Export Complexity and Economic Growth: Empirical Analysis for Selected CEE Countries

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Abstract

The principal objective of the paper is to test the hypothesis that export sophistication (complexity) rather than the volume of exports has a more robust impact on economic growth. We applied a dynamic panel specification model (system GMM) to a sample of 22 selected CEE countries in the 2009–2019 period. Estimated research results suggest that export still plays a significant role in determining economic growth in these countries. However, the analysis shows that export sophistication (complexity) has a predominant role in stimulating economic growth for the observed sample of countries. In addition to the main focus of the paper, estimated results show that FDI inflows have a positive and statistically significant direct and indirect impact on economic growth. Moreover, the results indicate that, apart from the direct effects of export sophistication

on economic growth, it has an additional positive effect on export performance through structural transformation. When comparing the impact of export sophistication on economic growth, the difference between EU and non-EU economies seems to be mostly insignificant.

Keywords: export complexity, economic growth, GMM panel regression, CEE countries

JEL classification: F1, O1, R1, O10, O57

1 Introduction

The importance of manufacturing goods export sophistication for economic growth has increased over time. According to recent literature about export sophistication and economic growth, the countries which based their export basket predominantly on highly sophisticated products with higher added value will perform better. Schott (2008) explored export sophistication of China, USA, and other OECD members by applying a comparative approach, while Wang and Wei (2008) investigated the main determinants of China's export sophistication improvements. Additionally, Al-Marhubi (2010) presented empirical evidence that export diversification promotes economic growth for a group of selected developing countries, while Trinh and Thuy (2021) empirically investigated the non-linear relationship between export diversification and economic growth in 44 emerging markets and developing economies, supporting the thesis that export is important for long-term economic growth. Yuni, Urama, Ugwuegbe, and Agbanike (2020) examined the relationship between the level of export diversification and economic growth by applying fixed effect and GLS regression models to Sub-Saharan African countries and found a U-shaped relationship between export concentration and economic growth. Siswana and Phiri (2021) tried to find out whether export diversification or export specialization is more powerful in stimulating economic growth in BRICS countries for the 1995–2017

period. They found a semi-inverted U-shaped diversification schedule, suggesting that BRICS countries should re-specialize their export structures so as to accelerate the process of economic growth.

However, there are many studies that empirically analyze the level of export complexity and economic growth for CEE countries; hence, our contribution is reflected in our efforts to investigate the link between export complexity level and economic growth for a group of selected countries from the CEE region. The majority of existing studies referring to CEE countries focus on testing the ELG (export-led growth) thesis and the relationships between export volume and economic growth. For illustration, Dritsakis (2004) analyzed export volume and economic growth for Romania and Bulgaria as CEE countries, Konya (2004) empirically tested the ELG hypothesis for Hungary among 25 OECD countries, while Awokuse (2007) examined the importance of export volume for economic growth in Bulgaria, Czech Republic, and Poland. Pop Silaghi (2009) examined the relationship and causality between export volume and economic growth for selected CEE countries by applying vector autoregressive (VAR) models in levels, in first-difference and error correction models, for the 1990–2006 period.

The primary objective of this paper is to provide empirical evidence on export performance of selected CEE countries and to answer the question of whether export sophistication has a strong influence on economic growth in this group of countries. To test the link between export sophistication (complexity) and economic growth, we have applied the dynamic panel growth model (system GMM) to 22 selected CEE countries for the 2009–2019 period, including several determinants of economic growth, such as inflation rate, FDI inflows, export volume, bank credit to private sector, and others.

The findings based on empirical work indicate that export still plays an important role in the determination of economic growth. However, the results show that export sophistication (complexity) plays a more important role in stimulating economic growth in the observed sample of countries. In addition to the main

findings related to export sophistication and economic growth, estimated results show that FDI flows have a positive and statistically significant impact on economic growth.

In addition to direct impact, there is an indirect impact that generates effects on export sophistication. Moreover, the results indicate that, apart from direct effects of export sophistication on growth, there is also an additional positive effect, recognized as the impact of structural transformation on export performance. Regarding the effects of export sophistication on economic growth, the difference between EU and non-EU economies seems to be comparatively insignificant.

The paper is structured as follows. Following the introduction, where the main objectives of the paper are presented, the sample of countries included in the empirical research is defined. Section 2 reviews empirical literature on export-lead-growth, with special focus on literature related to export sophistication and economic growth. Section 3 presents the data and model used in the empirical analysis. Section 4 discusses the estimated results of panel regression analysis and presents the robustness tests. The final section presents the main conclusions and limitations we face in conducting empirical research, as well as some directions for future research.

2 Literature Review

This section summarizes the results of the most important empirical studies analyzing export sophistication and economic growth. There are a number of studies that examine the validity of the ELG hypothesis by applying cross-country, time series, and other empirical techniques to different countries and regions, and the majority of those studies have identified a positive effect of exports on economic growth through increased economies of scale, knowledge transfer and the adoption of new modern technologies, investments, and higher production capacity utilization.

Balassa (1985) supports the ELG hypothesis and suggests that outward foreign trade orientation is beneficial for the economic growth of the semi-industrialized countries by using cross-country OLS regression for the 1973–1979 period. Fosu (1996) also supports the ELG hypothesis for the selected African countries by using the OLS regression technique for the 1960–1980 period. Kugler (1991) found positive effects of exports on economic growth for the group of industrialized countries by using time-series econometric analysis, but without strong long-run relationships. At the same time, Tang, Lai, and Ozturk (2015) found a long-run relationship between exports and GDP in the case of Four Asian Little Dragon economies. China and India are also countries that have achieved rapid economic growth by increasing export activities and internationalizing their economies (Khan, Wazir, & Akhtar, 2019), while Stiglitz (2007) found that globalization and trade have a significant positive impact on economic growth in almost all countries. Dritsakis (2004) analyzed the relationship between exports, investments, and economic development in Bulgaria and Romania and found a positive and strong causal relation between exports and economic growth.

However, export-dependent countries were vulnerable and severely affected by the global economic crisis in 2007/08, raising questions about the sustainability of export-led growth policies in these countries. At the same time, a group of papers has tried to show that export structure rather than export volume is an important determinant of economic growth. These studies focus on export complexity and export sophistication as the main drivers of long-run economic growth.

Hausmann, Hwang, and Rodrik (2007) confirmed a strong positive relationship between the level of GDP per capita and export sophistication by using panel techniques for 113 countries over the 1992–2003 period. Their research has shown that the structure of exports exhibits a strong predictive power for future economic growth. Hausmann and Klinger (2006) explored the export structure and the potential of the economy in implementing structural changes aimed at increasing export sophistication. For a group of 106 countries, they showed a statistically significant relationship between the export structure of the country

and export sophistication growth, measured as the growth of the *EXPY index*. The estimated results of the research indicate that the countries which export a wide range of sophisticated products have a greater capacity to implement structural transformation and accelerate long-term economic growth.

Hesse (2008) examined the relationship between exports concentration and economic growth using a dynamic panel model (GMM regression method) for a group of 99 countries (excluding Eastern European countries and oil-exporting countries) over a long period of time (1961–2000). The results have shown that the developing countries with a greater export concentration exhibited higher economic performance and a more dynamic economic growth, but, at the same time, they have shown that this relationship is non-linear. However, this empirical study did not attempt to explore the mechanisms through which export concentration affects economic growth *per capita* (whether this is due to the deterioration in the terms of trade for countries exporting natural resource-based products or something else).

Hausmann et al. (2007) tried to explain the main transmission mechanism between export sophistication and economic growth using the costs of new product discovery by entrepreneurs. Indeed, the entrepreneurs in countries with considerable production capabilities and complementary inputs have lower fixed costs when it comes to building up comparative advantages in the production of new products and expanding the existing export basket, as opposed to countries with limited production knowledge and a short supply chain that are stuck in the process of structural transformation.

McCann (2007) examined the composition of exports and economic growth. The research has drawn attention to exports structure rather than the value of exports as a determinant of economic growth. The author performed a detailed decomposition of the exports structure, classified into high and low technology-intensive industries and sectors, and examined the structure of exports and the level of export complexity for each country in the sample. The econometric results

using the panel method of random effects for a sample of 117 countries, over the 1980–2003 period, show that there is a positive and statistically significant correlation between export sophistication and economic growth. In addition, Hidalgo, Klinger, Barabási, and Hausmann (2007) empirically tested the hypothesis that the countries with a higher level of export sophistication have greater opportunities to diversify their exports than the countries with limited possibility to extend their export basket, as a result of a shorter list of accumulated capabilities.

Hidalgo and Hausmann (2009) tried to explain the mechanism between the structure of exports (the country's position in the product space) and economic growth by applying network theory. They have provided a useful framework and analytical approach for analyzing export sophistication and the complexity of each country, as well as the cost of creating new and adopting the existing capabilities (human and physical capital, institutions, infrastructure, organizational and business practices) needed for the expansion of a number of existing export products. The results of empirical analysis support the thesis that economic complexity (the country's ability to produce and export products with a higher level of productivity) is a fundamental factor in long-term economic growth.

Jarreau and Poncet (2012) empirically investigated export sophistication and economic growth between individual Chinese provinces by using panel techniques (*Fixed and Random effects and GMM method*) for the 1997–2007 period. Supplementary, this survey has decomposed export sophistication of domestic and foreign firms, whereby the results have shown that the relationship between export sophistication and economic growth is conditioned by the level of income of the provinces, market conditions, and the presence of foreign direct investments.

Felipe, Kumar, and Abdon (2010) developed an *Index of Opportunities* for 130 countries based on their capabilities to transform their economic and export structure. They found that some Asian countries that have simultaneously

invested in improving their production capabilities have achieved successful results in diversifying their export structures and improving the level of export sophistication, which are very important steps for accelerating their economic growth in the long run. According to the study, at the other extreme, another group of countries, mainly from Africa, scored very low on the Index of Opportunities because their production capabilities are not sufficient to transform their economies and change their export structures towards more sophisticated and diversified products. Therefore, the authors suggested that these countries should create economic policies focusing on stimulating investments in new production capabilities as a way of speeding up the structural transformation process and economic growth.

Felipe, Kumar, Abdon, and Bacate (2012) studied product complexity and economic development using a database based on 5.107 products and 124 countries according to Hidalgo and Hausmann's (2009) method of reflections to compute the measures of the countries' export complexity, as well as the product space model (Hidalgo et al., 2007), based on the BACI database (Gaulier & Zignago, 2008). The paper found a positive relationship between export complexity and the level of economic development.

Abdon and Felipe (2011) analyzed the structural transformation process and economic development of Sub-Saharan Africa (SSA), attempting to examine the export structure of analyzed countries and identify the opportunities for export diversification and economic growth. They found that much of Sub-Saharan Africa's export structure is based on unsophisticated and highly standard products that are poorly linked in the product space, making the process of structural transformation in the region particularly difficult.

There are recent studies which analyze the link between export complexity and economic growth using the Economic Complexity Index (ECI) as a measure of the level of complexity of the products exported by the countries. The Economic Complexity Index (ECI) is also used as a technique to predict and explain the

economic trajectories of countries, cities, and regions (Hidalgo, 2021) and there are new approaches for measuring the level of export sophistication (Lall, Weiss, & Zhang, 2006).

However, Koch (2021) has provided a new empirical approach that approximates economic complexity based on a country's value-added export structure, which has led to significantly different complexity rankings with a higher explanatory power of GDP per capita growth rates compared to established metrics. This new approach, which measures the domestic and foreign component of the countries' export complexity, builds on previous studies that have tried to capture the share of foreign value added in the export structure. This is especially important when we take into consideration the fact that the process of globalization and FDI inflows initiate the increasing trend of the foreign value-added share in the countries' export, which could lead to erroneous conclusions when analyzing the relationship between export, complexity, and economic growth (Koopman, Wang, & Wei, 2014; Timmer, Miroudot, & de Vries, 2019). This should be the case even when examining the link between export and economic performance. Finally, Shahzad, Madaleno, Dagar, Ghosh, and Doğan (2022) investigated the influence of export product quality and economic complexity on economic growth for 28 OECD countries by using the data from 1990 to 2019 and found a positive and significant impact of export quality on growth in the long run.

The paper contributes to the existing literature on export sophistication and economic growth in that no previous study has tested the hypothesis that export sophistication has a robust impact on economic growth for the sample of CEE countries using dynamic panel regression analysis (system GMM).

3 Data and Model

The main objective of this section is to analyze the export structure and the level of export sophistication of 21 selected CEE countries and to answer the question of whether export sophistication has a robust impact on economic growth in

these countries. For the purpose of this analysis, export complexity index (EXPY), which measures the added value and technology intensity of products that are a part of the countries' export structure, is used.

A country's export complexity is determined by the level of sophistication of the products it produces and exports with comparative advantages. Countries that have specialized in producing and exporting capital- and technology-intensive products with a high added value and degree of finalization have a high export complexity and sophistication level, while countries with standard export products characterized by a low added value have a low export complexity and sophistication level. In this paper, we use the *EXPY* index developed by Hausmann et al. (2007) to measure export sophistication.

This index is calculated as a weighted average of the level of complexity of exported products that are a part of the country's export ($PRODY_K$), where the weights are simply the value shares of the products in the country's total exports:

$$EXPY_i = \sum_l \left(\frac{x_{il}}{X_i} \right) PRODY_l \tag{1}$$

It analyzes export structures and complexity at the country level by examining the level of product sophistication. Rich countries have accumulated modern technology, know-how, and productive knowledge and they have also developed modern infrastructure, strong institutions, and a national innovation system, which allows them to produce and export complex products, so they are specialized in the production of highly sophisticated products.

The level of sophistication of a product, $PRODY_k$, is estimated as a weighted average of the GDP per capita of the countries exporting that specific product. The equation for the index measuring the level of product complexity is given below:

$$PRODY_K = \sum_j \frac{(x_{jk} / X_j)}{\sum_j (x_{jk} / X_j)} Y_j \tag{2}$$

where the term x_{jk}/X_j is the relative share of the product in the country's total exports, while the term $\sum_j \left(x_{jk}/X_j\right)$ is the aggregate relative share of all countries exporting that product at the world level. Thus, the index represents the weighted average of GDP per capita, where the weight corresponded to the country's comparative advantage value of the exported product, *k*.

In our empirical work we have used dynamic panel growth models to test whether export sophistication influences growth performance for the sample of 21 selected CEE countries in the 2009–2019 period.

We decided to use a dynamic panel model (system GMM) because it takes several econometric problems common to panel regression approach into account (Blundell & Bond, 1998; Nickell, 1981). These problems are related to the endogeneity of the regressors and the difficulty of finding a valid instrumental variable for IV regression, the potential endogeneity of some other explanatory variables (omitted variables and error measurement), the small number of time periods, and the dynamic nature of the data generating process (Bond, Bowsher, & Windmeijer, 2001; Gujarati, 2003; Wooldridge, 2002).

The general growth equation used in our empirical analysis is presented below:

$$g_{it} = \alpha g_{i,t-1} + \beta X_{it} + \gamma ES_{it} + \lambda Z_i + \mu_i + u_i, \; for\; i = 1...N \; and \; t = 1...T \qquad (3)$$

where g_{it} is the *GDP growth rate* of the country *i* in the time period *t* measured as the logarithm of the real GDP per capita, $g_{i,t-1}$ is the *lagged value* of the GDP growth rate, i.e., lagged dependent variable that allows for a dynamic structure of the model, X_{it} contains the *determinants* of GDP growth which vary over *i* and *t*, ES_{it} is the *level* of *export complexity* measured by the *EXPY index*, while the Z_i symbol interprets initial GDP per capita as a variable controlling the growth convergence effects.

The second part of the equation contains individual unobservable country-specific effects, μ_i, together with the independently identically distributed stochastic disturbance term, u_{it}. The selected set of economic growth determinants, X_{it},

contains several variables: initial GDP per capita, which measures the convergence effects, a variable representing financial intermediation, measured by bank credit to private sector (% of GDP), export volume growth as a variable measuring total export performance, the level of inflation as a variable representing macroeconomic stability, and the growth rate of foreign direct investment (FDI) inflows.

We did not include other country-specific policy variables that are likely to be endogenous, such as human capital and investments in physical capital, because they are embodied in export complexity as production capabilities that are important for the production and export of high value-added products. The coefficient, γ, interprets the focal variable in our empirical analysis, which measures the relationship between export complexity and economic growth for the selected group of CEE countries.

As we have just mentioned above, the data used in empirical research are from the sample of 21 selected CEE countries. One part of these countries belong to the EU (Austria, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic, Croatia, and Slovenia), the second part are the countries from the Western Balkans (WB) region (Albania, Bosnia and Herzegovina, and North Macedonia), while the third part are the countries of the former Soviet Union (Armenia, Azerbaijan, Kazakhstan, Moldova, Russian Federation, and Ukraine). The period, covering the years from 2009 to 2019, is characterized as a relatively stable post-transition period without significant economic or political turbulence. In fact, the selected period is the period that followed the global economic and financial crisis in 2007/08 and preceded the COVID-19 crisis in 2020.

Some CEE countries, such as Belarus, Georgia, Kyrgyz Republic, Tajikistan, Turkmenistan, and Uzbekistan, have not been included in the empirical analysis due to the lack of reliable data on export sophistication statistics. Although Austria is not a CEE country, we included it because it is geographically a part

of the broader CEE region and could be an important sample for this empirical research.

The data for the index measuring the level of export sophistication, $EXPY_i$, are annual and were extracted from the *BACI international trade database*.[1] This database has been constructed using the data from the original *ComTrade database* developed by the UN,[2] which records the bilateral trade flows of 6-digit products according to a harmonized classification system. At the same time, we used *World Integrated Trade Solution (WITS)* database as a source of exports sophistication data for our estimates.

Data on real GDP per capita, inflation rate, export growth measured as a logarithm of export volume, FDI growth measured as a logarithm of FDI inflows, and financial intermediation measured by bank credit to private sector are generated from the *World Development Indicators database* of the World Bank.[3]

4 Empirical Analysis of Export Complexity and Economic Growth in Selected CEE Countries

The table below presents the estimated regression results for the relationship between export complexity and economic growth for the selected CEE countries, along with the results of the control variables (initial GDP per capita, bank credit to private sector, inflation rate, FDI inflows, and export volume growth) and the results of several standard specification tests that we have conducted, such as: the Sargan test for over-identification restrictions, the Arellano-Bond test for first and second order serial correlation AR(1) and AR(2), and the panel unit root tests (Levin, Lin and Chu; Im, Peasaran and Shin; and Fisher-type).

1 http://www.cepii.fr/CEPII/en/bdd_modele/presentation.asp?id=1

2 http://comtrade.un.org/

3 http://data.worldbank.org/indicator

Table 1: *The Impact of Export Complexity on Economic Growth (dependent variable: GDP growth)*

Variables:	**(1)**	**(2)**	**(3)**
Growth rate (t-1)	0.155* (.027)	0.249* (.000)	0.370* (.000)
Initial GDP per capita	-0.847* (.000)	-0.537* (.000)	-0.411* (.000)
Bank credit to private sector	0.003* (.990)	0.006* (.485)	0.0008* (.904)
Inflation rate	0.006* (.010)	0.007* (.006)	0.009* (.000)
Export complexity	0.284* (.000)		
FDI inflows growth	0.010* (.012)		0.0084* (.015)
Export growth	0.097* (.000)	0.0945* (.000)	
FDI inflows growth * Export complexity		0.002* (.000)	
Export volume growth * Export complexity			0.0085 (.000)
Wald (chi2) statistics	225.79 (.000)	130.26 (.000)	117.68 (.000)
Panel unit root (Levin, Lin-Chu) test (Ho: panels contain unit root)	-10.2225 (.000)	-10.2225 (.000)	-10.2225 (.000)
Arellano-Bond AR (2) test (Ho: no second order serial correlation)	-1.5357 (.125)	-1.4811 (.139)	-1.4868 (.137)
Sargan test (Ho: instruments are valid)	75.01234 (.168)	77.50044 (.125)	78.69013 (.099)

Notes: * Statistical significance at the 1% level (*p*-values are indicated in parentheses). System GMM with robust standard errors is applied. Instruments used for level equations are lagged first differences of growth rate, bank credit to private sector, FDI inflows, export volume growth, and export complexity level. Instruments for the first-differenced equations are lagged values of growth rate, bank credit to private sector, export volume growth, export complexity, and FDI inflows dated t-2 and earlier.

Source: Authors' calculations.

The coefficient of the lagged growth rate [Growth rate (t-1)] as a right-hand side variable of the initial dynamic panel growth model is expectedly positive and statistically significant, probably reflecting the contribution of omitted variables in the equation. It might also be interpreted as a result of a rather slow adjustment of growth to changes in the right-hand side variables.

The results of the basic growth model specification reported in Table 1 indicate that both export growth and export sophistication are important in explaining economic growth. According to the main findings of the paper, based on the results estimated by applying dynamic panel specification models (system GMM), export plays a major role in determining economic growth. However, export sophistication has a predominant role in stimulating economic growth in the observed sample of CEE countries during the 2009–2019 period.

In addition to the main objective of the paper – to identify growth determinants of CEE countries with special focus on the influence of export sophistication on economic growth – another focus of empirical research is to estimate whether the structural transformation process (upgrading the export basket) affects export growth and whether the FDI inflows determine export sophistication. For this analysis, we included interaction terms that allow for the changes in the slope coefficients.

The estimated results show that FDI inflows have a positive and statistically significant impact on economic growth, but, at the same time, they have an indirect impact on export sophistication through their generating effects. Moreover, the results indicate that, apart from the direct effects of export complexity on growth, it has an additional positive effect through the structural transformation effect on export performance (we should take into account oil price movements and their impact on export growth for the oil exporting countries in our sample).

Moreover, the empirical results of the econometric estimations indicate that the inflation rate has positive effects on GDP growth, which is not in line with classical macroeconomic theory. However, some studies show that price volatility rather than price level is a negative determinant of economic growth. In the case of countries that have, to some extent, relied on final consumption for their short-run growth, the estimated result in our model is logical. Regarding bank credit to the private sector as a determinant of economic growth, the results show that there is a positive impact on economic growth.

In order to verify the results of our empirical estimations and to validate the model specification, we have conducted several tests, such as the *Sargan test for over-identifying restrictions, the Arellano-Bond test, the GMM robust standard errors test and the panel unit root test* (Arellano & Bond, 1991). According to the results of the conducted tests, we can conclude that the chosen set of instruments is valid and that the models are well specified, that there is no second order autocorrelation, that the regression panel results are robust, that there are no small sample biases, and that the estimated panels are stationary.

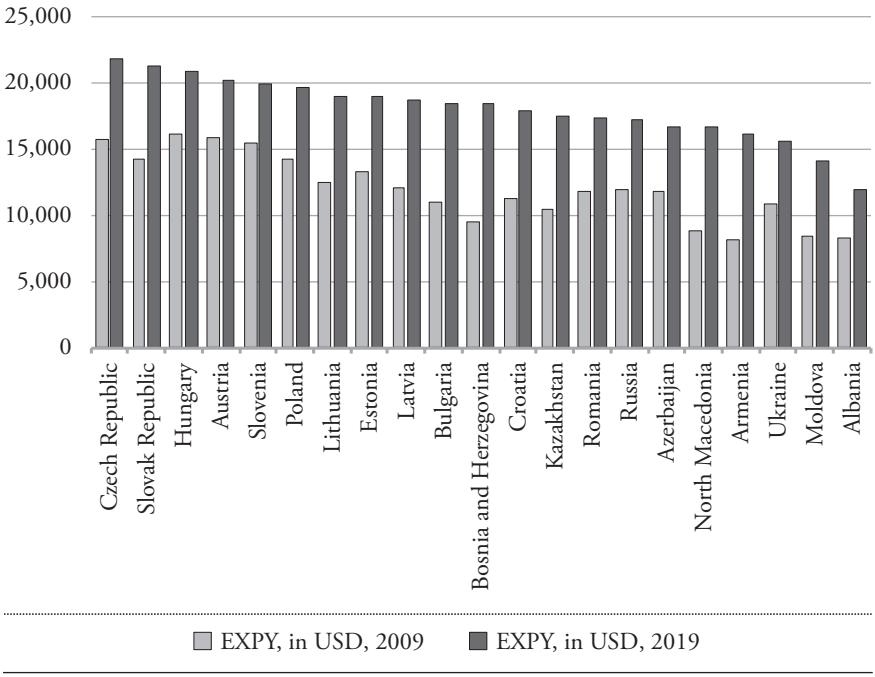
5 Comparative Analysis of Export Complexity for the Selected CEE Countries

The comparative analysis of export complexity for the selected CEE countries provides a more detailed view of the export structure and the level of export sophistication of each country. The top countries (such as Austria, Czech Republic, Hungary, Slovak Republic, Slovenia, and Poland) in terms of export complexity, as measured by the *EXPY index*, are the countries with export structure dominated by highly technology-intensive sectors (automotive sector, machinery, electronics, chemicals) and products with a high added value (motor vehicles and automotive parts, machines and machinery parts, electronic products and components, chemical and other products based on advanced materials). On the other side, the bottom-ranked countries (such as Albania, North Macedonia, Armenia, Moldova, Ukraine, Russia) with the lowest level of export complexity measured by the *EXPY index* are the countries whose export structure is predominantly composed from the labor and natural resource-intensive sectors (agricultural and food sector, minerals, metal sector, and others) and primarily agricultural products, low-added value food, metal products, mainly resource based intermediate goods, and semi-finished products.

The figure below presents the comparative analysis of export complexity for the selected CEE countries in order to explore the current level achieved and the

progress made by each country in terms of export complexity over the analyzed period.

Figure 1: *Export Complexity (EXPY Index in USD) for Selected CEE Countries*



Source: Authors' calculation based on the ComTrade database.

The table below presents the data on export performance measured by the growth of export of goods and services, export complexity measured by the EXPY index, technology-intensive exports measured by the relative share of high-technology exports in total exports, the rate of economic growth, and the level of economic development measured by GDP per capita in US dollars for the 2009–2019 period.

Table 2: *Export Performance and Economic Growth of Selected CEE Countries (2009–2019)*

Country	EXPY, in USD, 2009	EXPY, in USD, 2019	GDP per capita, USD 2009	GDP per capita, USD 2019	Exports growth (average annual % 2009–2019)	High-technology exports (% of exports), 2009	High-technology exports (% of exports), 2019
Czech Republic	15,744	21,770	19,861	23,664	5	15.2	20.7
Slovak Republic	14,256	21,345	16,597	19,383	5.3	5.4	9.9
Hungary	16,117	20,900	13,077	16,782	5.3	26.0	17.4
Austria	15,935	20,195	46,915	50,070	3.1	13.0	11.5
Slovenia	15,478	19,930	24,792	26,016	4.7	5.7	7.4
Poland	14,224	19,650	11,525	15,699	6.3	3.8	9.9
Lithuania	12,434	18,985	11,820	19,595	6.6	11.5	12.0
Estonia	13,322	18,930	14,711	23,424	5.3	11.8	16.9
Latvia	12,078	18,715	12,331	17,945	5	7.4	17.2
Bulgaria	11,052	18,510	6,988	9,879	5.8	6.3	10.8
Bosnia and Herzegovina	9,500	18,470	4,542	6,011	6.1	4.5	5.3
Croatia	11,200	17,900	14,708	15,332	3.2	9.5	8.3
Kazakhstan	10,430	17,490	6,777	9,812	1.3	/	/
Romania	11,797	17,300	8,548	12,958	9.7	4.4	11.1
Russia	11,963	17,250	8,562	11,536	2.6	7.2	12.9
Azerbaijan	11,835	16,750	4,950	4,805		4.3	5.0
North Macedonia	8,867	16,638	4,584	6,070	8.2	0.9	4.2
Armenia	8,114	16,155	2,917	4,828	9	1.1	9.8
Ukraine	10,835	15,560	2,639	3,661	/	4.5	5.5
Moldova	8,443	14,075	1,898	4,493	0.75	2.8	3.0
Albania	8,318	11,910	4,114	5,396	6.2	1.3	0.1

Source: World Development Indicators, World Bank database.

The above data confirm the main thesis of this paper, namely, that export complexity has a significant impact on the level of economic development, showing that the countries which have achieved significant progress in the level of export complexity recorded a high level of economic development at the same time.

Therefore, the main suggestion of this paper to policy makers in the less developed CEE countries for promoting economic growth is to focus on the economic, investment, and education policies that will increase production capabilities (human capital, applied technology, innovation) and build comparative advantages for the production and export of more sophisticated and technology-intensive products with higher value added. At the same time, policy makers should focus on policies to increase export readiness of SMEs and stimulate the process of internationalization through export promotion in foreign markets and integration into regional and global value chains.

6 Conclusion

There is a historical academic debate and many empirical studies which attempt to explain the importance of exports and export sophistication for economic growth. According to the export-lead-growth (ELG) theory, export performance is the main driver of economic growth, especially for small open economies like many countries from our sample. However, recent empirical studies have paid more attention to the structure of export rather than the volume of exports and have shown that the countries which based their export basket predominantly on highly sophisticated products with higher economic added value perform better.

Our paper examined the relationship between export complexity and economic growth in the 21 selected CEE countries by using system GMM for the 2009–2019 period. The main findings of the paper, based on dynamic panel regression analysis, indicate that exports still play a significant role in determining economic growth. However, the analysis has shown that export complexity had a more

important role in stimulating economic growth in the observed sample of CEE countries during the referred period. In addition to the main focus of the research, the estimated results show that FDI inflows have a positive, statistically significant impact on economic growth.

In addition to direct impact, there is also an indirect effect on export sophistication through spillover effects. Moreover, the results indicate that, apart from the direct effects of export sophistication on growth, there is an additional positive effect, recognized as the impact of structural transformation on export performance. The estimated results indicate that the inflation rate has positive effects on economic growth, which is not in line with classical macroeconomic theory. However, some studies have shown that price volatility rather than the price level has a negative impact on economic growth. In the case of countries that have, to some extent, relied on final consumption for their short-term growth, the estimated results of our model are logical. Regarding bank credit to private sector as a determinant of economic growth, the results show that there is a positive impact on economic growth.

The model specification tests carried out indicate that there are no model specification problems, that there is no second order serial correlation and that the panels are stationary. All these tests confirm the estimated results and the general conclusions based on them.

The main limitation of the empirical analysis within the paper is the scarcity of available data series regarding export complexity, as is the case for other indicators related to the measuring of export performance. Therefore, our main future task will be to expand the database by following the methodology used by the creators of these indices. At the same time, we will include additional indicators, such as the number of exported products, the number of exporting countries, level of export standardness, and other indicators for measuring the different aspects of export performance.

Moreover, the main drawback of the EXPY index, which we use to measure export complexity, is the fact that it is based exclusively on tradable goods, without taking into account the services that show an increasing trend in the export structure of countries (ICT, financial, insurance, business, transport, and other type of services). In this context, additional research on the impact of the composition of export (including services) on economic growth would be valuable in order to examine the whole picture of export sector for this group of countries.

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