forests

MDPI

Article

Impacts of Foreign Trade on the Economy of Wood-Based Sectors Generating Different Levels of Value Added in the Slovak and Czech Republics

Andrea Janáková Sujová [1,2,*], Katarína Marcineková [1] and Václav Kupčák [2]

[1] Department of Economics, Management and Business, Technical University in Zvolen, T.G. Masaryka 24, 960 01 Zvolen, Slovakia
[2] Department of Forest and Wood Products Economics and Policy, Mendel University in Brno, Zemedelská 3, 613 00 Brno, Czech Republic
* Correspondence: sujova@tuzvo.sk or qqsujova@node.mendelu.cz

Abstract: Foreign trade belongs among the main sources of economic growth as classical theories of international trade affirm. The aim of the paper is to evaluate the impact of trade balance flows on sectors generating different value-added in the wood-based industries (WBI) of the Czech and Slovak Republics. The multivariate regression method (MLR) was applied to identify the relationship between foreign trade and economic indicators and also specific indicators assessing impacts of foreign trade on the economy of wood-based industries. The results showed that the performance of high value-added production is only slightly affected by foreign trade. It means that both monitored countries do not utilize raw wood so intensively that the positive effects of foreign trade are manifested. Growth in net exports represents a positive influence on the economy of the sector regardless of the value-added rate only if the increase in imports is smaller than in exports. The contribution of the study to existing knowledge is in using specific indicators evaluating trade impacts on the industry's economy. The article provides new empirical insights into the influence of foreign trade balance flows on the economy of wood-based sectors with a different value-added rate.

Keywords: contribution of foreign trade; economic performance; net export; value-added rate; timber industry; furniture industry

Citation: Janáková Sujová, A.; Marcineková, K.; Kupčák, V. Impacts of Foreign Trade on the Economy of Wood-Based Sectors Generating Different Levels of Value Added in the Slovak and Czech Republics. *Forests* **2023**, *14*, 1029. https://doi.org/10.3390/f14051029

Academic Editor: Sofia Knapic

Received: 6 May 2023
Revised: 11 May 2023
Accepted: 15 May 2023
Published: 17 May 2023

1. Introduction

According to Afonso [1], foreign trade enables technological transfers and foreign investment and belongs among the main sources of economic growth. The association between economic growth and international trade has started to be investigated using international trade theories originating from classical economics. The specialization of each country in the production of products where a comparative advantage exits and trade with other countries contributes to the economic growth [2].

Assessing the causalities between international trade and macroeconomic performance or growth has been a subject of many researchers and their studies in many African, Asian, and European countries [2–13]. The methods frequently used in research were econometric models, such as ARDL, the Johansen multivariate cointegration model, the autoregressive distributed lag cointegration framework, and statistical regression models. In most studies a positive impact of foreign trade on GDP was revealed.

The impact of foreign trade on economic performance can also be measured by specific indicators such as multipliers of export and export, the contribution of trade balance, and input-output analysis. This approach was used in studies by several authors [14–20].

Many current empirical studies focusing on investigating the relationship between foreign trade and economic output worldwide indicate that the issue has been extensively discussed and is worthy of investigation. However, such research for industries or economic

sectors is insufficient. Therefore, this study deals with the evaluation of the impact of foreign trade flows on the sectoral economy within the wood-based industries (WBI). Secondly, most empirical studies applied econometric and statistical methods. An approach using indicators has rarely been used.

The national strategies for the development of wood-based industries (WBI) in EU countries are aimed at higher utilization of the country's own resources of wood as a raw material and the finalization of wood processing in the country of origin [21]. The high level of exports of wood as a raw material in Slovakia and the Czech Republic contributes to an active trade balance, which on the one hand is positive for the economy of these countries, but on the other hand is not in line with national strategies [22].

The production of wood-based products in the conditions of the Slovak Republic and the Czech Republic has a long tradition and, as one of the options for obtaining renewable resources, is closely linked to many sectors of the national economies. Both countries have sufficient sources of wood as a raw material to produce wood products. WBI provides an economic, environmental, and social contribution based on the use of renewable resources. Wood-based products are recyclable, and reusable either in new products or as energy. They are biodegradable and can replace materials from non-renewable sources. The WBI sector is an important part of the emerging economy, a new promising direction based on biotechnology. Support for the development of industries based on renewable resources is also declared in the European Union's strategy. The principles of the circular economy and the bioeconomy, which are currently being intensively discussed and promoted, indicate the importance of developing wood-based industries as strategic sectors of national economies. The study of determinants influencing the WBI economy and its improvement is therefore indispensable and important in the implementation of national and transnational economic development strategies.

The authors of several scientific studies have explored the possibilities of assessing the competitiveness of wood-based industries [23–29]. Works focusing on the analysis of competitiveness in Slovakia and Czechia have found that comparative advantages are below the EU average and their level is steadily decreasing. However, the Czech and Slovak wood-based industries have the potential for international economic growth in terms of higher valorization of domestic wood as a raw material. The study by Bojnec and Ferto [30] explored the comparative relative trade advantage in finished wood products experienced by the Czech and Slovak Republics.

The aim of this paper is to examine the effects of foreign trade on the economy of the wood-based industry and to compare them in sectors with different degrees of valueadded, using not only statistical methods, but also specific indicators.

Statistical and econometric methods can identify the significance and direction of influence between independent and dependent variables in models. However, they do not allow for a more precise analysis when both flows of foreign trade are dynamic. This is considered by the specific indicators designed to assess the impact of foreign trade flows and the net export on sectoral economic indicators.

The contribution of this paper is an assessment of the impact of foreign trade at the mesoeconomic level, i.e., at the sectoral level, which is based on the use of a combination of methods of statistical analysis with the calculation of specific indicators measuring the impact of foreign trade on the economy of the sector. The article also provides new empirical insights into factors affecting the economic development of wood-based industries with different degrees of value-added creation.

The rest of the paper is organized as follows: Section 2 presents a review of the literature. Section 3 includes material and methods of the study. Section 4 presents the results and Section 5 the discussion. The conclusions are derived in the Section 6.

2. Literature Review

The measurement of economic growth and performance is based on different indicators at different levels of the economy. Macroeconomic performance is assessed on the basis

of gross national or domestic product (GDP), which includes net exports, i.e., the difference between national exports and imports. Thus, foreign trade can affect the value of GDP positively or negatively. The economic performance of individual enterprises is assessed through financial indicators of profitability, profit, economic and market valueadded. At the sectoral level, which represents the mesoeconomic level, it is a combination or link between the macroeconomic and enterprise approaches to measuring economic performance. However, the assessment at all levels is based on the same principle, the value added by processing.

Mesoeconomics is based on how to measure the effects of the structures of the macroeconomic reasoning of aggregate supply and demand, and microeconomic buying and selling and supply and demand, and mainly how these forces play out. Foreign trade is important because of its effect on levels of employment. In addition, the competitiveness of products in the global market affects the increase in income. In the theory of economic growth and international trade, competitiveness is defined as the ability to gain profitability and maintain market share. The competitive performance of a country or a sector of the national economy is demonstrated by using trade indicators, including trade balance [31].

The relationships and linkages between foreign trade flows and the economic growth of national economies have been analyzed by statistical and econometric models in several papers. A standard growth-regression analysis was carried out by Were in African countries [3]. Econometric, non-parametric approaches, ARDL and Johansen multivariate cointegration models have been used in analyses in China and in other Asian, African, and European countries. These studies confirmed that growth in foreign trade volume positively affected GDP growth in China [4–6], and a positive influence on GDP was recorded by export growth while conversely imports affected GDP negatively in Ghana [7]. A review of past empirical studies conducted by Winters and Masters showed that imports also contribute to economic growth [8]. The opposite findings were demonstrated by an analysis by Blavasciunaite et al. in EU countries, where foreign trade has negative effects on GDP growth [9]. The same results were found in an analysis of Saudi Arabia by Belloumi and Alshehry in the long run [2]. A study of the most important states in the world (the US, Russia, China, and Germany) conducted by the authors Makhmutova and Mustafin showed different effects of international trade on GDP growth in the surveyed countries [10]. Hobbs' study showed the opposite relationship in Albania, namely that economic growth induced export growth and foreign investment, but not vice versa [11]. The studies by Reppas and Christopoulus [12] and Cetin [13] revealed indirection by assessing the causality between international trade and macroeconomic growth. The impact of European integration on Visegrad countries trade using more advanced econometric techniques, examined by Gauger and Sledziewska [14], showed the influence on trade of higher value-added goods.

To measure the effects of trade balance flows on macroeconomic growth is possible via specific indicators. The most used measurement is quantification by so-called contribution to economic growth. This value expresses the contribution of net exports to the growth of GDP as a weighted difference between the export and import growth rate, where weights are portions of exports and portions of imports in relation to GDP based on the previous period [15,16]. Another measure of the impact of exports on economic growth is a quantification of the impact of exports using an input–output analysis based on the analysis of the direct and indirect intensity of home production to import. The contribution of net exports to economic growth is calculated as total exports after deducting induced imports for intermediate consumption [17]. Mandras and Salotti estimated the multipliers of production value and added value using input-output analysis of the smart industries in the Western Balkan countries [18]. Multipliers of the final use quantify home production, imports in the particular year of induced export, the total consumption of households, the total consumption of the government, the creation of gross capital or the amount of produced added value, and employment at all stages of production [19]. Marcato et al. [20] explored value-added trade measures to illustrate countries' specialization patterns in

vertically-integrated production networks. A positive linear association between higher levels of domestic value added and higher levels of RCA was found. The contribution of foreign trade to the competitiveness of product groups in South Korea using CTBI (contribution to trade balance index) as an indicator was confirmed in exports of high value-added products in the study by Erkan and Aybudak [32].

According to authors Pawera et al. and Stefanovic et al., indicators measuring industrial international competitiveness are being continuously improved [33,34]. They constructed a comprehensive international-competitiveness index by combining the variation coefficient and the entropy method. It was based on the market share index (MS), trade competitiveness index (TC), revealed comparative advantage index (RCA), and relative trade advantage index (RTA). Trade balance is considered a factor of political-economic cooperation [33] as well as a factor of economic development influencing corporate performance [34].

In the study by Bojnec and Ferto [35] it was found that the central European countries export lower value-added raw wood and semifinished wood products to Austria, and Austria exports higher value-added wood products back to the central European countries. Similarly, studies by the UN Economic Commission for Europe [36] revealed that the increased supply of Czech raw wood in 2016 was mostly exported to Germany when exports increased by +12.2%. The study of Toth et al. [37] revealed the strong correlation between unplanned wood harvesting by incidental logging and the decrease in wood prices. More than 42% of the harvested timber is purchased by German and Austrian partners based on long-term contracts with Czech producers.

Michal et al. in their study [38] considered the export orientation of the timber trade an ongoing disaster due to the current capacity and production potential of the wood-based sector in the Czech Republic. Loučanova et al., [39] also stated that most Slovak wood processing faces difficulties in direct access to foreign markets and their production is often sold as semi-finished or low value products (raw material such as sawnwood) to processing companies. Slovakia is inter-industry specialized, but with the increasing added value of products Slovak trade could become intra-industry specialized.

According to the study by Slavova [40], exports of Bulgarian wooden products show a steady trend of growth over the years 2016 and 2019 and the branch is described by a positive trade balance. Key factors of the economic growth are population, natural energy and resources, fixed assets and infrastructure, organization and entrepreneurship, enterprise knowledge and technological change [34]. The furniture enterprises have been forced for social reasons (the COVID-19 Pandemic) to invest in new technologies as a key tool to enhance their competitiveness [40]. Presumptions for the development of the forestry and wood-based industry are increasing the level of production, consumption, and export of wood and paper commodities with higher added value [38]. Similar results were presented in the published paper by Keegan et al. [41] whose research sample was from the EU. In addition, this statement was confirmed by Gordeev in a study from Russia [42]. Vu et al. [43] found that the low value added and low productivity of Vietnam's wood processing industry caused a gradual fall in the international competitiveness growth rate.

Schier et al., authors of the study [44] used The Global Forest Products Model (GFPM) as a partial model for a forest market simulating production, consumption, and trade in wood and wood-based products. The structure of the model distinguishes between raw, intermediate, and finished products. They concluded that both the production of roundwood and wood products shifted from the EU to non-EU countries to varying degrees and decreasing production of roundwood could be a valid estimator for future scenarios in building processes. In addition, from the research results it could be stated that an increase in possibly occurring leakage effects is not significantly affected by the pre-set supply and demand elasticities.

According to theories of international trade, specialization allows countries to focus on production in which they can make the most efficient use of available domestic resources and achieve the best quality [45]. The Heckscher–Ohlin model of international trade speaks

of a comparative advantage in a particular factor of production by virtue of its relatively better endowment [7]. The price of the productive resource that a country has an abundance of is low, and so countries specialize in production and exports in those commodities that are input-intensive to produce and with which they are well endowed. In imports, on the other hand, they specialize in commodities whose production is demanding of scarce input resources. As Slovakia and the Czech Republic are well equipped with inputs of wood as a raw material, the processing of domestic raw material, the production of final wood products with the highest added value and their subsequent export should contribute to economic growth and to the higher performance of the wood-based industries. At the same time, these countries do not need to achieve high levels of imports of wood as a raw material and semi-finished wood products.

After reviewing the literature and scientific studies dealing with the impact of the foreign trade on macroeconomic growth, it can be assumed that the export of high value-added finished wood products will have positive effects on the economy of the sector, while the impact of imports will be negative. At the same time, simultaneous changes in both export and import volumes must be considered when assessing the impact of foreign trade and the economic performance of the sectors. These findings were the basis for setting the research propositions.

3. Materials and Methods

The literature review concerning associations between economic outputs and the foreign trade (FT) was a basis for the research goals and methodology statement. The object of investigation is the wood-based industry and its two sectors generating different levels of value-added rate:

- Timber industry: processing of roundwood and production of semifinished products
- Furniture industry: production of high value-added final products

The research methodology was designed thus:

- Formulation of the research problem and propositions
- Statistical methods proposal
- Design of specific measures evaluating contribution of FT to economic results of WBI sectors
- Data collection: official databases of secondary data
- Statistical analysis
- Indicator values calculation
- Interpretation of results achieved and discussion
- Conclusions and recommendations

Following the goal of the paper, the research propositions were defined:

Proposition 1. *The export of high value-added wood products affects the economic performance of the sector positively.*

Proposition 2. *The export of low value-added wood products has a negative impact on the economic performance of the sector.*

Proposition 3. *The import of low value-added wood-based products influences the performance of the sector positively.*

Proposition 4. *Net export growth has a positive effect on the economic indicators of the wood-based sector regardless of the value-added rate.*

3.1. Data and Sources

The input data was gained by processing statistical data on international trade and economic indicators in the timber and furniture industries in the Slovak and Czech Republics for the period 2009–2019. The source of data was official databases. Annual data for

the foreign trade of the economic sectors was found in Eurostat [46] databases by NACE activities and commodity structure. According to the Eurostat methodology [47], the division NACE 16 includes the manufacture of wood products, such as lumber, plywood, veneers, wood containers, wood flooring, wood trusses, and prefabricated wood buildings. The division NACE 31 includes the manufacture of furniture and related products of any material except stone, concrete and ceramics. Also excluded are metal furniture manufacturing which is classified in division 25 and plastic furniture, classified in division 22. The remaining material for furniture manufacturing is wood, so the data from this division mainly concern wooden furniture. According to information requested from the Slovak and Czech Statistical Bureaux, the share of wooden furniture in NACE 31 is more than 97%.

The economic indicators of the timber and furniture sectors—the revenues, value added, and profit before taxation (EBIT)—were obtained from the Slovak Statistical Office—Slovstat, datacube [48] and the Ministry of Industry and Trade of the Czech Republic [49].

3.2. Indicators and Methods

The indicators and methods evaluating the impacts of foreign trade on economic growth were applied at a macroeconomic level in the relevant empirical studies. Measurement at the mesoeconomic (industry) level needed to modify the indicators.

As mentioned above, each sector of the wood-based industry creates a different level of value added. To evaluate it, the indicator value-added rate (VA_r) was applied. The VA_r is the ratio of value added to the total revenue of the industry. Its calculation is as follows:

$$VA_r = \frac{VA}{R} \cdot 100, \quad (1)$$

where VA is the value added of the industry and R is the revenue of the industry.

Return on sales (ROS) is a measure of how efficiently revenue (sales) is turned into profit in an industry. It is calculated by dividing EBIT by revenue [50]:

$$ROS = \frac{EBIT}{R} \cdot 100, \quad (2)$$

where EBIT is profit before tax of the sector and R is the revenue of the industry.

To find the relationship between economic indicators and foreign trade, the multiple linear regression (MLR) method was used. MLR is a statistical technique that uses several explanatory variables to predict the outcome of the response variable. The objective of MLR is to model the linear relationship between the explanatory (independent) variables and the response (dependent) variable. In interpreting the results of multiple regression, the beta coefficients are valid while all other variables remain constant. In our MLR models, the relationship between imports and exports as independent variables and individual economic indicators, which were the dependent variable, was examined. The MLR equation in the analysis is as follows:

$$Y_t = \beta_0 + \beta_1 M_t + \beta_2 X_t \quad (3)$$

where Y represents the dependent variable as a predicted value of the economic factor of industry (turnover, added value, or EBIT), the independent variables are M (import value) and X (export value), β_0 is the value of the economic indicator when the export and import are equal to zero, β_1 and β_2 are coefficients.

Each regression coefficient represents the change in Y relative to a one-unit change in the predictive independent variable. In the multiple regression situation, β_1 is the change in Y relative to a one-unit change in M, holding all other independent variables constant (i.e., when the remaining independent variables are held at the same value or are fixed). Statistical tests can be performed to assess whether each regression coefficient is significantly different from zero.

The estimation of the MLR parameters was carried out using the least-squares method, which provides an objective assessment of whether the basic assumptions of the regression model are met [51].

There are several assumptions about the data that must be met to perform a linear regression analysis: linearity, normality, and independence of the variables in the model. The statistical Ljung-Box test was used for checking autocorrelations in a time series and testing overall randomness based on a number of lags. The normality of sample data distribution by the Jarque-Bera method was tested. This test measures whether the skewness and kurtosis of sample data matches a normal distribution. The results are positive if they are not close to zero. The linearity in parameters of the regression models was verified by the Ramsey RESET test. It evaluates whether the fitted values of linear regression or non-linear combinations explain the dependent variable. If the results are too close to zero, then the model equation has an incorrect functional-form specification. Testing procedures of the above-mentioned tests are explained in the publication by Greene [52].

The next part of the study assessed the foreign trade of each sector by quantifying its comparative advantage through the revealed comparative advantage (RCA) indicator modified to industry level. It describes a comparative advantage or disadvantage of export and its competitiveness, and it is calculated as follows [53]:

$$RCA = \ln [(X_{ij}/M_{ij}):(X_j/M_j)] \quad (4)$$

where X_{ij} is the export value of commodity group "i" within industry "i" in country "j"; M_{ij} is the import value of commodity group "i" within industry "i" in country "j"; X_j is the value of total exports from country "j", and M_j is the value of total imports to country "j".

The RCA < 0 indicates comparative disadvantages in the industry or commodity group; RCA > 0 indicates comparative advantages in the country for export commodities for that industry or commodity group, and RCA > 1 identifies the commodity and industry as internationally competitive.

A comparison of the development of foreign trade indicators in the observed years was necessary for the analysis and correct interpretation of the obtained results. It is represented by the index of change (growth rate-G) of a trade balance part:

$$G = \frac{I_t}{I_{t-1}} - 1 \quad (5)$$

where I refers to a component of the trade balance (e.g., the value of exports, imports, and net exports).

The core part of this phase was the calculation of designed indicators to measure the impact of foreign trade on the economic results of the WBI sectors. The indicator used in the study was the contribution of foreign trade (CFT) to the growth of economic indicators, which expresses the contribution of net export to a year-on-year growth rate of the chosen economic indicator for the industry. It is calculated as follows:

$$CFT = \left(\frac{X_t}{X_{t-1}} - 1\right) \cdot \left(\frac{X_{t-1}}{Y_{t-1}}\right) - \left(\frac{M_t}{M_{t-1}} - 1\right) \cdot \left(\frac{M_{t-1}}{Y_{t-1}}\right) \quad (6)$$

where X is the export of sector commodities; M is the import of sector commodities; and Y is an economic indicator of the sector (revenue, value added, EBIT).

Using the CFT indicator, the foreign trade impact on revenue, added value, and EBIT of each sector was analyzed. The values of the CFT indicator are interpreted as follows: if CFT > 0 foreign trade contributes to industry performance; if CFT < 0 foreign trade influences the economic performance negatively.

Based on a statistical method and specific indicators, the study was carried out in wood-based sectors generating different levels of value-added in Slovakia and Czechia for a period of 11 years (2009–2019). The impact of the trade balance on the economy of industries could be identified and analyzed more accurately and deeply through a

comparison of the growth indices of net exports, imports, and exports (I_i) with values of CFT indicators.

4. Results

Results of the statistical MLR method and the calculated values of indicators evaluating the impact of international trade on the economy of two wood-based sectors in Slovakia and Czechia, the timber and furniture industries, are presented.

Wood-based industries represent a comparable share of GDP near 4% in both surveyed countries. In the period of the last 11 years, the share of exports of WBI to national exports was 2.7% in Slovakia and 2.2% in Czechia on average. The growing trend of economic indicators was recorded in both sectors and both countries. The foreign trade balance surplus has gradually fallen during the monitored period in the timber and furniture industries of Czechia. In the Slovak timber industry, a surplus of foreign trade is gradually growing and in the furniture industry an active trade balance has declined and has turned to a passive one since 2016. The Slovak and Czech timber industries reached an average export performance of 38%. As for the furniture industry, the export performance was on average 47% in Slovakia and 19% in Czechia.

4.1. Economic Performance of Timber and Furniture Sectors in Slovakia and Czechia

Manufacturing specifics in particular sectors of the wood-based industry indicate a sequential creation of the value-added chain from the timber industry, through pulp and paper to furniture industries. Theoretically and logically, the furniture industry should reach a higher value-added rate than the timber industry. The indicator value-added rate calculated showed the results presented in Table 1.

Table 1. The value-added rate (VA_r) in Slovak (SVK) and Czech (CZ) WBI sectors in 2009–2019.

VA_r in %	Year										
SVK	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
TI	21.28	30.82	30.89	25.50	21.01	19.51	19.34	19.70	20.08	20.25	21.47
FI	25.32	28.34	29.28	24.99	26.32	20.99	21.80	26.62	26.34	20.46	22.40
CZ	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
TI	28.25	27.48	26.39	26.46	27.13	27.40	27.57	27.26	28.31	30.27	32.13
FI	32.54	31.55	30.24	31.80	31.55	31.39	32.38	32.00	32.21	32.13	32.71

TI—timber industry. FI—furniture industry. Source: authors' calculation according to data from Eurostat, MIR CR, and the Slovak Statistical Office.

The value-added rate reached the lowest values in the Slovakian timber industry, with an average level of 22.34%. The value-added rate in the Slovak furniture industries was over 24% on average, but the difference was only 0.7%. The oscillation from 26% to 21% can be seen in the Slovak furniture industry. There are some interesting findings in Czechia where the value-added rates in the timber and furniture industries were almost the same in 2019; over 32%, the difference was only 0.5%. While the Czech furniture industry kept the level of VA_r between 31.5% and 32.7% with an increasing trend, the VA_r in the timber industry rose from 27% to 32% over the 10 years. The Czech timber industry reached a higher value-added rate than the furniture industry in Slovakia. The value-added rate of the furniture industry was 10% higher in the Czech Republic compared to Slovakia.

The results of the economic efficiency of sectors evaluated by the ROS indicator are presented in Table 2.

The results of economic efficiency in Table 2 show that the timber industry reached higher values of ROS than the furniture industry in both countries. The larger difference was in Slovakia in the last two years when the furniture industry lost rentability on revenue. This may relate to periodic investment in the furniture industry. The Czech timber and furniture industries showed an increasing trend in rentability and much higher values than in Slovakia.

Table 2. The ROS in WBI sectors of Slovakia (SVK) and Czechia (CZ) in 2009–2019.

ROS in %	Year										
SVK	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
TI	2.69	20.49	18.92	14.33	12.55	10.84	9.95	9.83	10.15	10.33	10.86
FI	5.32	9.39	10.44	4.97	7.72	2.08	3.29	6.88	6.86	−0.13	0.89
CZ	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
TI	6.36	6.51	6.75	6.39	7.06	8.98	9.38	10.97	10.96	13.66	15.32
FI	3.33	4.21	4.45	5.20	5.74	6.79	7.31	8.06	8.14	7.63	7.12

TI—timber industry. FI—furniture industry. Source: authors' calculation based on data from Eurostat, MIR CR, and the Slovak Statistical Office.

4.2. Multivariate Linear Regression Results

The relationship between exports, imports and economic indicators in the wood-based industries was analyzed using the statistical method of linear multivariate regression. The analysis results in the Slovak timber and furniture sectors are presented in Tables 3–6.

Table 3. Linear Multiple Regression of the Slovak timber industry (NACE 16).

Revenue on IM and EX (*i* = 0, 1, 2)	β_i	β_I **(Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	−156,67	792,149.6	−0.19	0.848
Import (β_1)	7	3.4	2.14	0.054
Export (β_2)	−3	2.0	−1.47	0.180
Value Added on IM and EX (*i* = 0, 1, 2)	β_i	β_I **(Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	204,556.4	227,052.5	0.90	0.393
Import (β_1)	1.4	1.0	1.46	0.181
Export (β_2)	−0.9	0.6	−1.59	0.149
EBIT on IM and EX (*i* = 0, 1, 2)	β_i	β_I **(Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	135,744.3	177,484.4	0.76	0.466
Import (β_1)	1.4	0.8	1.86	0.099
Export (β_2)	−1.0	0.5	−2.22	0.050 *

Source: authors' calculation. significance levels: * $p \leq 0.05$.

Table 4. MLR Models Summary of the Slovak timber industry (NACE 16).

Multiple Regression Model Summary–SVK16	**Revenue**	**Value Added**	**EBIT**
Multiple *R*	0.62	0.49	0.62
Multiple R^2	0.38	0.25	0.38
Adjusted R^2	0.226	0.057	0.227
F-test	2.458	1.303	2.466
p-value	0.147	0.324	0.146
St. Error of Estimate	290,285.43	83,204.03	65,039.66

Source: authors' calculation.

An *F*-test performed on the association between revenue and foreign trade in the timber industry of Slovakia (SVK NACE 16) revealed that the multiple regression model $Y = 1.56 \times 10^5 + 7.0M - 3.0X$ was not significant ($p = 0.15$), but slight significance could be seen in relation to imports ($p = 0.054$). The estimated values of the parameters β imply that if the export variable is held constant, sales will increase by EUR7 when imports increase by EUR1. A EUR1 increase in exports will cause sales to rise by EUR3, conditional on imports remaining unchanged.

A multivariate regression analysis of value added in the Slovak timber industry did not reveal a statistical significance of the model $Y = 2.04 \times 10^5 + 1.40M - 0.90X$ ($p = 0.32$).

Table 5. Linear Multiple Regression of the Slovak furniture industry (NACE 31).

Revenue on Import and Export (*i* = 0, 1, 2)	**β_i**	**β_I (Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	690,060.7	22,009.96	31.35	0.000 ***
Import (β_1)	0.44	0.05	7.45	0.000 ***
Export (β_2)	−0.22	0.04	−6.33	0.000 ***
Value Added on Import and Export (*i* = 0, 1, 2)	**β_i**	**β_I (Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	191,049.2	10,761.90	17.75	0.000 ***
Import (β_1)	0.1	0.03	2.69	0.027 *
Export (β_2)	−0.1	0.02	−2.83	0.021 *
EBIT on Import and Export (*i* = 0, 1, 2)	**β_i**	**β_I (Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	54,155.28	12,357.22	4.38	0.002 **
Import (β_1)	−0.02	0.03	−0.80	0.445
Export (β_2)	0.01	0.02	0.63	0.545

Source: authors' calculation. significance levels: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p < 0.001$.

Table 6. MLR Models Summary of the Slovak furniture industry (NACE 31).

Multiple Regression Model Summary–SVK 31	**Revenue**	**Value Added**	**EBIT**
Multiple *R*	0.95	0.71	0.38
Multiple R^2	0.91	0.51	0.14
Adjusted R^2	0.890	0.385	−0.072
F-test	41.28	4.13	0.66
p-value	0.000 ***	0.030 *	0.542
St. Error of Estimate	45,716.37	22,353.29	25,666.90

Source: authors' calculation. significance levels: * $p \leq 0.05$, *** $p < 0.001$.

The association between profit before tax (EBIT) and foreign trade in the timber industry showed that the multiple regression model $Y = 1.35 \times 10^5 + 1.4M - 1.0X$ was only significant for exports ($p = 0.05$), as the performed *F*-test revealed. The estimated values of the parameters β imply that if the import variable is held constant, EBIT will decrease by EUR1 when exports increase by EUR1.

The coefficients of determination in Table 4 Indicate that a given multiple regression model explains low proportions of variations in economic indicators for changes in exports and imports in the industry: 22.5% in revenue, 5.7% in added value, and 22.7% in EBIT.

An *F*-test performed on the relationship between revenue and foreign trade in the Slovak furniture industry (SVK NACE 31) revealed that the multiple regression model $Y = 6.90 \times 10^5 + 0.44M - 0.22X$ was highly significant ($p = 0.000$ ***). The estimated values of the parameters β imply that if the export variable is held constant, revenue will increase by EUR0.44 when imports increase by EUR1. A EUR1 increase in exports will cause revenue to fall by EUR0.22, conditional on imports remaining unchanged.

The association between value added and foreign trade in the Slovak furniture industry showed that the multiple regression model $Y = 1.91 \times 10^5 + 0.10M - 0.10X$ was highly significant ($p = 0.030$ *), as the performed *F*-test showed. The estimated values of the parameters β imply that if the export variable is held constant, value added will increase by EUR0.10 when imports increase by EUR1. A EUR1 increase in exports will cause a decline in value added by EUR0.10, conditional on imports remaining unchanged.

An MLR analysis of profit before tax (EBIT) in the Slovak furniture industry did not reveal a statistical significance in the model $Y = 5.41 \times 10^4 - 0.02M + 0.09X$ ($p = 0.54$).

The coefficients of the MLR models in Table 6 imply that a given model explains 89% of the variation in revenue, 38% of the variation in value added, and 7% of the variation in EBIT for changes in exports and imports in the industry.

The assumptions of the linear regression models for WBI sectors in Slovakia were tested for autocorrelations, normality, and linearity. The results are shown in Table 7.

Table 7. Tests of MLR Assumptions of Slovak WBI sectors.

SVK-TI	**Revenue**	**Value Added**	**EBIT**
RESET test (*F*-stat)	2.252	0.491	7.029
RESET test (*p*-value)	−0.444	−1.100	−0.089
Jarque-Bera (Stat)	0.845	1.227	0.408
Jarque-Bera (*p*-value)	−1.133	−0.996	−1.310
Ljung-Box test (Q-Stat)	0.738	0.368	0.899
Ljung-Box test (*p*-value)	−0.725	−0.932	−0.659
SVK-FI	**Revenue**	**Value Added**	**EBIT**
RESET test (*F*-stat)	1.276	0.360	3.515
RESET test (*p*-value)	−0.252	−0.806	−0.044
Jarque-Bera (Stat)	0.479	0.900	0.204
Jarque-Bera (*p*-value)	−0.642	−0.730	−0.655
Ljung-Box test (Q-Stat)	0.418	0.270	0.449
Ljung-Box test (*p*-value)	−0.411	−0.683	−0.329

Source: authors' calculation.

According to the results of the Ramsey RESET test, there is no sign of misspecifications and the linear model fits the specification of the regression models. The results of the Jarque-Bera test confirmed the normal distribution of the sample data in each MLR model. The Ljung-Box autocorrelation test showed that in correlation equations no autocorrelations exist.

The results of the linear multivariate regression in the Czech timber and furniture industries are presented in Tables 8–11.

Table 8. Linear Multiple Regression of the Czech timber industry (NACE 16).

Revenue on IM and EX (*i* = 0, 1, 2)	β_i	β_I **(Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	2052.92	329,317.2	6.23	0.000 ***
Import (β_1)	2	0.8	2.07	0.072
Export (β_2)	−0.1	0.6	−0.157	0.881
Value Added on IM and EX (*i* = 0, 1, 2)	β_i	β_I **(Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	462,623.4	123,365.2	3.751	0.006 **
Import (β_1)	0.9	0.3	2.71	0.027 *
Export (β_2)	−0.1	0.2	−0.621	0.551
EBIT on IM and EX (*i* = 0, 1, 2)	β_i	β_I **(Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	−29,801.0	62,572.19	−4.76	0.001 **
Import (β_1)	1	0.16	4.76	0.001 **
Export (β_2)	0.02	0.11	0.36	0.727

Source: authors' calculation. significance levels: * $p \leq 0.05$, ** $p \leq 0.01$, *** $p < 0.001$.

Table 9. MLR Models Summary of the Czech timber industry (NACE 16).

MLR Model Summary–CZ16	**Revenue**	**Value Added**	**EBIT**
Multiple *R*	0.87	0.89	0.98
Multiple R^2	0.75	0.79	0.959
Adjusted R^2	0.689	0.737	0.943
F-test	12.08	14.99	84.49
p-value	0.004 **	0.002 **	0.000 ***
St. Error of Estimate	119,486.87	44,760.86	22,703.46

Source: authors' calculation. significance levels: ** $p \leq 0.01$, *** $p < 0.001$.

Table 10. Linear Multiple Regression of the Czech furniture industry (NACE 31).

Revenue on IM and EX (*i* = 0, 1, 2)	**β_i**	**β_I (Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	1,196,870	27,731.30	43.16	0.000 ***
Import (β_1)	0.03	0.07	5.39	0.001 **
Export (β_2)	−0.02	0.04	−5.19	0.001 **
Value Added on IM and EX (*i* = 0, 1, 2)	**β_i**	**β_I (Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	379,934.3	7044.49	53.94	0.000 ***
Import (β_1)	0.1	0.02	7.86	0.000 ***
Export (β_2)	−0.1	0.01	−7.73	0.000 ***
EBIT on IM and EX (*i* = 0, 1, 2)	**β_i**	**β_I (Std. Error)**	***t*-Test**	***p*-Value**
Intercept (β_0)	62,903.15	6105.04	10.30	0.000 ***
Import (β_1)	0.08	0.01	5.78	0.000 ***
Export (β_2)	−0.05	0.01	−5.76	0.000 ***

Source: authors' calculation. significance levels: ** $p \leq 0.01$, *** $p < 0.001$.

Table 11. MLR Models Summary of the Czech furniture industry (NACE 31).

MLR Model Summary–CZ31	**Revenue**	**Value Added**	**EBIT**
Multiple *R*	0.89	0.94	0.90
Multiple R^2	0.80	0.89	0.81
Adjusted R^2	0.747	0.858	0.759
F-test	15.76	31.15	16.74
p-value	0.002 **	0.000 ***	0.001 **
St. Error of Estimate	62,396.39	15,850.33	13,736.54

Source: authors' calculation. significance levels: ** $p \leq 0.01$, *** $p < 0.001$.

The multivariate regression analysis of revenue in the Czech timber industry (CZ NACE 16) revealed that the model $Y = 2.05 \times 10^6 + 2.0M - 0.1X$ was highly significant ($p = 0.004$ **) according to the performed *F*-test. The estimated values of the parameters β imply that if the export variable remains constant, revenue will increase by EUR0.9 when imports increase by EUR1. A EUR1 increase in exports will cause a decline in revenue by EUR0.1 if imports are held unchanged.

An *F*-test performed on the relationship between value added and foreign trade in the Czech timber industry (CZ NACE 16) revealed that the multiple regression model $Y = 4.62 \times 10^5 + 0.90M - 0.10X$ was highly significant ($p = 0.002$ **). The estimated values of the parameters β imply that if the export variable remains constant, value added will increase by EUR0.9 when imports increase by EUR1. A EUR1 increase in exports will cause a decline in value added by EUR0.1 if imports are held unchanged.

The relationship between profit before tax (EBIT) and foreign trade in the Czech timber industry showed that the multiple regression model $Y = 2.98 \times 10^5 + 1.0M - 0.02X$ was highly significant only in relation to imports ($p = 0.000$ ***) as the performed *F*-test revealed. The estimated values of the parameters β imply that if the export variable remains constant, EBIT will increase by EUR1.0 when imports increase by EUR1. A EUR1 increase in exports will cause a slight decline of EBIT by EUR0.01 if imports are held unchanged.

The coefficients of determination in Table 9 indicate that a given multiple regression model explains 69% of the variation in revenue, 74% of the variation in added value, and 94% of the variation in EBIT for changes in exports and imports in the Czech timber industry.

The multivariate regression analysis in the Czech furniture industry (CZ NACE 31) showed a high statistical significance for all economic indicators.

The relationship between revenue and imports and exports in the Czech furniture industry showed that the multiple regression model $Y = 1.19 \times 10^6 + 0.03M - 0.02X$ was highly significant ($p = 0.002$ **) as the performed *F*-test revealed. The estimated values of the parameters β imply that if the export variable remains constant, revenue will increase

by EUR0.03 when imports increase by EUR1. A EUR1 increase in exports will cause a decline in revenue of EUR0.02 if imports are held unchanged.

An *F*-test performed on the association between value added and exports and imports revealed that the multiple regression model $Y = 3.80 \times 10^5 + 0.10M - 0.10X$ was highly significant ($p = 0.000$ ***). The estimated values of the parameters β imply that if the export variable remains constant, value added will increase by EUR0.1 when imports increase by EUR1. A EUR1 increase in exports will cause a decline in value added of EUR0.1 if imports are held unchanged.

An MLR analysis of EBIT in the Czech furniture industry and an *F*-test showed that the model $Y = 6.29 \times 10^4 + 0.08M - 0.05X$ was highly significant ($p = 0.001$ **). The estimated values of the parameters β imply that if the export variable remains unchanged, EBIT will increase by EUR0.08 when imports increase by EUR1. A EUR1 increase in exports will cause a decline in EBIT of EUR0.05 if imports remain constant.

The coefficients of determination in Table 11 indicate that a given multiple regression model explains 75% of the variation in revenue, 86% of the variation in added value, and 76% of the variation in EBIT for changes in exports and imports in the Czech furniture industry.

Linear regression models of the Czech timber and furniture sectors were tested for autocorrelations, normality, and linearity. The results are presented in Table 12.

Table 12. Tests of MLR Assumptions in Czech WBI sectors.

CZ TI	**Revenue**	**Value Added**	**EBIT**
RESET test (*F*-stat)	1.902	10.122	0.192
RESET test (*p*-value)	0.161	0.008	0.978
Jarque-Bera (Stat)	0.640	0.262	3.936
Jarque-Bera (*p*-value)	0.583	0.261	0.286
Ljung-Box test (Q-Stat)	0.349	0.812	0.035
Ljung-Box test (*p*-value)	0.437	0.497	0.988
CZ FI	**Revenue**	**Value Added**	**EBIT**
RESET test (*F*-stat)	1.343	9.490	0.104
RESET test (*p*-value)	−0.113	−0.005	−0.606
Jarque-Bera (Stat)	0.452	0.164	2.120
Jarque-Bera (*p*-value)	−0.412	−0.164	−0.154
Ljung-Box test (Q-Stat)	0.256	0.500	0.019
Ljung-Box test (*p*-value)	−0.308	−0.311	−0.608

Source: authors' calculation.

Statistical test of autocorrelation in a time series (the Ljung Box test) revealed that data values are independent in both sectors, no order of autocorrelation exists. The Jarque-Bera normality test showed the normal distribution of the residuals in MLR equations. The Ramsey RESET test confirmed that the applied linear regression model is a correct form of specification, no significant nonlinear relationships exist in revenue and EBIT.

4.3. Contribution of Foreign Trade to Industry Economic Performance

This part of the study is the investigation of the impact of foreign trade on industry performance in particular sectors of the wood processing industry through the indicator of the Contribution of Foreign Trade Index (CFT) and RCA index. The growth rates of exports, imports and net exports representing their development trends were calculated and compared to CFT indicators, so that the impact of trade balance flows on economic indicators could be explained. The results of the Slovak timber and furniture industries are shown in Table 13, and Table 14 presents the results in Czech industries.

Table 13. Contribution of Foreign Trade to the economy of the timber and furniture sectors in Slovakia.

Indicator	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
SVK NACE 16										
Growth rate of export (%)	−13.80	0.70	6.24	−2.62	0.33	7.82	6.86	13.40	10.12	−2.75
Growth rate of import (%)	10.94	−8.08	14.39	1.88	−6.53	8.21	7.02	4.83	9.24	2.19
Growth rate of net export (%)	−50.90	30.47	−13.21	−16.75	26.75	6.70	6.39	38.23	12.04	−13.35
RCA	0.27	0.36	0.23	0.19	0.25	0.27	0.27	0.40	0.38	0.38
CFT to revenue	−0.19	0.03	−0.02	−0.02	0.03	0.01	0.01	0.05	0.02	−0.02
CFT to value added	−0.91	0.09	−0.06	−0.10	0.14	0.03	0.03	0.25	0.10	−0.11
CFT to EBIT	−7.20	0.13	−0.10	−0.17	0.24	0.06	0.06	0.51	0.19	−0.21
SVK NACE 31										
Growth rate of export (%)	6.27	6.24	3.70	9.66	4.37	7.60	7.40	6.78	9.94	−6.83
Growth rate of import (%)	16.76	19.55	10.63	−0.93	7.50	37.12	26.77	5.25	22.66	12.19
Growth rate of net export (%)	−11.21	−22.91	−19.82	59.32	−4.76	−89.49	−823.4	−4.70	−115.5	−83.00
RCA	0.39	0.26	0.15	0.25	0.21	−0.01	−0.17	−0.10	−0.24	−0.37
CFT to revenue	−0.05	−0.08	−0.05	0.12	−0.01	−0.24	−0.21	0.01	−0.19	−0.28
CFT to value added	−0.19	−0.27	−0.17	0.47	−0.06	−1.16	−0.96	0.03	−0.74	−1.38
CFT to EBIT	−0.90	−0.81	−0.48	2.35	−0.19	−11.74	−6.39	0.13	−2.84	209.62

Source: authors' calculation based on data from Eurostat and the Slovak Statistical Office.

Table 14. Contribution of Foreign Trade to the economy of the timber and furniture sectors in Czechia.

Indicator	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
CZ NACE 16										
Growth rate of export (%)	12.99	7.48	0.29	3.77	5.71	0.33	0.03	5.85	13.70	−3.51
Growth rate of import (%)	4.59	3.75	4.11	−3.29	8.42	7.16	7.17	11.97	8.49	5.20
Growth rate of net export (%)	23.30	11.36	−3.42	11.15	3.24	−6.20	−7.77	−1.90	21.26	−14.80
RCA	0.62	0.64	0.57	0.62	0.59	0.54	0.45	0.45	0.48	0.38
CFT to revenue	0.04	0.02	−0.01	0.02	0.01	−0.01	−0.02	0.00	0.04	−0.03
CFT to value added	0.13	0.08	−0.02	0.08	0.03	−0.05	−0.06	−0.01	0.13	−0.10
CFT to EBIT	0.57	0.32	−0.10	0.34	0.10	−0.16	−0.17	−0.03	0.34	−0.21
CZ NACE 31										
Growth rate of export (%)	17.67	12.56	1.06	15.80	10.45	9.31	10.49	15.31	−2.20	0.29
Growth rate of import (%)	−5.22	13.76	6.97	12.06	24.63	25.78	20.01	14.29	2.30	3.25
Growth rate of net export (%)	62.89	11.18	−5.89	20.80	−7.13	−18.11	−13.85	18.93	−17.59	−12.28
RCA	0.58	0.55	0.45	0.47	0.34	0.22	0.12	0.19	0.12	0.08
CFT to revenue	0.25	0.07	−0.04	0.13	−0.06	−0.13	−0.08	0.09	−0.09	−0.05
CFT to value added	0.78	0.22	−0.13	0.42	−0.18	−0.43	−0.24	0.27	−0.27	−0.15
CFT to EBIT	7.61	1.66	−0.87	2.58	−1.02	−1.97	−1.07	1.07	−1.08	−0.65

Source: authors' calculation based on data from Eurostat and MIR CR.

The following findings result from the data in Table 13. The timber industry in Slovakia had much lower imports than exports of products. The RCA index demonstrated a comparative advantage of the timber industry and its rising trend since 2014. The values of CFT revealed that net exports declined in 2010, 2012, 2013 and 2016 (due to the growth in imports and decrease in exports) causing a fall in added value and EBIT. The growth of the trade balance (due to the increase in imports and exports) had a positive impact with an increase in value-added and EBIT. However, net exports only slightly affect revenue. Changes in net exports significantly influenced EBIT and moderately influenced value added in the furniture industry. Positive effects on the performance of furniture products were observed in a trade balance surplus if the net export grew due to a higher increase in exports and decline in imports. If imports grew faster than exports, performance was affected negatively.

The negative trade balance and its increasing trend in the last two years had a high negative effect on economic performance, especially on profit. The small changes in net exports had only a slight impact on revenue and value added. The Slovak furniture sector has lost a comparative advantage due to the negative values of the RCA index since 2015.

The analysis of the Czech timber and furniture sectors in Table 14 brought similar results to the Slovak industry. The RCA index values demonstrated a comparative advantage of the timber and furniture industries in Czechia at the national level, but while a growth trend in the timber industry was noticed, the furniture industry is gradually

losing its advantage. The same finding was that net exports do not influence revenue in the timber sector. Net exports had a strong effect on profit in the timber industry. Value added was influenced at a moderate level with a growth trend. The net export growth due to a higher increase in exports than in imports improved economic results, significantly for EBIT and slightly for value added. In the years 2012 and 2015–2017, when net exports fell due to a higher increase in imports than in exports, the effect on performance was negative. CFT indicators in the furniture sector showed that net export positively affected EBIT to 2013 and after this year the effect gradually decreased to a negative one. The most positive effects of net exports on value-added and profit were observed in 2010, 2011 and 2013 when the net export growth was the highest due to faster growth in exporting than in importing. The net export decline in 2018 due to a drop in exports influenced value added and profit negatively.

4.4. Verification of Research Propositions

Based on the results achieved the research propositions stated as the objective of the study can be verified:

Verification of Proposition 1. The export of high value-added wood products affects the economic performance of the sector positively.
The higher value-added rate was in the furniture industry. The identified MLR models revealed that exports had a significant impact in the opposite direction on revenue and added value in the furniture sector of Slovakia and on all economic indicators in the Czech Republic, if imports held constant. However, negative changes in economic indicators caused by exports are small. CFT indicators revealed a positive effect of export growth by simultaneous growth in imports that was smaller than export growth. The export growth affected EBIT and value added of the furniture sector in both countries positively.
Proposition 1 was confirmed by the simultaneous growth of exports and imports.

Verification of Proposition 2. The export of low value-added wood products has a negative impact on the economic performance of the sector.
The statistical MLR models did not prove a significant impact from exports on the economic indicators of the timber sector in both countries if imports remain unchanged. The values of CFT indices demonstrated that export growth, against simultaneous but smaller growth in imports, in the Czech and Slovak timber industries caused a significant increase in EBIT and value added, while revenue was affected only slightly.
Proposition 2 was not confirmed.

Verification of Proposition 3. The import of low value-added wood-based products influences the performance of the sector positively.
According to the identified multivariate regression models, imports in the timber industry have a significant positive impact on added value and EBIT in the Czech Republic and slightly on revenue in Slovakia if exports remain the same. The CFT indicators revealed a positive impact of imports on the economic indicators of the industry only if imports increase less than exports.
Proposition 3 was confirmed only for the Czech Republic.

Verification of Proposition 4. Net export growth has a positive effect on the economic indicators of the wood-based sectors regardless of the value-added rate.
The CFT indicators uncovered that net export growth has a strong impact on the increase in EBIT and added value, and slightly affects revenue if imports grow less than exports of timber and furniture products. The stronger positive effect on profit was seen in a decrease in imports of furniture products in Czechia and Slovakia.
Proposition 4 was confirmed.

5. Discussion

Multiple linear regression models examining the relationships between imports, exports and three economic indicators of the timber and furniture industry in the Slovak and Czech Republics showed that the direction of the impact on the economic indicators is the same for imports and the opposite for exports.

The multiple regression results are valid under the "ceteris paribus" condition, that is, if the other independent variable remains constant. In fact, the foreign trade balance has been changing due to simultaneous changes in both flows; imports and exports. These dynamics are considered by the CFT indicators, which were able to reveal the impact of a change in the trade balance, so-called net exports, on the economic indicators of the sectors.

According to the MLR results, only imports have a significant influence in the timber industry, on sales in Slovakia and on profit and value added in Czechia. In the timber industries of both countries, the MLR analysis did not confirm any influence on exports.

The CFT indicators showed that, in the timber industry, a reduction in net exports due to a decrease in exports or an increase in imports has a significant impact on EBIT, a slightly negative impact on value added and almost no impact on revenue. The positive impact of foreign trade on the economy was confirmed in the case of net export growth. Exports of timber products do not show a significant negative impact on the economic performance of the industry, except when import growth exceeds export growth and net exports decline. In the Czech and Slovak Republics, the export of timber products brings a significant increase in profit. A positive effect of the growth in imports on economic performance through value added and profit in the timber industry of both countries was revealed. It can be stated that the import of timber products supports their export as does the economic performance of the industry. The findings were confirmed in the previous works of authors [21,50]. The analysis of the period 2002–2012 showed that export growth affected the industry's economy positively in the Czech Republic but negatively in the Slovak Republic. In addition, the same results were found for the common wood-based industry in the recent study by authors [54].

The high and growing level of comparative advantage in the timber industry in the Slovak Republic is related to the growth of exports, which is also reflected in the high return on sales (ROS), that is two to three times higher than in the furniture sector, which generates a higher level of added value. The high export of wood and semi-finished wood products in both the Slovak and Czech Republics is due to long-term contracts with foreign trading partners, according to a study by Toth et al. [37]. This situation was also confirmed by the analysis by Bojnec and Ferto [35]. According to Loučanová [39], foreign trade in wood semi-finished products is also intensive due to easier access to foreign markets and more favorable trading conditions. However, our findings do not correspond with the results of the work of Michal et al. [38] and Keegan et al. [41], which argue that WBI economic growth implies the export of high value-added products, which is similarly confirmed by the results of a study in Russia [42].

It can be concluded that foreign trade contributes to the improvement in the economic performance of the timber sector if import growth is lower than export growth or if imports are declining. However, this also means that lower value-added products bring higher economic benefits when exported than when further processed in the country of origin. The benefits of foreign trade in terms of the principles of the Heckscher–Ohlin theory, presented in [7], are thus not confirmed for the timber sector in both countries.

According to MLR analysis, the economic performance of the furniture industry is strongly influenced positively by imports and negatively by exports in both countries. The strongest impact was found in the Czech furniture industry. There is a moderate impact on revenue and value added in the Slovak furniture sector, but no impact on EBIT.

CFT indicators showed that in the furniture sector of both countries, the decline in imports and thus the increase in net exports had a significant positive impact on the growth of revenues and value added. The most pronounced effect of imports is observed for EBIT when imports fall or if the increase in imports is smaller than the increase in exports

and net exports rise. This corresponds with the findings in the V4 countries according to the study by Gauger and Sledziewska [14]. However, during the period under review, the furniture industry lost its comparative advantage due to a negative trade balance because of the growth in imports in Slovakia and the decline in exports in Czechia. A negative trade balance of the Slovak furniture industry from 2016 had a negative impact on economic performance, especially on profit. The negative net exports are also likely to be the reason for the lower profitability of furniture enterprises compared to timber enterprises, even though they achieve a higher level of value added. The growth in net exports improved the economic results of the furniture sector. It was also revealed that the import of furniture products led to increased exports. It can be stated that trade in furniture products in Slovakia and Czechia brings higher economic performance to the sector than the export of manufactured furniture. The same results were obtained in a study by Erkan and Aybudak [32]. The findings in the furniture sector are consistent with the claims in Michal et al. [38] that manufacturers of higher value-added products, due to the necessity of purchasing imported inputs, lose competitive advantages in foreign markets and their economic performance declines.

The positive effects of export growth and a positive trade balance on macroeconomic performance have been confirmed in studies analyzing China and other Asian and African countries [4–6,10,12,55], but refuted in the work by Belloumi and Alshehry [2] in an analysis of Saudi Arabia over a long-time horizon of 50 years, and in an analysis of economically strong EU countries by Blavasciunaite et al. [9]. The positive impact of net export growth on the economy of the wood-based sectors in the Slovak and Czech republics has been revealed since the year 2000, as the previous works of authors [21,50,54] showed.

The export of raw materials and semi-finished wooden products still prevails, and neither examined countries utilizes wood as a raw material so intensely that the positive impacts of international trade are manifested. We can agree with Bojnec and Ferto [30] that forest-based industry management should focus on better quality and greater trade competitiveness in the vertical wood-industry supply chains from lower to higher value added.

A higher comparative advantage for semi-finished products is accompanied by the negative influence of foreign trade on the economy of the sector creating a higher value added. According to [56], the Slovak and Czech Republics would have different policy priorities in terms of improving export quality. In the SR and CR, the economic performance would be improved mainly by the growth in furniture exports, which were lower than imports in the last three years of the analyzed period. This would increase profitability and the level of value added, and the furniture sector would regain its comparative advantage. The direct linear relationship between the amount of value-added generated and RCA was confirmed by the study by Marcato et al. [20].

6. Conclusions

The results of the presented study showed that analyzing the interactions between foreign trade and economic performance is important in researching the factors influencing the economic development of countries and industries. The effects of foreign trade on wood-based industries with different levels of value-added creation were investigated using a statistical method over a period of 11 years in 2 EU countries. The contribution of this paper to the development of current knowledge can be the carrying out of an analysis at the industry level and the use of a combination of statistical methods with the calculation of indicators measuring the impact of foreign trade on the economy of the industry. The specific indicators proposed have complemented the statistical findings with a more accurate and in-depth analysis of the impact of changes in the overall trade balance on the economic performance of the sectors.

An ambition of developed countries is to achieve the best possible valorization of home resources instead of doing business with resources. In the timber industry of both countries, exports have not been shown to have a statistically significant impact on the sector's economy. Nevertheless, the trade balance is positive and net exports are growing.

It can be concluded that the high intensity of foreign trade brings higher profits to timber traders than to domestic producers. The furniture industry benefits from imports, which mainly bring higher sales and a slight increase in value added, without having an impact on EBIT. Furniture manufacturing could increase its economic performance by a decrease in imports and an increase in exports. A negative trade balance in the Slovak furniture sector has had a negative impact on its economic performance.

The economic development of WBI in the Slovak and Czech Republics can be achieved by more intensive use of domestic wood as a raw material and its higher valorization. Although the results of the study showed that the comparative advantage is achieved by the lower value-added sector and the growth of imports contributes to the economic performance of this sector, the processing of imported wood semi-finished products in the furniture sector reduces the competitiveness of the higher value-added products as well as the economic growth of the furniture industry.

Positive effects of foreign trade on the economy of the two WBI sectors under study can be achieved if export growth is higher than import growth and the balance of foreign trade is positive with an increasing trend. Imports are also important for the WBI economy; their growth contributes to the growth of output and value added in the downstream wood-based industries with the production of higher value-added final products.

The findings of the study lead to recommendations for practitioners and economic policy makers in both surveyed countries. The proposed measures for policymakers that would contribute to increasing the economic performance and competitiveness of WBI in the Slovak and Czech Republic are as follows:

- Support for domestic wood processors and furniture manufacturers by giving priority to the supply of input materials (wood and semi-finished wood products). The governments should adopt a measure to allow the export of timber and semi-finished wood products only after domestic demand has been met.
- Promotion of furniture exports: government measures and instruments should encourage furniture companies to enter foreign markets, through more intensive pro-export financial instruments.
- Creating more favorable conditions and advantages for domestic producers of lower value-added products than for traders in terms of legislative and financial instruments.
- Encouraging the import of semi-finished wood products only if demand by domestic processors for further processing is insufficiently met. The governments should take measures to restrict imports for the purpose of re-export without valorizing the imported wood products by further processing and thus obtaining higher economic benefits.
- Focus economic policy measures on improving the conditions for innovation in the wood-based industries and on improving the quality of exports in the structure of exported wood products.

The regulation of foreign trade in wood as a raw material and semi-finished wood products can be implemented by setting import and export quotas, which would represent the excess of domestic supply over domestic demand. The same approach can be applied at EU level, whereby an embargo on the export of wood as a raw material to non-EU countries can be placed under the common trade policy. The effects of the proposed measures will be reflected in an increase in the commercial competitiveness of the furniture industry and an increase in value added and EBIT in all wood-based industries.

The limitations of the study can be characterized as follows. Shorter time series (periods shorter than 20 years) do not allow the use of some dynamic models of econometric analysis. The timber sector has a long-term (more than 20 years) active trade balance, which did not allow the evaluation of the impact of the negative balance of foreign trade on the economic indicators of the sector.

Future research will be directed to the examination of export quality and specific tools of economic policy towards the economic development of the timber and furniture manufacturing sectors.

Author Contributions: Conceptualization, methodology, validation, investigation, writing—original draft preparation, review and editing A.J.S.; Validation, data curation, K.M.; Formal analysis, resources, V.K. All authors have read and agreed to the published version of the manuscript.

Funding: This paper is supported by project No. 1/0333/22 under the VEGA agency, Slovakia.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data supporting the reported results can be found in official statistical databases Eurostat (https://ec.europa.eu/eurostat/web/international-trade-in-goods/data/focus-on-enterprise-characteristics-tec, accessed on 25 September 2022), Slovak statistical Office (http://datacube.statistics.sk/#!/view/sk/VBD_SLOVSTAT/nu2056rs/v_nu2056rs_00_00_00_sk, accessed on 30 August 2022) and Ministry of Industry and Trade of the Czech Republic (https://www.mpo.cz/cz/panorama-interaktivni-tabulka.html, accessed on 4 September 2022).

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Afonso, Ó. The Impact of International Trade on Economic Growth. In *Working Paper nº 106*; Faculdade de Economia do Portol: Porto, Portugal, 2001.
2. Belloumi, M.; Alshehry, A. The Impact of International Trade on Sustainable Development in Saudi Arabia. *Sustainability* **2020**, *12*, 5421. [CrossRef]
3. Were, M. Differential effects of trade on economic growth and investment: A cross-country empirical investigation. *J. Afr. Trade* **2015**, *2*, 71–85. [CrossRef]
4. Kong, Q.; Peng, D.; Ni, Y.; Jiang, X.; Wang, Z. Trade openness and economic growth quality of China: Empirical analysis using ARDL model. *Financ. Res. Lett.* **2020**, *38*, 101488. [CrossRef]
5. Lin, S. Foreign Trade and China's Economic Development: A time-series analysis. *J. Econ. Dev.* **2000**, *25*, 145–153.
6. Sun, P.; Heshmati, A. International Trade and Its Effects on Economic Growth in China. IZA Discussion Papers 5151, Institute for the Study of Labor (IZA), Bonn. 2010. Available online: https://ssrn.com/abstract=1667775 (accessed on 15 January 2021).
7. Enu, P.; Havi, E.D.K.; Hagan, E. The Impact of Foreign Trade on Economic Growth in Ghana (1980–2012). *Int. J. Acad. Res. Econ. Manag. Sci.* **2013**, *2*, 174–191. [CrossRef]
8. Winters, L.A.; Masters, A. Openness and growth: Still an open question? *J. Int. Dev.* **2013**, *25*, 1060–1070. [CrossRef]
9. Blavasciunaite, D.; Garsviene, L.; Matuzeviciute, K. Trade Balance Effects on Economic Growth: Evidence from European Union Countries. *Economies* **2020**, *8*, 54. [CrossRef]
10. Makhmutova, D.I.; Mustafin, A.N. Impact of International Trade on Economic Growth. *Int. J. Sci. Study* **2017**, *5*, 140–144.
11. Hobbs, S.; Paparas, D.E.; AboElsoud, M. Does Foreign Direct Investment and Trade Promote Economic Growth? Evidence from Albania. *Economies* **2021**, *9*, 1. [CrossRef]
12. Reppas, P.A.; Christopoulos, D. The export-output growth nexus: Evidence from African and Asian countries. *J. Policy Model.* **2005**, *27*, 929–940. [CrossRef]
13. Cetin, M. The Impact of Energy Consumption, Trade Openness and Financial Development on Economic Growth: Empirical Evidence from Turkey (1980–2014). *Eur. J. Econ. Stud.* **2016**, *18*, 459–469.
14. Gauger, I.; Sledziewska, K. Is a model of comprehensive regionalism trade increasing for V4 countries? Sectoral approach. *Prague Econ. Pap.* **2018**, *27*, 21–39. [CrossRef]
15. Breda, E.; Cappariello, R.; Zizza, R. Measures the external trade impulse to economic growth: How relevant is the internalization of production? In Proceedings of the 16th International Input-Output Conference, Istanbul, Turkey, 2–6 July 2007; pp. 1–28.
16. Hajnovičová, V. *Measuring Influence of Foreign Trade on Economic Growth of SR*; Working Papers No 8; Štatistický ústav SAV: Bratislava, Slovakia, 2008.
17. Coronado, C.J.; McConnell, E.; Matthews, S.N. Economic impacts of timber product outputs in Ohio across timber market regions. *BioResources* **2014**, *9*, 7579–7592. [CrossRef]
18. Mandras, G.; Salotti, S. An Input–Output Analysis of Sectoral Specialization and Trade Integration of the Western Balkans Economies. *Economies* **2020**, *8*, 93. [CrossRef]
19. Lábaj, M.; Luptáčik, M.; Rumpelová, D. Structural connections of the Slovak economy based on input-output analysis. *Econ. J.* **2008**, *56*, 745–763.
20. Marcato, M.; Baltar, C.; Sarti, F. International competitiveness in a vertically fragmented production structure: Empirical challenges and evidence. *Econ. Bull.* **2019**, *39*, 876–893.
21. Sujová, A.; Michal, J.; Kupčák, V.; Dudík, R. The Impact of International trade to the Growth of Forest-Based Sector in the Czech and Slovak Republics. *BioResources* **2016**, *12*, 1102–1111. [CrossRef]
22. Kupčák, V.; Pek, R. The level of the wood raw material base processing in the Czech Republic. *Procedia Econ. Financ.* **2015**, *34*, 557–564. [CrossRef]

23. Carvalho, K.H.A.; Silva, M.L.; Soares, N.S. Competitiveness of Brazilian wood pulp in the international market. *Cerne* **2009**, *15*, 383–390.
24. Hajdúchová, I.; Hlaváčková, P. Influence of global economy on forest-based sector in the Czech and Slovak Republic. *Acta Fac. Xylologiae* **2014**, *56*, 135–146.
25. Han, X.; Wen, Y.; Kant, S. The global competitiveness of the Chinese wooden furniture industry. *For. Policy Econ.* **2009**, *11*, 561–569. [CrossRef]
26. Sujová, A.; Hlaváčková, P.; Marcineková, K. Evaluating the competitiveness of wood processing industry. *Drv. Ind.* **2015**, *66*, 281–288. [CrossRef]
27. Wanat, L.; Lis, W. International competitiveness of the Polish wood industry from the mesoeconomic perspective. *Transf. Inovácií* **2012**, *23*, 7–12.
28. Zhang, J.; Ebbers, H.; Mulder, R. Competitiveness of Chinese industries—A comparison with the EU. *Rev. Eur. Stud.* **2012**, *4*, 203–209. [CrossRef]
29. Verter, N.; Grega, L. Export performance and competitiveness in wood products in the Czech Republic and Austria. *Ekon. Pregl.* **2019**, *70*, 743–764. [CrossRef]
30. Bojnec, Š.; Ferto, I. Forestry industry trade by degree of wood processing in the enlarged European Union countries. *For. Policy Econ.* **2014**, *40*, 31–39. [CrossRef]
31. Hamulczuk, M.; Pawlak, K. Determinants for international competitiveness of the food industry in 43 countries worldwide: Evidence from panel models.Equilibrium. *Q. J. Econ. Econ. Policy* **2022**, *17*, 635–667. [CrossRef]
32. Erkan, B.; Aybudak, H.G. South Korea's competitiveness on the basis of factor density and technology equipment in terms of contribution to trade balance. *Idea Stud. J.* **2020**, *6*, 832–840. [CrossRef]
33. Pawera, R.; Vojtech, F.; Levický, M.; Filip, S. Effects and motivation of political—Economic cooperation between two countries: A case study of Slovakia and Austria. *Entrep. Sustain. Issues* **2020**, *8*, 454–470. [CrossRef]
34. Stefanovic, S.; Cvejic, R.; Kostic, D. Functions that causative affects to the implementation of Reengineering from the aspect of general financial parameters. *Metal. Int.* **2013**, *18*, 240–246.
35. Bojnec, Š.; Ferto, I. Trade in raw and semi-finished wood products of Hungary and Slovenia with Austria. *J. For. Sci.* **2011**, *128*, 157–176.
36. United Nations Economic Commission for Europe. Austrian Market Report 2017. Available online: https://bit.ly/2yx0XKz (accessed on 25 August 2022).
37. Toth, D.; Maitah, M.; Maitah, K.; Jarolínová, V. The Impacts of Calamity Logging on the Development of Spruce Wood Prices in Czech Forestry. *Forests* **2020**, *11*, 283. [CrossRef]
38. Michal, J.; Brezina, D.; Šafarík, D.; Babuka, R. Sustainable Development Model of Performance of Woodworking Enterprises in the Czech Republic. *Forests* **2021**, *12*, 672. [CrossRef]
39. Loučanová, E.; Paluš, H.; Dzian, M. A Course of Innovations in Wood Processing Industry within the Forestry-Wood Chain in Slovakia: A Q Methodology Study to Identify Future Orientation in the Sector. *Forests* **2017**, *8*, 210. [CrossRef]
40. Slavova, P. Trends in business processes management in the furniture industry in Bulgaria. *SHS Web Conf.* **2021**, *120*, 02012. [CrossRef]
41. Keegan, D.; Kretschmer, B.; Elbersen, B.S.; Panoutsou, C. Cascading use: A systematic approach to biomass beyond the energy sector. *Biofuels Bioprod. Biorefining* **2013**, *7*, 193–206. [CrossRef]
42. Gordeev, R. Comparative advantages of Russian forest products on the global market. *For. Policy Econ.* **2020**, *119*, 102286. [CrossRef]
43. Vu, T.T.H.; Tian, G.; Khan, N.; Zada, M.; Zhang, B.; Nguyen, T.V. Evaluating the International Competitiveness of Vietnam Wood Processing Industry by Combining the Variation Coefficient and the Entropy Method. *Forests* **2019**, *10*, 901. [CrossRef]
44. Schier, F.; Iost, S.; Seintsch, B.; Weimar, H.; Dieter, M. Assessment of Possible Production Leakage from Implementing the EU Biodiversity Strategy on Forest Product Markets. *Forests* **2022**, *13*, 1225. [CrossRef]
45. Nazarczuk, J.M.; Umiński, S.; Gawlikowska-Hueckel, K. The Role of Specialization in the Export Success of Polish Counties in 2004–15. *Entrep. Bus. Econ. Rev.* **2018**, *6*, 91–109. [CrossRef]
46. European Commission. EUROSTAT Statistics Database. Available online: http://epp.eurostat.ec.europa.eu/ (accessed on 25 September 2022).
47. Eurostat, NACE Rev. 2 Statistical Classification of Economic Activities in the European Community. Methodologies and Working Papers. Luxembourg: Office for Official Publications of the European Communities, 2008. Available online: https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF.pdf/dd5443f5-b886-40e4-920d-9df03590ff91?t=1414781457000 (accessed on 26 April 2023).
48. Statistical Office of the Slovak Republic. Database Slovstat. Available online: http://slovak.statistics.sk (accessed on 30 August 2022).
49. Ministry of Industry and Trade of the Czech Republic. Panorama of Manufacturing Industry. Available online: https://www.mpo.cz/cz/panorama-interaktivni-tabulka.html (accessed on 5 September 2022).
50. Sujová, A.; Hlaváčková, P.; Marcineková, K. Measuring the impact of foreign trade on performance of the wood processing industry. *Wood Res.* **2015**, *60*, 49–501.
51. Gujarati, D.N. *Basic Econometrics*; McGraw-Hill: New York, NY, USA, 2003.
52. Greene, W.H. *Econometric Analysis*; Prentice Hall: Hoboken, NJ, USA, 2003.

53. Aiginger, K.; Landesmann, M. *Competitive Economic Performance: The European View. WIFO Working Papers 179/2002*; Austrian Institute of Economic Research (WIFO): Vienna, Austria, 2002.
54. Sujová, A.; Simanová, Ľ.; Schmidtová, J.; Lukáčiková, A.; Kupčák, V. Effects of Foreign Trade on the Economic Performance of Industries—Evidence from Wood Processing Industry of Czechia and Slovakia. *Economies* **2021**, *9*, 180. [CrossRef]
55. Awokuse, T. Causality between exports, imports, and economic growth: Evidence for transition economies. *Econ. Lett.* **2007**, *94*, 389–395. [CrossRef]
56. Rahman, J.; Stepanyan, A.; Yang, J.; Zeng, L. *Exports in a Tariff-Free Environment: What Structural Reforms Matter? Evidence from the European Union Single Market*; IMF Working Paper WP/15/187; IMF: Washington, DC, USA, 2015; 38p.