Does causality exist between exports and economic development? Evidence from selected EU countries

Gitana Dudzevičiūtė

General Jonas Žemaitis Military Academy of Lithuania, Lithuania

gitana.dudzeviciute@lka.lt

ORCID 0000-0002-4891-224X

Abstract. The investigation focuses on the assessment of inter-linkages between exports performance and economic development in selected EU countries, such as Lithuania, Latvia, Estonia, Luxembourg, Denmark, and Iceland. The research covers the period between 1990 and 2019. The author has employed econometric techniques in order to explore inter-linkages between the variables. The correlation analysis has revealed very strong and positive inter-relationships between exports and development in all of the countries under consideration. The Granger causality test has shown evidence of a bidirectional link between exports performance and economic development in Denmark, causality which runs from real GDP per capita to exports per capita in Luxembourg and Iceland, a causal link from exports to development in Latvia, and no causal links between the variables for Lithuania and Estonia. The insights could be useful in terms of the implementation of economic policy aimed at promoting sustainable development in EU countries.

Keywords: exports, economic development, GDP per capita, EU countries.

JEL Classification: C10, F10, F43, O10

1. INTRODUCTION

Exports have been a driving force of the wealth and competitiveness of numerous countries, irrespective of their economic status. Even mercantilists understood the significance of exports. Large volumes of exported goods guarantee a high return inflow of wealth into a country. Smith (1776) and, later, Ricardo (1821) were amongst the first to point out the positive effects of exports when it comes to economic development. According to the Ricardian theory, international trade leads to a specialisation in economic activities, which then induces further economic growth (Ricardo, 1821). Lee (2011) explored the specialisation of a sample of seventy-one countries since 1970. His study revealed that specialisation in exporting highly-technological goods has prompted economies to grow more rapidly than specialisation in traditional or barely-technological goods.

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In the mid-twentieth century alone there were four different approaches developed regarding the inter-linkage of exports and economic growth, namely: 1) exports-led growth; 2) growth-driven exports; 3) bidirectional causality; and 4) a neutral approach. Previous studies (Konya, 2006; Gurgul & Lach, 2010; Mishra, 2011; Tekin, 2012; Hailegiorgis, 2012; Mehmood, 2013; Dreger & Herzer, 2013; Mtaturu, 2016; Etale & Etale, 2016; Vianna, 2016; Acaravci & Shafiullah et al., 2017; Abdullah et al., 2017; Kalaitzi & Cleeve, 2017; Khoi & Chaudhary, 2018; Dinc & Gokmen, 2019; Kibria & Hossain, 2020) have revealed different aspects of exports – economic development nexus. Taking into consideration the differences in empirical results, there is a notable lack of research in EU countries that compares the results obtained across the countries in question with those of previous studies. The author expects to partially fill the existing gap.

Criterion for selecting countries for the research. Real GDP per capita was the main criterion for country selection. This indicator is used to assess the development of the country's economy and levels of well-being through international comparisons. According to the chosen criterion, Lithuanian, Latvian, and Estonian economies have experienced a low level of development during the period analysed. Meanwhile, Luxembourg, Denmark, and Iceland have been characterised by a high level of development and well-being. In Lithuania, Latvia, and Estonia, the average real GDP per capita has varied from USD 9,800 to 13,000 in 1990-2019. In Luxembourg, Denmark, and Ireland, meanwhile, the same indicator has ranged between USD 45,000 and 89,000. It is notable that in terms of population size none of the countries in question exceed populations of six million inhabitants. Figure 1 presents the average GDP per capita values in the countries under consideration, along with exports per capita, as well as exports as a share of GDP.
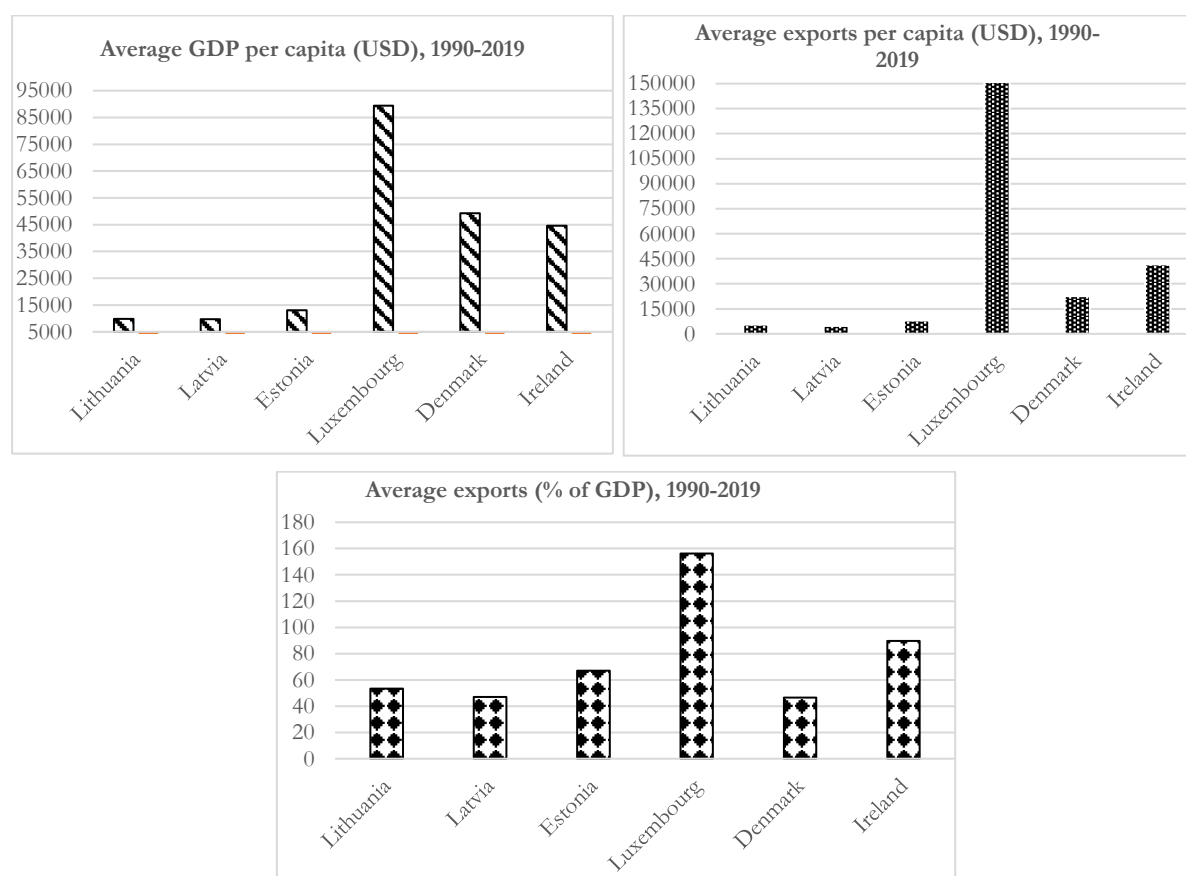

Figure 1. Indicators for the selected EU countries

Source: author's calculations based on UN data (2019)

Research problem: does a relationship exist between exports and economic development? Which form of causality is typical in those countries, which are under consideration (unidirectional, bidirectional, or neutral)?

Research aim: in this research, the author has attempted to provide estimates regarding the links between exports and the development of the economies within the selected EU countries.

Research limitations: this investigation involves two indicators: real GDP per capita in terms of USD and exports per capita in USD. The author has not considered other variables or relationships in this paper, with this being the main limitation in the research. The author believes that the findings have revealed those peculiarities of economic development which already existed for these countries, with the result that this information should be useful in terms of the implementation of a sustainable development policy for EU countries.

In the introduction, the author has presented the theoretical insights, along with the scientific problem, and the intended aim of the investigation. Section 2 summarises previous research in terms of the relationships between exports and economic development, along with examining the research methodology. Section 3 estimates the relationships between those variables, which are under consideration and compares them against the results of previous studies; it also provides recommendations for the implementation of an economic policy. The last section highlights the main findings of the study.

2. LITERATURE REVIEW AND RESEARCH METHODOLOGY

2.1. Findings of recent investigations

The available scientific literature contains a mixed degree of evidence regarding the inter-linkage between exports and economic development. Exports are a primary factor which can serve to promote economic performance (Saaed & Hussain, 2015; Abdullah et al., 2017). Much research has been done regarding the causal links between the expansion of exports and economic growth. Within the scientific context, the thread of causality, which runs from exports to economic performance, has been labelled as export-led growth. Meanwhile, the similar causal link from growth to exports has been labelled growth-driven exports. Very often, previous studies have supported a feedback or bidirectional approach regarding exports and economic performance, while a neutral approach has often been much less implemented. The author reveals the results of recent research where it reflects these four approaches.

Some studies tend to explore the inter-linkages through the framework of neo-classical growth, revealing that exports are an essential factor promoting economic performance (Dritsaki, 2013; Trošt & Bojnec, 2015; Ee, 2016; Sultanuzzaman et al., 2019). An expansion of exports can influence higher employment levels, a greater international demand and an increase in output (Dizaji & Badri, 2014; Abdullah et al., 2017; Dinc & Gokmen, 2019). In general, exports can boost economic growth in several ways, such as the allocation of resources to competitive economic activities, generating employment opportunities for unskilled labourers, improving equality, and producing greater foreign direct investment in addition to technology transfers into the countries (Khoi & Chaudhary, 2018). The research by Ee (2016) has indicated a long-running, positive impact in terms of exports on development in selected sub-Saharan African economies between 1985 and 2014. Analysing the Brazilian economy since the 1960s, Dinc and Gokmen (2019) have detected export-led development in the short-term and a mutual link between economic performance and exports in the long-term. Moreover, Yilmaz (2020) has revealed a causal link from exports to development in Turkish economies. The findings of Abbas (2012) have indicated that economic development promoted the increase in export volumes in Pakistan between 1975 and 2010. The results have suggested that the focus should be on increasing production which, in the long-run, has an impact upon

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both trade and economic performance. Dimonso and Utonga (2019) have revealed that in the long-run, economic activities impact on exports in Tanzania. Hussaini et al. (2015) studied an export-growth nexus in India between 1980 and 2013. The investigation revealed a feedback between the variables. The authors noticed that economic reform helped to reallocate resources to more productive uses. The research by Abdullah et al. (2017) also detected a feedback between variables in terms of an export–economic growth nexus in Malaysia. The researchers concluded that a rise in export levels can serve to boost economic performance and vice-versa. The findings of Sunde (2017) indicated that both exports and foreign direct investment stimulated development in South Africa. Moreover, the author has found a bidirectional causal link between development and exports, with causality from foreign direct investment to economic growth, and with causality also running from foreign direct investment to exports. The results of the study by Fannoun and Hassouneh (2019) confirmed the existence of a link between imports, exports, and output in Palestine during the period 2000-2018. The authors noticed that policymakers should focus on international trade when it comes to being able to stimulate development. In the case of Nigeria, the study by Oumarou and Maiga (2019) detected a positive effect of trade upon development, while the effect of foreign direct investment on economic performance was negative. The investigation by Mensah and Okyere (2020) showed the presence of the bidirectional link between real GDP and exports in Ghana in the period from 2010 to 2019. The study by Marwan et al. (2013) confirmed the neutral approach. The authors investigated the tendencies of exports in relation to economic performance in Sudan between 1977 and 2010. Their research has not detected any form of causality.

Taking into consideration this review of recent studies, the author has concluded that the export-economic development nexus remains a subject of intensive debate between scholars and policymakers, with the outcomes being reached remaining rather inconclusive. Taking into consideration available scientific findings, the investigation assumes that exports and economic performance have been interrelated. However, which of the variables is the cause remains an open question. The author believes that this investigation will answer the above question.

2.2. Methodological approach

Data. The investigation has involved annual data from the United Nations (2019). The research covers the period between 1990 and 2019. Estimations of relationships have used two variables: exports per capita in USD and real GDP per capita in USD, which together serve to reveal the development of the countries' economies.

Methodology. The author has referred to a methodology, which has been applied by various researchers (Mah, 2007; Mishra, 2011; Tekin, 2012; Marwan el al., 2013; Gokmenoglu el al., 2015; Sunde, 2017; Mensah & Okyere, 2020). The research involves three steps, which are outlined below.

Step 1. The author has used correlation analysis to assess the relationship, its strength, and the direction between the variables, which are under consideration.

Step 2. The author has applied the Augmented Dickey Fuller (ADF) test in order to check the stationary process of the variables at levels of significance of 1%, 5%, and 10% (Fuller, 1976; Nielsen, 2005). The ADF test has been used to test the following equations:

$$\Delta y_t = a + \delta y_{t-1} + u_t \text{ , \textit{(with intercept, no trend)}} \tag{1}$$

$$\Delta y_t = a + \delta y_{t-1} + \beta t + u_t \text{ , \textit{(with intercept, with trend)}} \tag{2}$$

$$\Delta y_t = \delta y_{t-1} + u_t \text{ , \textit{(no intercept, no trend)}} \tag{3}$$

where: *a* is an intercept and *δ, β* are coefficients, u_t is white noise, and *t* is a time variable. Maximum lags have been determined by applying the Akaike Info and Schwarz Info criteria.

The author has used a process of differencing for non-stationary variables.

Step 3. The author has applied the Granger test in determining the direction of any causal link. Two regression equations are used in the Granger test (Granger, 1980; Stern, 2011):

$$y_t = \beta_{1,0} + \sum_{i=1}^{p} \beta_{1,i} y_{t-i} + \sum_{j=1}^{p} \beta_{1,p+j} x_{t-j} + \varepsilon_{1t} \quad (4)$$

$$x_t = \beta_{2,0} + \sum_{i=1}^{p} \beta_{2,i} y_{t-i} + \sum_{j=1}^{p} \beta_{2,p+j} x_{t-j} + \varepsilon_{1t} \quad (5)$$

where: *p* is the number of lags, β is the parameter, and ε is the error.

If the *p* parameters $\beta_{1,p+j}$ are jointly significant then the null hypothesis which states that x does not cause y when using the Granger test is something which can be rejected. Moreover, if the p parameters, $\beta_{2,i}$, are jointly significant then the null hypothesis that y does not cause x when using the Granger test is also something which can be rejected.

The author has carried out the calculations by using the econometric software, Eviews v8.0. The following section examines the relationships between the variables.

3. EMPIRICAL RESULTS AND DISCUSSION

3.1. The exports and economic development nexus

In this section, the author has applied Spearman's correlation, the ADF test in addition to a causality test in order to determine the inter-linkages of exports performance and development in Lithuania, Latvia, Estonia, Luxembourg, Denmark, and Iceland.

Correlation analysis. Table 1 presents the summary of the correlation analysis within the selected EU countries.

Table 1

Spearman's correlation between exports and development of countries' economies

Countries	Correlation coefficient, r	t-statistic	Probability
Lithuania	0.9439	15.1302	0.0000
Latvia	0.9582	17.7168	0.0000
Estonia	0.9546	16.9600	0.0000
Luxembourg	0.9515	16.3659	0.0000
Denmark	0.9631	18.9269	0.0000
Iceland	0.9382	14.3384	0.0000

Source: author's calculations based on Eviews v8.0.
Note: the level of significance is 5%.

The correlation analysis has revealed positive and statistically-significant inter-relationships of the expansion of exports and development in all of those countries which are under consideration. It has also provided information about two possible scenarios. Firstly, as exports increase, GDP per capita tends to

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grow. Secondly, as the economy grows, exports also increase. The correlation answers the question of whether a relationship exists between the variables, but does not reveal which of the factors under consideration is the cause and which is the consequence of the influence of another factor. The Granger test needs to be used with the purpose to detect causality. However, prior to doing that, the author applied the unit root test to help in checking the stationary process in relation to the variables.

Unit root test. Economic factors often contain a unit root and are not found to be stationary. The ADF test checks the stationary process in relation to the variables. The Akaike Info and Schwarz Info criteria have revealed a maximum lag length of six when the variables are of the first difference. Table 2 reports that not all variables have been stationary at their respective levels. Therefore, the author has carried out a process of differencing.

Table 2

Augmented Dickey Fuller test

Countries	Variables	In level			In first difference		
		Intercept	Intercept & trend	None	Intercept	Intercept & trend	None
Lithuania	GDP per capita, USD	1.63	-4.44	2.83	-5.56***	-5.53***	-5.51***
	Exports per capita, USD	2.47	-0.21	4.28	-4.88***	-4.77***	-4.55***
Latvia	GDP per capita, USD	-0.10	-3.50	1.37	-5.85***	-5.73***	-6.04***
	Exports per capita, USD	2.05	-3.11	4.31	-4.22***	-3.87***	-4.13***
Estonia	GDP per capita, USD	-0.15	-3.80***	2.54	-5.63***	-5.49***	-5.71***
	Exports per capita, USD	1.12	-2.52	2.96	-4.10***	-3.42*	-4.21***
Luxembourg	GDP per capita, USD	-1.82	-1.21	2.60	-6.96***	-6.81***	-7.10***
	Exports per capita, USD	-1.19	-0.64	2.43	-3.98***	-3.96**	-4.11***
Denmark	GDP per capita, USD	-0.91	-2.00	2.11	-3.66**	-3.59**	-2.69***
	Exports per capita, USD	0.19	-2.85	4.27	-4.52***	-4.39**	-4.58***
Iceland	GDP per capita, USD	-0.68	-1.85	2.42	-3.51**	-3.62**	-2.79**
	Exports per capita, USD	2.16	0.11	4.84	-7.59***	-7.46***	-7.70***

Note: ***$p<0.01$, **$p<0.05$; *$p<0.1$.
Source: author's calculations based on Eviews v8.0.

After the first differencing, both series become stationary. Therefore, for further analysis, the author applied the Granger test.

Granger causality test. The author applied the Granger test in detecting the causal link between the exports performance and development in the selected countries. The author rejected the null hypothesis if the probability which is associated with the F-statistic is less than or equal to 0.05. Otherwise, the null hypothesis was not rejected. Table 3 reveals the results of the Granger test. Using the Akaike Info Criterion, the optimum number of lags has been selected for every country.

Table 3

Summary of the Granger causality test

Null hypothesis	Observations /lags	F-statistic	Probability	Test results
Lithuania				
GDP per capita does not Granger cause exports per capita	Obs.: 24 Lags: 5	2.69340	0.0697	Do not reject
Exports per capita do not Granger cause of GDP per capita		1.35867	0.3015	Do not reject
Latvia				
GDP per capita does not Granger cause exports per capita	Obs.:28 Lags: 1	2.9009	0.1009	Do not reject
Exports per capita do not Granger cause of GDP per capita		5.1215	0.0326	Reject
Estonia				
GDP per capita does not Granger cause exports per capita	Obs.: 27 Lags: 2	2.15363	0.1399	Do not reject
Exports per capita do not Granger cause of GDP per capita		1.33136	0.2846	Do not reject
Luxembourg				
GDP per capita does not Granger cause exports per capita	Obs.: 27 Lags: 2	6.4790	0.0061	Reject
Exports per capita do not Granger cause of GDP per capita		0.2037	0.8172	Do not reject
Denmark				
GDP per capita does not Granger cause exports per capita	Obs.: 28 Lags: 1	4.5415	0.0431	Reject
Exports per capita do not Granger cause of GDP per capita		7.4065	0.0117	Reject
Iceland				
GDP per capita does not Granger cause exports per capita	Obs.: 23 Lags: 6	9.0020	0.0015	Reject
Exports per capita do not Granger cause of GDP per capita		3.0063	0.0602	Do not reject

Source: author's calculations based on Eviews v8.0.

The Granger test has indicated unidirectional causality in Luxembourg and Iceland which runs from GDP per capita to exports per capita. This means that a growing economy promotes export development more than export expansion stimulates economic growth. However, the author has evaluated the results obtained from Iceland with some caution because six lags may appear to be too long in order to draw conclusions about the existence of a causal link. In addition, the investigation has detected a causal link from the expansion of exports to development in Latvia. Moreover, in Denmark, the research has confirmed the feedback between the variables. This suggests that the implementation of both economic growth and exports promotion strategies can contribute to the achievement of sustainable development in Denmark. Lithuania and Estonia have supported a neutral approach and demonstrated a non-existent causal link between expansion of exports and economic performance. This implies that neither exports nor economic developments have had a statistically significant impact on each other during the period, which is being considered.

The next section of the paper is devoted to the discussion of the research results, comparing the obtained findings with the previous ones.

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3.2. Discussion

From the literature review mentioned above, the inter-linkage between exports and economic development has been and still are a subject of intensive debate amongst researchers and policymakers, with inconclusive outcomes being reached along the way. The findings of investigations have varied across the countries involved (Trošt & Bojnec, 2015; Ee, 2016; Dinc & Gokmen, 2019; Sultanuzzaman et al., 2019; Fannoun & Hassouneh, 2019; Mensah & Okyere, 2020). This research has shown that evidence exists in regard to a correlation between exports and economic development. Positive and statistically significant relationships have been detected in all of those countries, which are under consideration. The findings imply two possible scenarios. Firstly, as exports increase, GDP per capita tends to grow. Secondly, as the economy grows, exports also increase. This partially reflects the results of a recent study by Mosikari and Eita (2020), in which an expansion of exports caused economic growth.

The use of correlation analysis helps in detecting relationships. However, it does not inform the causality. The Granger test more forcefully reveals the presence or absence of causality between the variables analysed than does the correlation analysis (Stern, 2011). Therefore, the author has applied the Granger test, with the investigation demonstrating different results within the selected countries.

These insights have shown that economic growth promotes expansion of exports in Luxembourg and Iceland. These results are in line with other previous investigations by Mishra (2011), Tekin (2012), Abbas (2012), and Dimonso and Utonga (2019). This means that a growing economy spurs exporting of goods and services more than exports manage to stimulate economic growth. In this case, the policymakers should focus on the proper reallocation of economic resources in order to promote development of the countries' economies with stimulation of the expansion of exports. In addition, the research has revealed a causal link from exports to development in Latvia. This supports the export-led growth approach and the results of previous scientific research by Awokuse (2007), Lee (2011), Dritsaki (2013), Ee (2016), Sultanuzzaman et al. (2019), and Yilmaz (2020). In this case, policymakers should focus on implementing export-orientated policies in order to increase competitiveness in international markets, while also removing trade barriers and investigating new markets. Moreover, the investigation has confirmed the presence of a bidirectional link between variables in Denmark. This insight supports a feedback approach and the studies by Mah (2007), Sunde (2017), Guntukula (2018), Mensah and Okyere (2020), and Adebavo (2020). It is assumed, that the implementation of strategies to promote economic growth and exports could contribute to the achievement of sustainable development. Lithuania and Estonia have demonstrated the absence of any causal link between the variables. This implies that neither exports nor economic developments have had a statistically significant impact on each other during the period which is being considered. The findings support the neutrality approach, which has been confirmed in the study by Marwan et al. (2013).

However, the author has doubts regarding this work, suspecting that the attempt has perhaps been incomplete and is potentially disputable, and thinks that the results of the investigation should be assessed with some caution. Taking into consideration the fact that this investigation has involved only two indicators - exports per capita and GDP per capita - supplementary research which includes other factors would be useful in order to build up a comprehensive understanding of the exports and economic development nexus.

4. CONCLUSIONS

This research has aimed at considering the links between exports and development within the selected EU countries, those countries being Lithuania, Latvia, Estonia, Luxembourg, Denmark, and Iceland.

Spearman's correlation has shown positive and very strong inter-relationships between the expansion of exports and the development of the countries' economies. It has highlighted two possible scenarios. Firstly, as exports increase, GDP per capita tends to grow. Secondly, as the economies of the countries

grow, exports also tend to increase. The use of the Granger test revealed different results across the countries in question. In Luxembourg and Iceland, the findings have indicated a causal link from GDP per capita to exports per capita. This means that growing economies promote export development more than exports stimulate economic growth. In this case, policymakers should focus on the proper distribution of economic resources to stimulate economic growth in order to boost export performance. In addition, the analysis has detected a thread of causality, which runs from exports to the development of the Latvian economy. The insights recommend focusing on implementing exports-orientated instruments, which would serve to increase competitiveness in international markets, while also removing trade barriers and investigating new markets. Moreover, the investigation has shown the presence of a bidirectional link or feedback in Denmark. It is assumed, that the implementation of strategies for economic growth and exports promotion could contribute to the achievement of sustainable development in Denmark. Lithuania and Estonia have not demonstrated any causal links between the variables during the period analysed.

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