

I. SUMMARY

- ▶ In 2010 Lithuanian exports contributed 31.5 percent to the gross domestic product (GDP). The total value of exported goods and services in that year was equal to 67.7 percent of GDP. Goods and services processed abroad and used in exports account for the difference.
- ▶ During the last decade the contribution of exports to the Lithuanian economy steadily increased from 22.8 percent in the year 2000 to 26.1 percent in 2005 until the aforementioned 31.5 percent in 2010.
- ▶ Half of exported goods and services in 2010 contained goods and services that were previously imported. The import content of exports produced domestically equaled 42.9% in 2010, which is an increase of 8.6 percentage points compared to 2005.
- ▶ The Lithuanian dependency on exports is comparable to that of other small open economies. Lithuania has a slightly lower export dependency than Estonia, which was for 35.6 percent dependent on exports (an input-output table for Latvia is unavailable).
- ▶ Measured in value added terms, exports are most important for the manufacturing industry, the transport and logistics sector and the trade sector. The relatively high share of exports in added value of the wholesale trade sector is due to intermediary trade activities.
- ▶ In 2010 employment due to exports was 366 thousand persons. This employment constituted 29.4 percent of total employment in Lithuania in that year. Most employment due to exports can be found in the manufacturing industry, followed by the transport and logistics sector, agriculture and the wholesale trade sector. Total employment decreased with 150 thousand persons between 2000 and 2010, but during the same period employment due to exports increased with 56 thousand persons.
- ▶ The contribution of re-exports to the Lithuanian economy equaled 1.7 percent of GDP. 14.5 thousand persons were directly or indirectly employed as a result of re-exporting activities, which was 1.2 percent of total employment. The contribution of one LTL of re-exports to the economy is approximately 9 LTL cents. Exports of Lithuanian-made goods and services are a much more lucrative business: 58 and 68 LTL cents respectively for each LTL worth of exported goods and services.

II. METHODOLOGY

- ▶ Traditionally, export turnover is registered to the sectors that are directly exporting. 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. This can be intermediate goods and services imported from abroad or supplies from other sectors within 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 turnover. 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 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 part 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 GDP total imports have to be assigned to all expenditure categories. This can be done with a so-called Cumulative Production Structure (CPS) matrix.¹ 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 the (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. In matrix algebra, the CPS matrix looks as follows:

$$CPS = P \cdot (I - A)^{-1} \cdot F + W$$

where:

- CPS = cumulative production structure matrix (in current prices)
- P = matrix of primary input coefficients
- I = unit or identity matrix
- A = matrix of domestically produced intermediary demand
- F = matrix of domestically produced final demand (in current prices)
- W = matrix of primary inputs that are at the same time final demand (for example final imports, indirect taxes on final sales, in current prices)

- ▶ To develop this matrix, consider the following input-output table:

	(n)	(f)	(1)
(n)	A	F	z
(p)	P	W	x
(1)	z'	y'	

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
- x = p by 1 vector of total primary inputs
- y = f by 1 vector of total final demand
- n = number of sectors

¹ For methodology used in this analysis see: H.C. Kranendonk & J.P. Verbruggen. 2008. Decomposition of GDP growth in some European countries and the United States, *CPB Memorandum No. 3*, Appendix A. Available online from: <http://www.cpb.nl/sites/default/files/publicaties/download/memo203.pdf>.

f = number of categories of final demand
 p = number of primary input of 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: $X = (I - A^*)^{-1} \cdot F$. 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:

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

$$CPS' = P^* \cdot (I - A^*)^{-1} \cdot F$$

► 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:

$$CPS = CPS' + W$$

$$CPS = P^* \cdot (I - A^*)^{-1} \cdot F + W$$

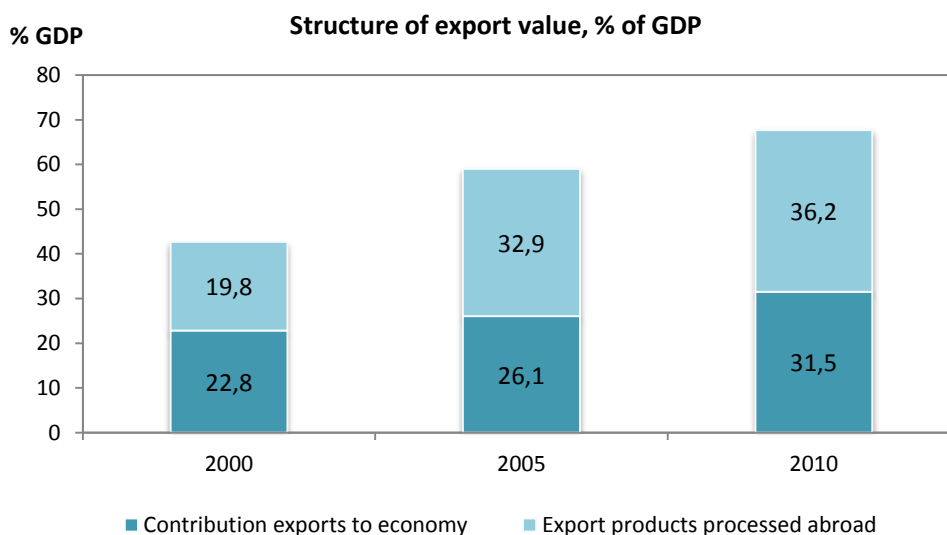
► The column totals of this CPS matrix are the total value of the primary inputs needed, both directly and through intermediaries, to produce the corresponding category's final demand. Because total cost must be equal to total production, these column totals must be the same as the entries of vector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

$$\begin{matrix} & (f) & (1) \\ (p) & CPS & x \\ (1) & y' & \end{matrix}$$

► Dividing the CPS matrix by its column totals produce the standardized 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).

III. ADDED VALUE FROM EXPORTS

► In 2010, the total value of exported goods and services is equal to 67.7 percent of the Gross Domestic Product (GDP).² This standard export to GDP ratio is a questionable measure to express the importance of exports for an economy, because imports used in exported products are included in the total value of exported goods and services. A more meaningful indicator is acquired by dividing the added value of exports (in which the imports used for exports are excluded) through GDP. Input-output analysis reveals that in 2010 Lithuanian exports contribute approximately 31.5 percent to GDP. Goods and services processed abroad and used in exports account for the difference.



Source: Enterprise Lithuania calculations using data sourced from Statistics Lithuania and Eurostat

► During the first decade of the century, the importance of exports for the Lithuanian economy has been gradually increasing from 22.8 percent in 2000 to 26.1 percent in 2005 until the aforementioned 31.5 percent in 2010. Exports of goods and services as a percentage of GDP increased from 42.7 percent in 2000 to 59.0 percent in 2005 until 67.7 percent in 2010.

IV. IMPORT CONTENT OF EXPORTS

► The export to GDP ratio is obviously growing at a faster rate than the added value of exports to the economy due to a faster increase of imports that are used for exporting. These export induced imports increased because of two reasons. First, re-exports have been growing at a faster rate than exports produced domestically. Second, the import content of exports produced domestically has increased during the 2000s. This import content of exports has been increasing from 38.0 percent in 2000 to 42.9 percent in 2010.

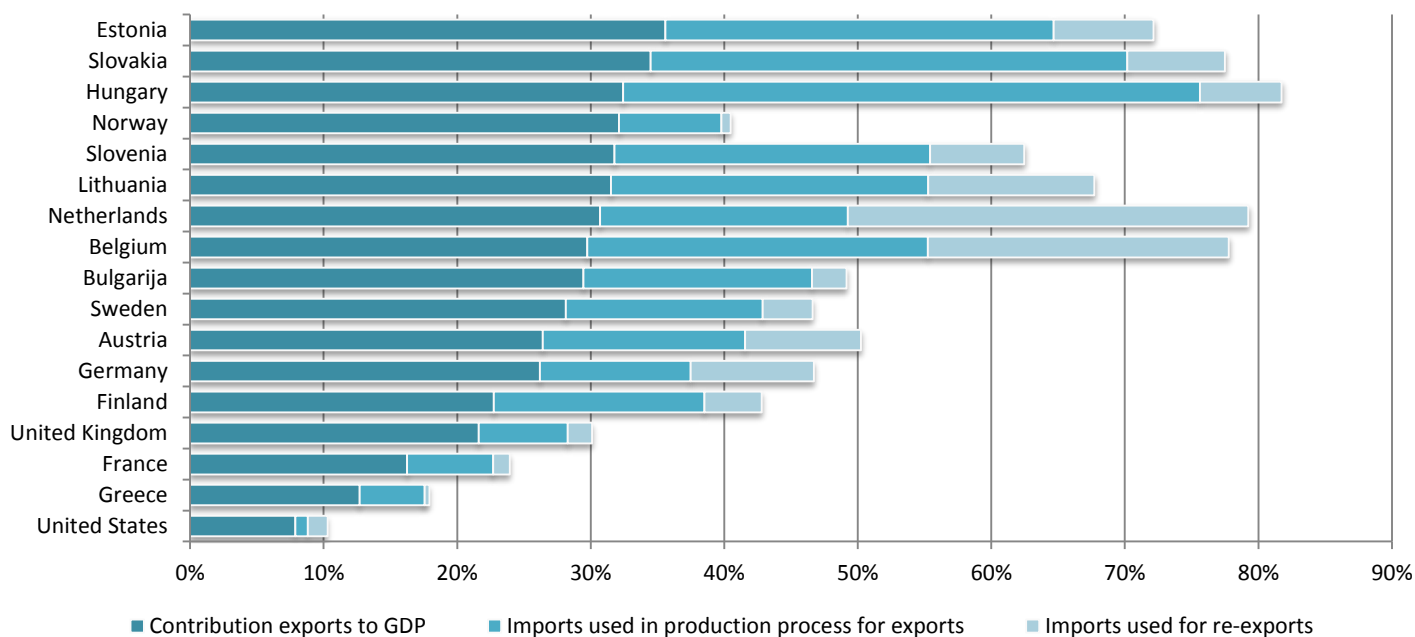
² 2010 is the latest year for which a symmetric input-output table is available. The compilation of input-output tables is a time consuming endeavor. Symmetric input-output tables are compiled for Lithuania every five years by Statistics Lithuania. The latest 2010 symmetric input-output table for domestic production and imports was published on January 15, 2014.

► A relevant question for growth and employment is how the trend in the use of imported intermediate inputs in the production for exports has been developing. The import content of exports produced domestically equaling 38.0 percent in 2000 dropped to 34.3 percent in 2005. In 2010 the import content of domestically produced exports was equal to 42.9 percent, an increase of 8.6 percentage points compared to 2005.³

V. INTERNATIONAL PERSPECTIVE

► The Lithuanian dependency on exports is comparable to that of other small open economies. Belgium and the Netherlands, countries known for their openness to foreign trade due to the presence of large seaports have a dependency on exports of 29.7 and 30.7 percent of GDP respectively. Lithuania has a slightly lower export dependency than Estonia, which was for 35.6 percent dependent on exports (an input-output table for Latvia is unavailable). In contrast, economies with a large domestic market have a lower dependency on exports. France and the United Kingdom have an export dependency that is considerably lower than that of Lithuania with 21.6 and 16.2 percent of GDP respectively. The United States is only for 7.9 percent of its GDP dependent on demand from foreign markets. Export champion Germany is an exception with 26.2 percent of GDP.

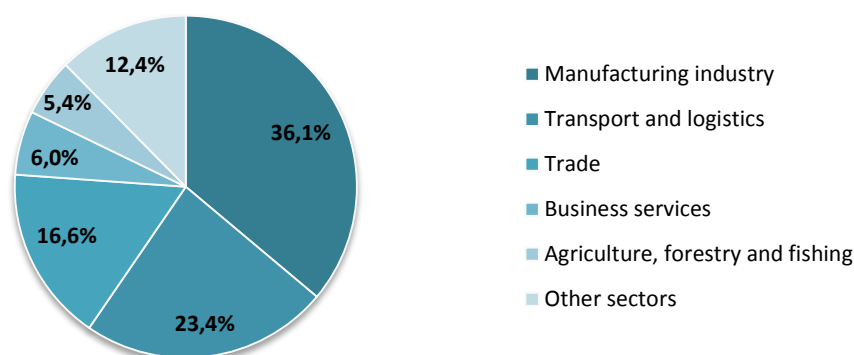
Structure of exports to GDP for selected countries, %



VI. ADDED VALUE FROM EXPORTS BY SECTOR

► The manufacturing industry has the largest share in exports measured by value added with approximately 36.1 percent, followed by the transport and logistics sector with 23.4 percent and the trade sector with 16.6 percent.

Structure of added value from exports by sector in 2010, % of total added value from exports

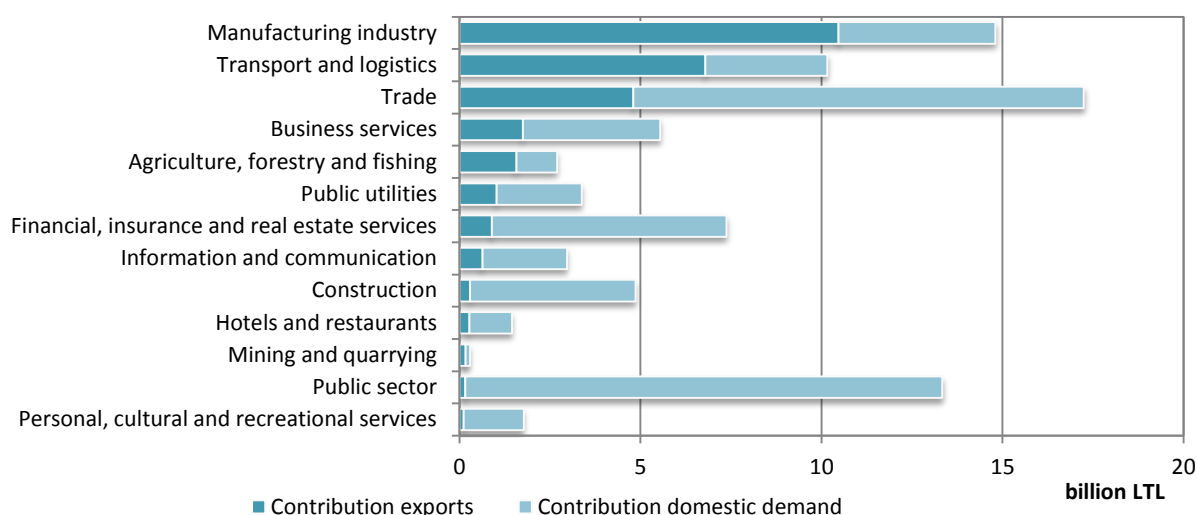


Source: Enterprise Lithuania calculations using data sourced from Statistics Lithuania and Eurostat

► In 2010, exports accounted for 70.7 percent to the contribution of the manufacturing industry to GDP and for 66.9 percent to the contribution of the transport and logistics sector. With 58.4 percent, exports also have a majority share in contribution to GDP for agriculture, forestry and fishing.
 ► In the services sector, exports contributed for approximately one quarter to the added value. Besides exports, domestic demand (consumption, investment, etc.) also contribute to GDP.

³ When interpreting this trend it has to be considered that the change in the import content of exports either traces back to the additional use of intermediate inputs in volume terms as a result of a shift in prices between domestically produced and imported inputs or to a change in export prices. The separation of these parameters cannot be achieved using input-output tables, since transactions in input-output tables are reported at current prices.

Contribution to GDP by sector in 2010, billion LTL



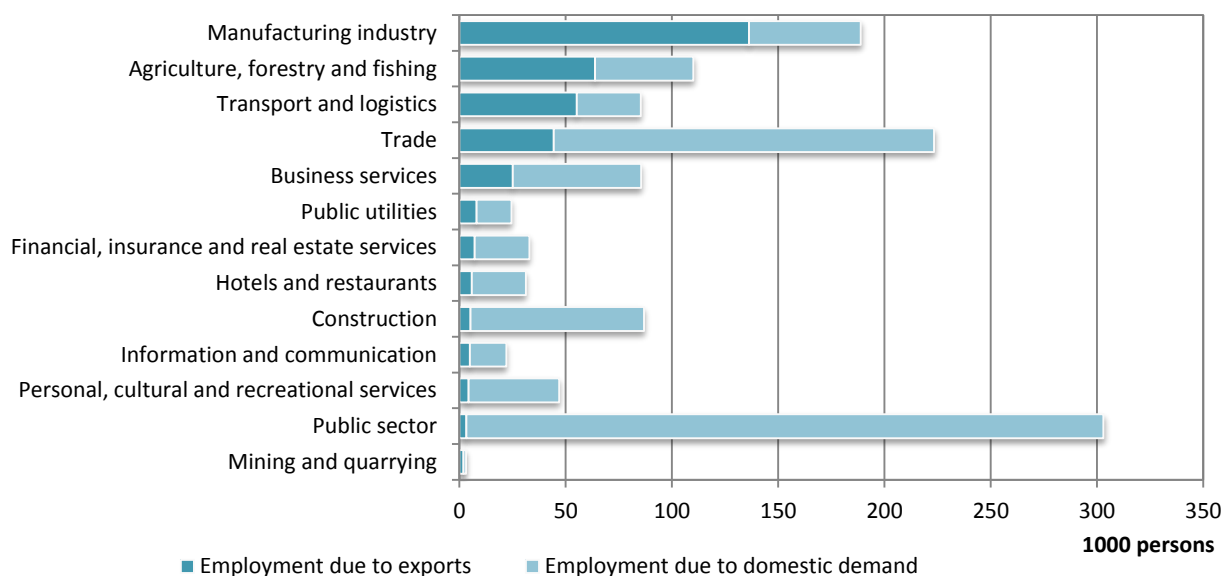
Source: Enterprise Lithuania calculations using data sourced from Statistics Lithuania and Eurostat

VII. EMPLOYMENT DUE TO EXPORTS

▶ Exports generate employment, in both exporting companies and their supplying companies. For example, the furniture industry employs workers for the exports of furniture. But in the wood industry employment is generated as well due to exports of the furniture industry, because the wood industry produces for the exporting furniture industry. In 2010 employment due to exports was 366 thousand persons. This employment constituted 29.4 percent of total employment in Lithuania.

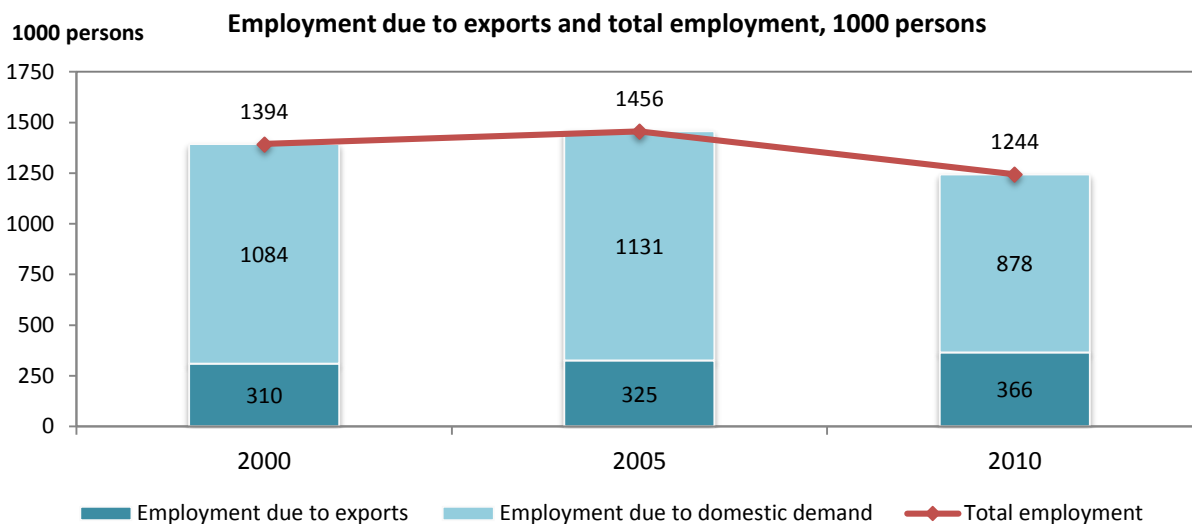
▶ Most employment due to exports was generated in the manufacturing industry, followed by agriculture, forestry and fishing and transports and logistics. In these three sectors, the majority of employment is due to exporting activities.

Contribution to employment by sector in 2010, 1000 persons



Source: Enterprise Lithuania calculations using data sourced from Statistics Lithuania and Eurostat

▶ Total employment decreased with 150 thousand persons between 2000 and 2010, but employment due to exports increased with 56 thousand persons during the same time period.



Source: Enterprise Lithuania calculations using data sourced from Statistics Lithuania and Eurostat

IIX. ECONOMIC IMPORTANCE OF RE-EXPORTS

- ▶ The added value of re-exports, i.e. after deduction of the purchase price on the foreign market, is estimated at only 1.6 billion LTL in 2010.⁴ The contribution of re-exports to the Lithuanian economy equaled 1.7 percent of GDP. Employment due to re-exports equaled 14.5 thousand persons, which was 1.2 percent of total employment.
- ▶ The contribution of one LTL of re-exports to the economy is approximately 9 LTL cents. Exports of Lithuanian-made goods and services are a much more lucrative business: 58 and 68 LTL cents respectively for each LTL worth of exported goods and services.

Structure of added value from re-exports by activity in 2010, %



Source: Enterprise Lithuania calculations using data sourced from Statistics Lithuania and Eurostat

- ▶ The majority of added value from re-exports is contributed by wholesale trade with a share of 59.0 percent, with smaller shares for land transport services and warehousing and support services for transportation.

⁴ The added value of re-exports is derived from separate transport margin and trade matrices provided on request from Statistics Lithuania. Re-export shares calculated from merchandise trade data are multiplied with the transport and trade margins for exports by sectors. The sum of these margins are subtracted from exports of transportation and logistics services and wholesale trade services in the input-output table and assigned to a separate re-export demand category.

IX. A CUMULATIVE PRODUCTION STRUCTURE MATRIX OF THE LITHUANIAN ECONOMY
Cumulative Production Structure matrix of the Lithuanian economy in 2010, million LTL

	Consumption		Gross capital formation	Exports			Total
	Household	Government		Domestic	Re-exports	Services	
Agriculture, forestry and fishing	1127	23	-29	1564	3	9	2697
Mining and quarrying	56	1	58	172	0	2	290
Food, beverage and tobacco industry	1700	21	-44	1584	3	14	3278
Textile, clothing and leather industry	227	19	-113	1030	2	4	1168
Wood industry	203	38	3	780	2	12	1038
Paper and printing industry	186	69	10	352	6	37	659
Petroleum and chemical industry	506	139	218	2505	4	38	3409
Plastics industry	151	7	-26	639	1	13	786
Engineering industry	353	45	-131	1926	5	33	2231
Furniture industry	198	256	-205	1079	5	38	1370
Other manufacturing industries	395	71	42	324	4	28	864
Public utilities	2006	307	45	856	28	140	3381
Construction	370	108	4094	120	5	171	4868
Trade	11668	341	432	3436	1073	297	17247
Transport and logistics	2704	399	265	2024	340	4431	10163
Hotels and restaurants	1057	111	11	35	4	235	1452
Information and communication	1395	253	687	250	12	381	2977
Finance, insurance and real estate	5629	649	202	514	36	347	7377
Business services	2518	740	535	881	82	789	5544
Public sector	1364	11799	10	28	2	133	13336
Other services	1134	510	15	52	2	64	1778
Gross value added	34948	15905	6075	20151	1621	7216	85914
Intermediate imports	9976	1917	2530	19860	241	1481	36005
Domestic production	44924	17822	8605	40011	1862	8697	121920
Final imports	10244	719	6654	0	11920	0	29537
Taxes -/- subsidies	6369	935	1301	1039	14	104	9762
Minor corrections	-33	0	0	1146	0	0	1113
Final use at basic prices	61504	19475	16560	42196	13795	8801	162331
Total imports	20220	2635	9184	19860	12161	1481	65542
Gross Domestic Product	41317	16840	7376	21190	1635	7319	95676
Share in Gross Domestic Product (%)	43.2	17.6	7.7	22.1	1.7	7.7	100

Source: Enterprise Lithuania calculations using data sourced from Statistics Lithuania, Bank of Lithuania and Eurostat