

A Vector Error Correction Model Approach to Analyze the Causality Among SME Export-Import Activity and the Economic Development of EU Countries

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Abstract

The article employed a vector error correction model approach to assess the short-term and long-term causal relationships between the export-import activities of SMEs and economic growth. The analysis revealed that the time series for GDP, GDP per capita, value added at factor costs in production and the volumes of exports and imports by SMEs are integrated of the first order. Cointegration was identified only for two sets of time series: (GDP per capita, SME exports, SME imports) and (value added at factor cost in production value, SME exports, SME imports). According to the Pedroni panel data test, no other variable combinations exhibited cointegration relationships. Utilizing the developed VECM models for these specific sets of time series, it was determined that long-term causality exist only from exports and imports towards the value added at factor costs. In the short term, causality is observed for both variable sets, indicating that previous periods of exports and imports significantly influence both GDP at current prices per capita and value added at factor cost. The identification of notable short-term impacts of SME imports and exports on GDP per capita implies that any policies or occurrences impacting SME trade operations can promptly affect a nation's economic health. The findings suggest that economic development and GDP growth in EU may rely on the balanced growth of SMEs' export and import activities.

Keywords

SME, export, import, small and medium enterprises, VECM, EU, causality, economic development, cointegration.

1. Introduction

The relationship between exports, imports and economic growth has received considerable attention in the literature. This relationship is important in the sense that it relates to one of the key economic issues: which foreign economic activity strategy is most favorable for accelerating the country's economic growth. Increased exports can contribute to economic growth by opening up new markets for domestic goods and services. It can also lead to increased production capacity, increased employment and higher incomes. Imports can also support economic growth by providing access to raw materials, equipment and technologies that are not available or limited in the domestic market, and they can improve productivity and innovation.

Until recently, businessmen who wanted to avoid the uncertainty of international markets could limit their activities to local and regional companies, thus avoiding global competition. However, with the opening of trade borders, protective barriers disappeared. Now even small

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regional companies face threats from international competitors entering Europe's previously protected domestic markets. The success of entrepreneurs largely depends on their ability to be competitive in the European space.

Given the importance of SMEs in European markets and their contribution to the financing of public budgets, regional and national regulators should create the most favorable conditions to support the internationalization of SMEs. It should also be taken into account that Small and Medium Enterprises (SMEs) in European Union have been negatively impacted by Russia's military aggression against Ukraine, directly due to sanctions, export restrictions and supply chain disruptions. In addition, SMEs have also experienced knock-on effects from the war, including rising energy costs that threaten their economic growth.

Given the significant importance of small and medium-sized enterprises to the European economy, individual governments are focusing on developing strategies to stimulate their development and international activities. Government actions include introducing tax incentives for SMEs exporting or entering foreign markets; creation of educational programs for SME owners and entrepreneurs; initiatives to improve the level of education among SME owners; providing credit support, loans and financing for the SME sector; as well as promoting the formation of clusters and networks that support the development of certain industries and regions. Scientific research shows both positive and negative aspects of the influence of government policies on the process of internationalization of SMEs.

2. Related Works

Many scientific publications are devoted to the problems of analyzing the role of export-import activities of SMEs in the economic development of the European Union and identifying the nature of the relationships between them. Small and medium-sized enterprises (SMEs) play a key role in increasing regional GDP. Particular attention to export-import activity is explained by the fact that most studies have confirmed the fact that export growth stimulates aggregate economic growth ([1], [2], [3]). Thus, the study [1] showed that online import and export, as well as trade outside the EU, have a significant impact on economic development, determined on the basis of added value, volumes of venture capital investments and e-commerce turnover. A one-way Granger causality from exports and terms of trade to economic growth in Bangladesh was also found in the study [4], while there was no causal effect of economic growth on exports and terms of trade. The results of the study [5] confirmed two-way Granger causality between GDP and exports, unidirectional Granger causality from imports to exports in Kosovo.

The risk management process in international companies requires more attention than national ones. Virglerova (2020) also points out the existence of differences between risk management methods and risk reduction strategies depending on the presence of a business in the international market [6].

In [7], the impact of sectoral exports on economic growth in Turkey was analyzed. The results of the statistical analysis also support the export-led economic growth hypothesis for four sectors, while the feedback hypothesis is valid for three economic sectors. However, there are works that show that domestic investment and exports are not considered a source of economic growth. Thus, in a study [8], based on the use of a vector error correction model, it was found that in the long term in Greece there is no connection between exports, domestic investment and economic growth, which to a certain extent explains the difficult situation in the economy of this country. In the study [9], GDP, merchandise exports, merchandise imports and gross capital formation in Jordan did not show long-term relationships with each other. It turns out that in the short run both GDP and gross capital formation are Granger causes for goods exports. The shocks to merchandise exports, merchandise imports, and gross capital accounted for very small fluctuations in GDP responses in the short run, and responses approached zero in the long run. Findings obtained in research [10] indicate that small and medium-sized enterprises (SMEs) in Thailand are less involved in both upstream and downstream participation in global value chains (GVCs) compared to larger companies. Additionally, this

research reveals that active involvement in GVCs, whether upstream or downstream, correlates positively with improved company performance.

The pressing issue of studying the nature of the interdependence between economic growth, energy efficiency of the national economies of the EU and export volumes has been the focus of numerous scientific studies ([11], [12], [13]). The findings of the research [14] reveal no support for the hypotheses of exports-led growth and growth-led exports in either the short or long term in Nepal. Nonetheless, the research indicates support for the notion of imports leading to growth in the short term, and growth leading to increased imports in the long term. Interesting result was obtained in article [15], where the analysis suggests that throughout the period of 2019-2021 a rise in GDP was observed alongside a decrease in exports. On the other hand, an uptick in exports was associated with a reduction in GDP. This study demonstrates that during the pandemic affecting Indonesia from 2019 to 2021, an increase in exports paradoxically led to a GDP decline. This was due to the fact that other nations partnering with Indonesia for exports were also grappling with the pandemic, leading to a downturn in economic growth.

3. Methods

To identify the nature of the relationship between the export-import activity of SMEs and indicators of economic development, we used time series that characterize the level of economic development of EU countries in the form of panel data of 28 countries of the European Union and Great Britain for the period from 2010 to 2021, namely, GDP at current prices, GDP at current prices per capita, value added at factor cost in production value. The time series `export_sme` and `import_sme` recognize the volume of exports and imports of SMEs of these countries, respectively (see Tables 1 and 2). Statistical data were taken from Eurostat databases [16]. We performed all calculations and statistical tests using the EViews 10 package.

Table 1
Variables of VECM models

Time series	Characteristic
<code>gdp</code>	GDP at current prices, million euros
<code>gdp_pc</code>	GDP in current prices per capita, million euros
<code>va_total</code>	Value added at factor cost in production value, million euros
<code>export_sme</code>	Export volume of SMEs, thousands of euros
<code>import_sme</code>	Import volume of SMEs, thousands of euros

Source: compiled by the authors

Table 2
Descriptive statistics of model variables

	<code>import_sme</code>	<code>export_sme</code>	<code>gdp_pc</code>	<code>gdp</code>	<code>va_total</code>
Mean	71229281	60159452	28571.85	522236.9	243218.7
Median	38202009	26519288	22185.00	186489.8	83825.80
Maximum	3.06E+08	2.71E+08	102240.0	3474110.	1912045.
Minimum	3203621.	1140044.	5780.000	6924.600	3547.600
Std. Dev.	77735580	74759657	19539.21	792836.3	388122.6
Skewness	1.422283	1.622978	1.667722	2.037676	2.460560
Kurtosis	3.833835	4.319039	6.293725	6.160441	8.727485
Observations	336	336	336	336	336

Source: compiled by the authors on the base of Eurostat databases [3]

GDP and value added at factor cost are closely related concepts in economics, but they characterize different aspects of economic activity. GDP at current prices measures the total value of all goods and services produced in a country during a given period (usually a year), at prices current at that time. GDP at current prices does not take inflation into account, so high GDP growth at current prices may be due in part to rising prices rather than real growth in economic activity. Cost value added is a method of measuring GDP that determines the value of the output created in an economy by adding all the costs required to produce it, including wages, production costs, depreciation, and normal return on capital. This allows us to evaluate the contribution of different sectors of the economy to the production of goods and services. The connection between them is that both of these indicators aim to measure the economic productivity of a country, but from different perspectives. GDP at current prices gives an idea of the overall size of the economy and its nominal growth, while value added at factor cost in production value details how this value is generated in different areas of the economy.

Before choosing a method for analyzing the type of causality between these variables, it is necessary to test for the stationarity of these series. For this purpose, we implemented the Im, Pesaran and Shin W-stat and ADF tests, based on which we can conclude about the presence of unit roots.

The verification of cointegration between variables was carried out on the basis of the Pedroni test, which is one of the main methods for determining the cointegration of panel data, and it allows to take into account the heterogeneity between different sections of the panel (in our case, between countries). The Pedroni test includes several statistics to test the hypothesis of no cointegration, including both between-group and within-group statistics. These statistics are based on the estimation of the residuals of the cointegration equations for each panel section.

Cointegration means that although each of the variables is non-stationary (it can tend to deviate from the equilibrium state), their relationship remains stable over a long period of time. This means that despite short-term fluctuations or trends in each individual variable, there is a certain stable relationship between them that does not change over time. In the context of economic analysis, cointegration between variables can indicate that they are moving together along a long-run equilibrium trajectory despite short-run deviations. This understanding is important for modeling and forecasting because it allows analysts to correctly model the relationships between variables, taking into account their long-term properties. The existence of cointegration between these three variables indicates a long-term stable relationship between them and the feasibility of using the VECM model. VECM models help model short-run deviations from long-run equilibrium relationships between series.

We will consider VECM for three variables - the first dependent variable Y determines the level of economic development (GDP in current prices per capita or value added at factor cost in production value), the other two are variables that characterize the volume of export and import of SMEs - *export_sme* and *import_sme*, respectively. In this case, consider one cointegration equation that defines the long-run relationship between the three variables:

$$Y_t = \beta_0 + \beta_1 \cdot \text{export_sme}_t + \beta_2 \cdot \text{import_sme}_t + \varepsilon_t, \quad (1)$$

where β_0, β_1 and β_2 - the coefficients of long-term equilibrium,

ε_t - stationary cointegration error.

Error correction ECT (Error correction term) will look like this:

$$ECT_{t-1} = Y_{t-1} - \beta_0 - \beta_1 \cdot \text{export_sme}_{t-1} - \beta_2 \cdot \text{import_sme}_{t-1}, \quad (2)$$

We will limit ourselves only to the model with the dependent variable Y, which characterizes the level of economic development of the country. The VECM equation for can then be represented as follows:

$$\Delta Y_t = \alpha_1 (ECT_{t-1}) + \sum_{i=1}^{p-1} \gamma_{1,i} \Delta Y_{t-i} + \sum_{i=1}^{p-1} \gamma_{2,i} \Delta \text{export_sme}_{t-i} + \sum_{i=1}^{p-1} \gamma_{3,i} \Delta \text{import_sme}_{t-i} + \mu + \varepsilon_t, \quad (3)$$

where α_1 - the coefficients for ECT, which shows the speed of adaptation of variables to long-term equilibrium.

$\gamma_{1,i}$ - coefficients of dynamics for lagged variables;

μ - constant;

ε_i - random error.

For the interpretation of long-term causality, the key values are the sign and the significance of the coefficient in ECT. If this coefficient is significant and negative, this indicates the presence of long-term causality between the variables in the model. Short-term causality is associated with temporal changes and is reflected through the significance of the lag coefficients of the variables in the error correction term [17]. If the short-run lag coefficients are significant, this indicates short-run causality between the variables.

4. Experiment and results

Currently, global commerce plays a crucial role in fostering economic growth and wealth. Within the European Union, a substantial portion of trading activities, both exports and imports, is conducted by large firms and multinational corporations. Small and medium-sized enterprises (SMEs), despite constituting around 99% of all businesses in Europe and supplying two-thirds of the private sector employment, participate in international trade to a lesser extent: they contribute significantly less than half to the total volume of exports and imports. Table 3 highlights the variances in operations and competencies between small and medium-sized enterprises (SMEs) and larger corporations within the realm of European trade activities. Notably, the disparity in trade value contribution is striking, with large corporations commanding a significantly greater portion despite their relatively fewer numbers.

Table 3.
Comparison of the export-import activities of small and medium-sized enterprises

Parameter	SMEs	Large Enterprises
Share of Total Exports	35%	65%
Barriers to International Trade	High (due to limited resources)	Low (due to extensive resources)
Geographical Coverage	Mainly regional and some international markets	Extensive international presence
Innovation	High flexibility and rapid market adaptation	Significant R&D with slower market adaptation
Impact on Local Economy	High (through diverse means including job creation)	High (with potential for market dominance concerns)

Source: compiled by the authors

The Single Market of the EU is the main market for European SMEs. It accounts for 70% of the value of SMEs' goods exports, and 80% of all SME exporters sell to other member countries. Nonetheless, the number of SMEs exporting to other member states could be much higher: for example, only 17% of all SMEs in the manufacturing sector export within the Single Market. Studies show that SMEs are the ones that suffer the most from persistent trade barriers [18].

The proportion of SMEs remains relatively consistent across EU Member States, yet there's a greater discrepancy in terms of their import value share. This share was most significant in Cyprus (83%) and Estonia (86%), while it was lowest in Germany (34%) and France (32%). Across the EU as a whole, this figure stood at 47%. [19]. In 2021, the volume of imports by SMEs was slightly higher compared to exports (see Figure 1). Countries like Germany, Italy, France,

the Netherlands, and Spain have robust SME sectors that contribute significantly to their export figures. Germany is known for its "Mittelstand" – a broad segment of highly specialized SMEs that are leaders in their niches, ranging from manufacturing to engineering services, contributing significantly to the country's exports.

Italy and Spain have a strong presence of SMEs in the fashion, food, and manufacturing sectors, which are highly competitive internationally. The Netherlands benefits from a strategic logistical position and a strong focus on innovation and technology, aiding its SMEs in reaching global markets effectively. France has a diverse SME sector that includes luxury goods, agriculture, and technology, all of which are significant contributors to its export economy.

Insights from causal analysis can inform policymakers in the development of trade policies and agreements that benefit the economy. Identifying the positive and negative impacts of various trade agreements on different sectors can help in crafting policies that support sustainable economic development. The first step in analyzing causality between exports, imports, and economic development is to establish the level of integration of the time series.

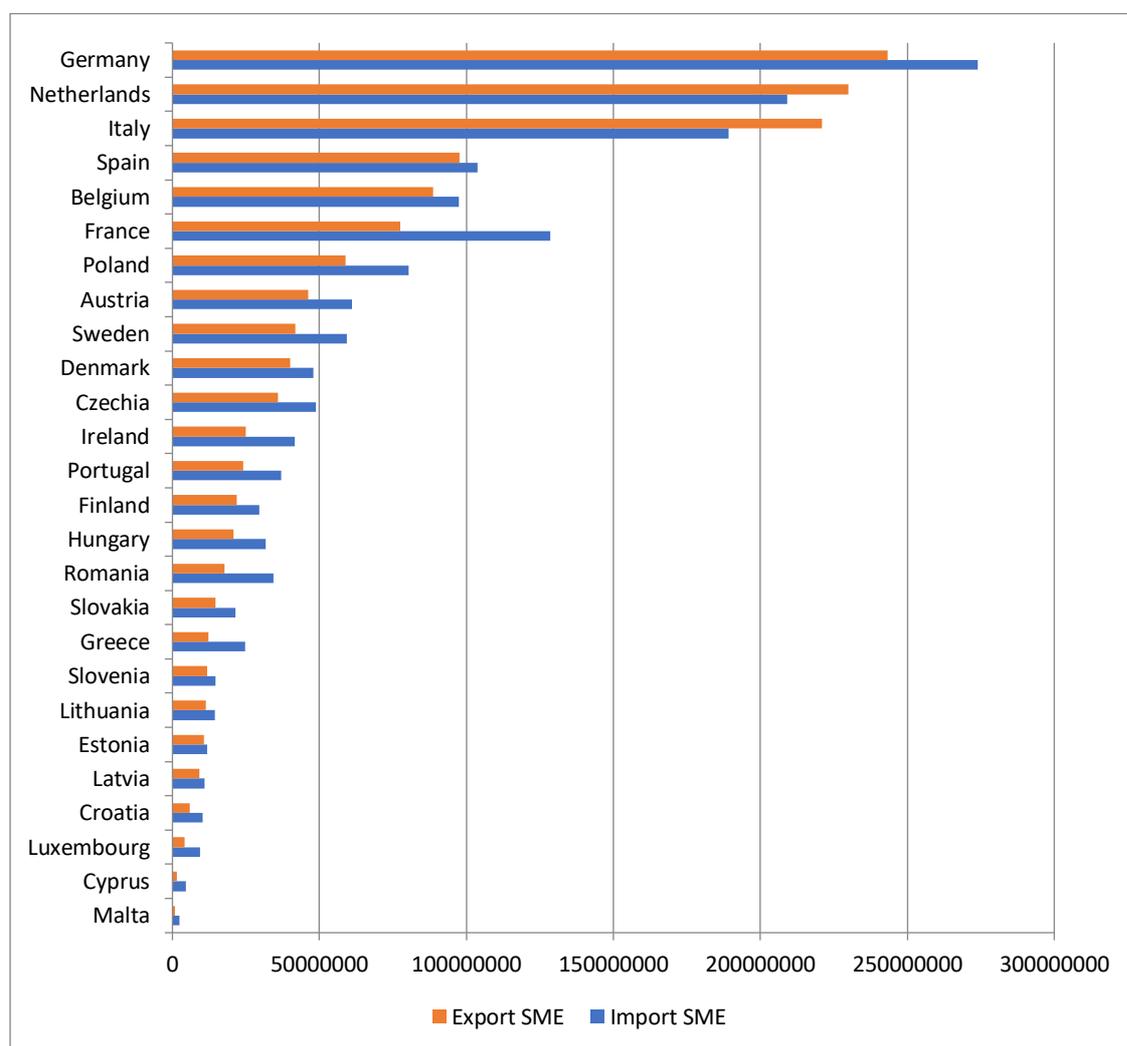


Figure 1: Exports and imports by SMEs in EU countries in 2021

Source: compiled by the authors on the base of Eurostat databases [16]

Checking for the presence of unit roots showed that all analyzed time series are stationary in the first differences, and therefore have the first order of integration $I(1)$ (see Table 4).

Table 4
Assessing the integration order of time series

	On the level				First difference				
	Im, Pesaran and Shin W-stat		ADF - Fisher Chi-square		Im, Pesaran and Shin W-stat		ADF - Fisher Chi-square		
	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	
export_sme	0.341	0.633	50.68	0.602	-5.194	0.000	125.27	0.000	I(1)
import_sme	-0.474	0.317	54.19	0.543	-2.552	0.005	93.904	0.000	I(1)
gdp_pc	0.014	0.506	61.49	0.285	-4.964	0.000	149.13	0.000	I(1)
gdp	0.526	0.700	51.33	0.651	-6.289	0.000	104.23	0.000	I(1)
va_total	2.370	0.991	42.09	0.915	-4.824	0.000	111.46	0.000	I(1)

Source: compiled by the authors

The presence of cointegration enables economists or data analysts to infer the stability and long-run relationships between these variables, which can be useful in forecasting and analysis. The time series gdp, export_sme and import_sme were not cointegrated. A Pedroni test between the pairs (gdp_pc, export_sme), (gdp_pc, import_sme), (va_total, export_sme), (va_total, import_sme) also showed no cointegration between the time series (see Table 5).

Table 5
Pedroni test results

	Unweighted		Weighted		Unweighted		Weighted		
	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	Stat.	Prob.	
gdp, export_sme, import_sme				gdp_pc, export_sme, import_sme					
Panel v-Statistic	0.427	0.334	-0.206	0.581	1.994	0.023	-0.371	0.644	
Panel rho-Statistic	1.746	0.959	1.780	0.962	3.530	0.999	1.839	0.967	
Panel PP-Statistic	-2.595	0.004	-1.449	0.073	2.014	0.978	-1.761	0.039	
Panel ADF-Statistic	-0.740	0.229	-1.493	0.067	-6.735	0.000	-2.492	0.006	
Group rho-Statistic	4.194	1.000			4.182	1.000			
Group PP-Statistic	-3.631	0.000			-3.923	0.000			
Group ADF-Stat	-1.022	0.153			-1.732	0.041			
va_total, export_sme, import_sme				gdp, export_sme					
Panel v-Statistic	0.536	0.295	-0.634	0.737	0.409	0.341	-0.885	0.812	
Panel rho-Statistic	2.067	0.980	2.104	0.982	3.429	0.999	1.266	0.897	
Panel PP-Statistic	-2.762	0.002	-2.594	0.004	5.126	1.000	-0.051	0.479	
Panel ADF-Statistic	-3.040	0.001	-4.390	0.000	4.660	1.000	-0.557	0.288	
Group rho-Statistic	4.495	1.000			3.213	0.999			
Group PP-Statistic	-3.007	0.001			-0.673	0.250			
Group ADF-Stat	-6.131	0.000			-0.511	0.304			
gdp, import_sme				gdp_pc, export_sme					
Panel v-Statistic	0.441	0.329	-0.249	0.598	0.409	0.341	-0.885	0.812	
Panel rho-Statistic	2.646	0.995	1.628	0.948	3.429	0.999	1.266	0.897	
Panel PP-Statistic	2.965	0.998	0.698	0.757	5.126	1.000	-0.051	0.479	
Panel ADF-Statistic	-2.310	0.010	-0.382	0.351	4.660	1.000	-0.557	0.288	
Group rho-Statistic	3.726	0.999			3.213	0.999			
Group PP-Statistic	1.639	0.949			-0.673	0.250			
Group ADF-Stat	-0.355	0.361			-0.511	0.304			
gdp_pc, import_sme				va_total, export_sme					
Panel v-Statistic	0.441	0.329	-0.249	0.598	1.960	0.024	-0.722	0.765	
Panel rho-Statistic	2.646	0.995	1.628	0.948	0.854	0.803	1.088	0.861	

Panel PP-Statistic	2.965	0.998	0.698	0.757	-1.056	0.145	-0.233	0.407
Panel ADF-Statistic	-2.310	0.010	-0.382	0.351	-0.623	0.266	0.497	0.690
Group rho-Statistic	3.726	0.999			2.864	0.997		
Group PP-Statistic	1.639	0.949			-0.934	0.175		
Group ADF-Stat	-0.355	0.361			1.4187	0.922		

Source: compiled by the authors

However, the results of the Pedroni test presented in Table 4 confirm the presence of cointegration between the other two sets of analyzed variables (*gdp_pc*, *export_sme* and *import_sme*) and (*va_total*, *export_sme* and *import_sme*). Thus, these variables have a long-term statistical interdependence, despite the fact that in the short-term they may behave unpredictably or independently of each other. This indicates that there is a long-run relationship between the three economic indicators, which indicates their common tendency to move together in the long run. This may mean that the overall economic dynamics of a country (reflected by GDP per capita or value added at factor cost) is closely related to the trade activities of SMEs, including both exports and imports. The absence of cointegration between individual pairs such as (*gdp_pc*, *export_sme*) and (*gdp_pc*, *import_sme*) may indicate that the long-run relationship between GDP per capita and trade activity of SMEs is not direct or unambiguous when considering individual components (exports or import) isolated. This may be a sign that the impact of exports and imports on GDP per capita is not manifested through a direct linear relationship, but a more complex interaction that becomes noticeable only when considering all three variables together. These results may indicate that economic development and GDP growth depend on balanced development of both export and import activities of SMEs. Exports can enhance incomes and promote economic expansion, whereas imports can fulfill the needs of the domestic market with essential goods and services, thereby influencing economic growth as well. Such a situation may indicate the need for a comprehensive approach to the formation of trade policy, which would take into account the interdependence of export and import of SMEs and their impact on the general economic dynamics. Policy measures aimed at supporting SMEs should take into account this long-term interaction, promoting both export growth and rational imports.

The main idea of VECM is to model the short-term dynamics of time series, taking into account the long-term equilibrium between them. If in the VECM the adjustment coefficient has a positive value, it indicates that the system will deviate more and more from the long-term equilibrium over time [20]. In our case according to obtained VECM model for the variables *gdp_pc*, *import_sme*, *export_sme* (table 6), when the dependent variable *gdp_pc* deviates from its long-run equilibrium interaction with *export_sme* and *import_sme*, then the system will adjust in the direction of increasing this gap at a rate of approximately 0.7% per year. Thus, the built VECM model with the dependent variable *gdp_pc* and *export_sme*, *import_sme* as independent variables makes it possible to conclude that there is no long-term causality from the export and import of SMEs of the EU countries to their *gdp_pc*. The Wald test (see table 7) confirmed the statistical significance of the coefficients for lag variables, and therefore, there is a short-term cause-and-effect relationship from the volume of imports and exports of SMEs to the *gdp_pc* of European countries. This means that there is statistically significant short-run causality from both imports and exports to GDP per capita, meaning that changes in imports and exports have an impact on changes in GDP per capita in the short run.

Table 6
Estimates of the VECM model parameters for the variables *gdp_pc*, *import_sme*, *export_sme*

Cointegrating Eq:	Coefficient	Std. Error	t-Statistic	Prob.
<i>gdp_pc</i> (-1)	1.00000			
<i>import_sme</i> (-1)	-0.00052	0.00032	-1.6584	
<i>export_sme</i> (-1)	0.00028	0.00032	0.8745	

C		-8239.83			
Error Correction:	D(gdp)				
cointeq1	C(1)	0.00715	0.00377	1.8947	0.0588
D(gdp_pc(-1))	C(2)	0.11735	0.06709	1.7490	0.0810
D(gdp_pc(-2))	C(3)	0.25365	0.06654	3.8119	0.0002
D(import_sme(-1))	C(4)	2.86e-05	2.97e-05	0.9608	0.3372
D(import_sme(-2))	C(5)	-0.00014	2.93e-05	-4.9061	0.0000
D(export_sme(-1))	C(6)	-1.8e-05	2.62e-05	-0.7211	0.4713
D(export_sme(-2))	C(7)	0.00014	2.56e-05	5.5885	0.0000
C	C(8)	465.753	112.9976	4.1218	0.0000

Source: compiled by the authors

Table 7
Wald Test in case of VECM model for the variables gdp_pc, import_sme, export_sme

Test Statistic	Value	df	Probability
	Null Hypothesis: C(4)=C(5)=0		
Chi-square	26.6839	2	0.0000
	Null Hypothesis: C(6)=C(7)=0		
Chi-square	34.8582	2	0.0000

Source: compiled by the authors

A slightly different situation arises when, instead of GDP, as an indicator of economic development, we consider value added by production costs *va_total*, which represents gross income from operating activities, adjusted for subsidies and indirect taxes. The Pedroni Residual Cointegration Test for the variables *va_total*, *export_sme* and *import_sme* showed the existence of cointegration between them.

The coefficient -0.012548 indicates how quickly *va_total* variable adjusts to changes in *import_sme* and *export_sme*, returning to the long-run equilibrium given by the relationship between these variables. The statistical significance of the correction coefficient -0.012548 (table 8) emphasizes the existence of long-run causality from *import_sme* and *export_sme* to *va_total*. Moreover, an increase in imports by one unit leads to a decrease in the cost-added value of *va_total* by about 0.0205 units in the long run, while an increase in exports by one unit will cause an increase in *va_total* by about 0.0133. In the VECM, a cointegrating equation is used to model error correction, meaning that any deviation from the long-run equilibrium will be corrected in future periods.

Table 8
Estimates of the VECM model parameters for the variables va_total, import_sme, export_sme

Cointegrating Eq:	Coefficient	Std. Error	t-Statistic	Prob.	
<i>va_total</i> (-1)	1.0000				
<i>import_sme</i> (-1)	-0.0204	0.0042	-4.8451		
<i>export_sme</i> (-1)	0.0132	0.0041	3.2308		
C	442211.7				
Error Correction:	D(va_total)				
CointEq1	C(1)	-0.0125	0.0060	-2.0615	0.0399
D(<i>va_total</i> (-1))	C(2)	0.5240	0.1203	4.3561	0.0000
D(<i>va_total</i> (-2))	C(3)	-0.3492	0.1154	-3.0247	0.0026
D(<i>import_sme</i> (-1))	C(4)	-0.0017	0.0009	-1.7927	0.0738
D(<i>import_sme</i> (-2))	C(5)	-0.0022	0.0008	-2.6107	0.0094
D(<i>export_sme</i> (-1))	C(6)	0.0014	0.0008	1.7690	0.0776

D(export_sme(-2))	C(7)	0.0023	0.0007	3.3162	0.0010
C	C(8)	7945.5	2333.5	3.4049	0.0007

Source: compiled by the authors

The results of the Wald test (table9) confirmed the significance of these coefficients of lag variables.

Table 9
Wald Test in case of VECM model for the variables gdp_pc, import_sme, export_sme

Test Statistic	Value	df	Probability
	Null Hypothesis: C(4)=C(5)=0		
Chi-square	23.31482	2	0.0000
	Null Hypothesis: C(6)=C(7)=0		
Chi-square	6.425407	2	0.0402

Source: compiled by the authors

It indicates existence which indicates the importance of the dynamics of exports and imports of small and medium-sized businesses in the short term for the dependent variable va_total. From this, it can be argued that the previous periods of exports and imports have a significant effect on the dependent variable, and therefore, the existence of short-term causality from both import_sme imports and export_sme exports to va_total value added is confirmed. This means that changes in imports and exports have an impact on changes in value added at production costs in the short run.

5. Discussion

Today international trade is a key driver of economic growth and prosperity. In the European Union, a significant part of exports and imports is carried out by large companies and transnational corporations. SMEs are not sufficiently active in international trade: although they represent approximately 99% of enterprises in Europe and provide two-thirds of jobs in the private sector, they account for well under half of all gross exports and imports. If we analyze direct foreign investments, the share of SMEs in them is even smaller.

Our results indicate that the expansion of an economy and its GDP relies on the balanced growth of export and import activities conducted by small and medium-sized enterprises (SMEs). The lack of cointegration for specific pairs like (gdp_pc, export_sme) and (gdp_pc, import_sme) could suggest that the long-term link between GDP per capita and the trading actions of SMEs does not exhibit a clear or direct correlation when analyzing exports or imports as separate elements.

The fact that import or export alone cannot be the reason for a change in the GDP trend in one or another interpretation was also obtained in other studies. The findings from study [1] revealed that the combined online imports and exports of SMEs, along with their imports and exports outside the EU, significantly influenced economic growth. This impact was measured in terms of value added, venture capital investment, and e-commerce turnover.

Mazher in [21] showed, that variations in the total value of imports do not directly cause changes in the total value of exports in Pakistan's SME sector. Study [22] suggests that in China, the growth rate of imports has an inverse relationship with the GDP growth rate. Initially, the GDP growth rate positively influences import growth during the first three quarters, but this influence turns negative thereafter.

Interestingly, for less economically developed economies, scientific studies often find a direct dependence of economic development on exports. Thus, the results obtained in articles [23,24] showed the existence of long-term bilateral causality and rapid adjustment to equilibrium between real GDP and exports in Ghana.

A distinctive feature of our study is the establishment of long-run and short-run causality relationships between SME import and export indicators and economic development in EU based on VECM models.

6. Conclusions

To establish the type of short-term and long-term causality between SME export-import activities and economic growth, the article conducted an analysis of the stationarity of the time series for GDP, GDP per capita, value added at factor cost in production, and the export and import volume of SMEs. A prerequisite for the application of the error correction model was the verification of the existence of cointegration between these variables. A cointegration relationship was found only between two sets of time series: (GDP per capita, SME exports, SME imports) and (Value added at factor cost in production value, SME exports, SME imports). All other combinations of these variables do not form cointegration relationships according to the Pedroni test for panel data.

Based on the constructed VECM models for these two sets of time series, long-term causality was found only from exports and imports to value added by production costs. Short-run causality holds for both sets of variables, meaning that prior periods of exports and imports have significant effects on both GDP at current prices per capita and value added at factor cost. Finding significant short-term effects of SME imports and exports on GDP per capita suggests that policies or events affecting SME trade activities can have immediate impacts on the economic well-being of a country. This insight is valuable for policymakers aiming to stimulate short-term economic growth. Enhancing or facilitating SME trade could be an effective strategy to quickly impact GDP per capita. It's important to note that the short-run effects might be subject to volatility and could be influenced by external shocks or temporary market conditions. Therefore, short-run findings should be interpreted with caution and considered alongside long-term dynamics and external economic factors. The same applies to the short-term causality from the export and import of SMEs to value added at factor cost in production value.

These findings suggest that the growth of an economy and its GDP hinges on the harmonious development of both the export and import operations of small and medium-sized enterprises (SMEs). While exports can boost incomes and drive economic growth, imports are crucial for meeting the domestic market's demand for necessary goods and services, thus also playing a role in economic advancement. This scenario underscores the importance of adopting a holistic approach to crafting trade policies, recognizing the mutual reliance between SME exports and imports and their collective influence on overall economic trends. Policies designed to support SMEs should consider this ongoing interplay, encouraging both the expansion of exports and the strategic management of imports.

7. References

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