Notes: see notes for equation (9).

Again, cointegration is confirmed by the bounds test, since the 48.383 F-statistic is larger than the upper critical value bound at the 1 per cent level for a model with a constant and a trend, 45 observations and one independent variable (k = 1) which

*The fraction of non-zero observations of shift dummy equals 30 per cent.

equals 10.965 (Narayan 2005). Tests were conducted with the inclusion of competitor prices and labour costs for the trade and transportation sectors, but these variables were dropped due to wrongly signed or insignificant coefficients. Re-export prices are thus mostly determined by import prices of re-exported goods, which is hardly surprising given the high import content of re-exports.

Conclusions

There is no global uniform definition of re-exports and few countries systematically gather data on re-exports. This makes it difficult to put the development of Lithuanian re-exports into a wider global context. Nevertheless, the limited data that are available show that not only in Lithuania has re-export growth outpaced the growth of domestically produced exports.

Contrary to re-export economies, such as Hong Kong or the Netherlands, Lithuania is not a global hub, but rather a transport and logistics spoke forming a corridor between the East and the West. Lithuanian re-exporters mainly concentrate on providing goods for consumer markets in CIS countries, among which the Russian market is the most prominent. The majority of re-exported goods have been previously imported from Western Europe. For some products Lithuania is part of a re-export chain, in which exotic products are imported from outside Europe into western European countries, where the new owners re-export these goods to Lithuania, whose new owners in Lithuania re-export these goods to CIS markets.

The main driver of Lithuanian re-exports is likely to be asymmetric information. Lithuanian intermediate traders have better knowledge about source and especially destination markets. Most re-exporting companies only have few employees and are often owned by foreign nationals, giving them an advantage over their competitors because they have better knowledge of the re-export markets. The product mix of Lithuanian re-exports follows a global pattern with a high share of machinery and electronic devices. Other important categories are used passenger cars and pharmaceuticals. A rather distinctive Lithuanian re-export category is fresh vegetables and fruits, previously imported from the Netherlands and re-exported mainly to Russia.

Re-exporting activities are less important for the Lithuanian economy than domestically produced exports of goods and services. In 2010, re-exports generated 1.7 per cent of GDP. Re-exports have displayed stronger growth rates than domestically produced exports since Lithuania became an EU member in 2004. The removal of trade barriers by joining the EU single market gave a boost to the development of Lithuanian re-exporting activities because of simplified customs conditions.

The explosive growth of re-exports is best explained by the high income elasticity of re-export demand. During the past decade, purchasing power in Lithuania's main re-export markets increased impressively. This led to higher demand for (more luxurious) consumer products which have a high share in Lithuania's re-export portfolio. Re-exports fall when the competitiveness of the Lithuanian re-export sector, measured by the ratio of re-export prices and competitor export prices, deteriorates. Due to the low domestic value added content of re-exports, it is unsurprising that re-export prices are largely determined by import prices for re-exports.

The present paper attempts to determine the economic importance and growth determinants of re-exports with little data that is available. It would be useful to expand this research using firm-level trade data. Insofar, such data has not been not available. Given the strong growth of re-exports, it would be advisable to incorporate re-exports as a separate final demand component into the national account framework. This would overcome the large discrepancy between re-exports derived from customs statistics and the estimates derived from input-output tables.

Table 1

List of variables and explanations

Variable	Description	Variable name used in text	Unit	Source
X_t^r	Re-export volumes excluding energy products	Re-export volumes	EUR million constant 2010 prices	Obtained by deflating re-exports excluding energy products in current prices taken from the Ministry of Economy of the Republic of Lithuania (1997–2003) and Statistics Lithuania (2004–2013) by export price P_t^{xre}.
P_t^{xr}	Unit value index of re-exports excluding energy products	Re-export prices	Index 2010 =100	See Section 4 in the main text.
Y_t^{wxr}	Weighted quarterly index of real GDP in Lithuania's re-export markets.	Level of economic activity in re-export markets	Index 2010 =100	Weighted quarterly index of real GDP in re-export markets. Weights are based on re-exports in 2010. The 12 countries and weights are Russia (0.531), Latvia (0.179), Estonia (0.077), Poland (0.065), Germany (0.061), the Netherlands (0.014), France (0.014), Denmark (0.014), Italy (0.012), Sweden (0.011), Finland (0.011) and the United Kingdom (0.010). Real GDP data sourced from Eurostat and Rosstat. Weights calculated from re-export data provided by Statistics Lithuania.
P_t^{mxr}	Unit value index of imports for the purpose of re-exports excluding energy products	Import prices for re-exports	Index 2010 =100	Constructed from import unit value indices for 59 SITC commodity categories excluding energy (31–34) using 2010 trade weights. Unit value indices taken from Eurostat Comext. The Unit value indices are extended to cover 1997–1999 using detailed import data provided by the Ministry of Economy of the Republic of Lithuania. Re-export weights are calculated from data provided by Statistics Lithuania.
P_t^{wxr}	Unit value index of competitor export prices excluding energy products	Competitor export prices	Index 2010 =100	Constructed from export unit value indices of 14 competitor countries' exports excluding energy products to Lithuania's 25 most important export markets as measured by re- exports excluding energy products, using 2010 trade weights, double reweighted by export market and 59 commodity categories (SITC excl. 31–34). Unit value indices taken from Eurostat Comext and Statistics Norway. Export weights are calculated from data provided by Statistics Lithuania. Import weights in re-export markets are calculated from data taken from the UN Comtrade database.

Source: formed by the author.

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Santrauka

LIETUVOS REEKSPORTO EKONOMINĖ REIKŠMĖ IR JĮ LEMIANTYS VEKSNIAI

Thomas E. H. Notten

Straipsnyje nagrinėjamas Lietuvos reeksportas – importuotų prekių ar paslaugų eksportavimas į trečiąsias šalis jų papildomai neapdirbant. Aptariama reeksporto sudėtis, kryptys, veiksniai, reikšmė šalies ekonomikai.

Nors reeksporto veikla Lietuvos įmonės pradėjo užsiimti šaliai atgavus nepriklausomybę, 2004 m. jai įstojus į Europos Sąjungą, reeksportas labai išaugo. Didžiąją reeksportuojamų prekių dalį sudaro mašinos ir įrenginiai, kompiuteriai, elektroniniai prietaisai ir jų dalys. Stambios reeksportuojamų prekių kategorijos yra ir lengvieji automobiliai bei vaisiai ir daržovės. Daugumos reeksportuojamų prekių kilmės šalis – Vakarų Europos valstybės, pagrindinės reeksporto kryptys – Nepriklausomų Valstybių Sandraugos (NVS) šalys.

Kitaip nei Honkongas ar Nyderlandai, Lietuva nėra pasaulinis reeksporto paskirstytojas, tai veikiau transporto ir logistikos koridoriaus tarp Rytų ir Vakarų dalis. Pagrindiniai Lietuvos reeksporto veiksniai – didelis rinkos potencialas NVS šalyse, konkurencingas Lietuvos transporto ir logistikos sektorius ir prekybininkų tarpininkų turimos žinios apie paklausą NVS šalyse (asimetrinė informacija).

Straipsnyje keliami du pagrindiniai tikslai. Pirmas – taikant sąnaudų ir produkcijos analizę, nustatyti reeksporto kuriamą pridėtinę vertę Lietuvos ekonomikai. Apskaičiuojama, kad 2010 m. ji sudarė 1,7 procento bendrojo vidaus produkto. Didžiąją reeksporto pridėtinės vertės dalį sukūrė didmeninės prekybos paslaugos, kiek mažesnę – sausumos transporto ir sandėliavimo paslaugos. Antrasis straipsnio tikslas – nustatyti pagrindinius reeksporto veiksnius. Daroma išvada, kad tiek ilguoju, tiek trumpuoju laikotarpiu reeksporto apimtis daugiausia priklauso nuo ekonominio aktyvumo reeksporto rinkose. Labiausiai reeksporto išaugimą paaiškina didelis reeksporto paklausos elastingumas pajamoms. Kai suprastėja Lietuvos reeksportuojančio sektoriaus konkurencingumas, matuojamas kaip reeksporto kainų ir konkurentų eksporto kainų skirtumas, reeksportas krinta. Kadangi reeksporto kuriama vidinė pridėtinė vertė yra maža, reeksporto kainas tiek ilguoju, tiek trumpuoju laikotarpiu daugiausia lemia reeksportuojamų prekių importo kainos.