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FORECASTS ON THE IMPORTS OF GOODS AND SERVICES IN EMERGING ECONOMIES OF THE EUROPEAN UNION

Liviu POPESCU[1], Mirela GĂMAN[2]

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The paper provides a statistical analysis of imports from seven emerging economies of the European Union during the period 1995-2023 and presents forecasts for the upcoming period. It was found that most of the analyzed countries recorded a significant increase in imports as a percentage of GDP, except for declines in 2009 (financial crisis) and 2020 (COVID-19 pandemic). Hungary and Slovakia experienced the highest increases, exceeding 80-100% of the GDP, while Bulgaria, Romania, Poland, the Czech Republic, and Croatia had a more moderate growth. The correlation analysis of imports in these countries revealed a strong association between Romania, Slovakia, and the Czech Republic, indicating economic integration in the region. Croatia showed lower correlations, suggesting a different import model, more oriented toward tourism. The statistical analysis of imports highlighted significant differences between countries. In Bulgaria, imports followed a cyclical pattern, influenced by economic crises but with an overall upward trend. In the Czech Republic, Hungary, and Poland, imports increased significantly, with stabilization projected for the coming years. In Romania, imports continued to grow after the EU accession, and the forecast suggests moderate growth between 2024 and 2026. In Slovakia, imports showed a steady upward trend after the EU accession and the adoption of the euro, with forecasts indicating slight growth in the coming years. ARIMA models were used for import forecasting, indicating slight fluctuations but with a general trend of stability in the future.

Keywords: **International trade, imports, forecast, emerging economies, Central and Eastern Europe.**

JEL Classification: **F17, C53**

[1] *Professor PhD, University of Craiova, Faculty of Economics and Business Administration, Craiova, Romania*

[2] *PhD student, University of Craiova, Faculty of Economics and Business Administration, Craiova, Romania*

1. Introduction

The study of the evolution of imports as a percentage of GDP and their forecasts for the former communist economies of Central and Eastern Europe (CEE) that are members of the European Union, such as the Czech Republic, Slovakia, Hungary, Poland, Romania, Bulgaria, and Croatia, can be of significant importance from multiple perspectives. Thus, the study of imports (% of GDP) can provide a clear picture of the economic structure of these post-communist countries, showing the extent to which their economies depend on international trade. A high percentage of imports relative to GDP may indicate an economy oriented toward the consumption of foreign goods and services, which can reflect deep economic integration into global markets. Therefore, analyzing this trend allows for an understanding of the degree of economic openness of these economies in relation to internal changes and the economic policies of the European Union.

The evolution of imports as a percentage of GDP can be used to forecast economic trends in Central and Eastern European countries, considering the significant structural transformations after their accession to the European Union. For example, a steady increase in imports may indicate rising domestic demand and an improvement in household incomes, but it can also put pressure on the trade balance. As the former communist economies of Central and Eastern Europe joined the European Union, the process of economic integration had a significant impact on their foreign trade. Accession brought tariff reductions, trade liberalization, and regulatory alignment, which facilitated the growth of imports from EU member states. A statistical analysis of this development helps to understand how integration into the European Union has influenced the trade relations of these countries, both in terms of imports and exports.

The economic transformation of these former communist states was marked by the transition from centralized economies to market economies. Imports, as a percentage of GDP, serve as a relevant indicator for assessing the success of this transition. For example, a significant increase in imports may indicate that an economy is modernizing, gaining access to new technologies and a diverse range of consumer goods, which reflects progress in post-communist economic and social integration.

The evolution of imports as a percentage of GDP can reflect the efficiency of various economic policies adopted by the governments of these countries, such as fiscal policy, monetary policy, and foreign trade policy. A correlation between imports and other economic variables can provide insights into the sustainability of economic growth and the economic risks associated with dependence on imports.

Last but not least, the study can also lead to an analysis of external risks, as imports serve as a means of assessing the economic vulnerability of these countries to external economic fluctuations, such as global economic crises or changes in international trade policy. In this

context, the study of imports helps evaluate the stability of the economies in Central and Eastern Europe and anticipate the potential negative effects of external crises on their economies.

In conclusion, studying the evolution of imports as a percentage of GDP and forecasting their trends for the former communist economies of Central and Eastern Europe, now members of the European Union, is essential for understanding economic processes and formulating appropriate economic policies that support the sustainable development of these countries. Statistical analysis provides a solid foundation for economic decision-making at both the national and European levels.

The novelty of the study lies in conducting a comprehensive and detailed analysis of the evolution of imports over the past 30 years in the Central and Eastern European countries that are members of the European Union. It provides an in-depth perspective on the significant economic transformations that have taken place in this region, reflecting how each of these economies has evolved from communist regimes to market economies, within the context of their integration into broader economic structures, such as the European Union. The study includes a detailed comparison of the economies of Central and Eastern European countries, highlighting the correlations between imports and the process of regional economic integration. By analyzing relevant economic data, it examines how market openness and trade liberalization have influenced the structure of imports, emphasizing both changes in consumer behavior and international trade flows. Through this comparison, the study identifies common characteristics and significant differences among regional economies, providing a clearer understanding of the impact of globalization and European integration on post-communist economies.

To ensure the validity and reliability of the obtained results, the study employs a wide range of rigorous statistical methods. These include the Shapiro-Wilk test, used to assess the normality of data distributions, the Mann-Whitney test for comparing independent samples, the Durbin-Watson and Breusch-Godfrey tests for detecting error autocorrelation, and the ARCH test for evaluating heteroscedasticity in economic data. These methods are essential for verifying the fundamental assumptions of the analysis and ensuring that the conclusions drawn are based on robust and valid data.

Additionally, the study expands by utilizing ARIMA models to formulate economic forecasts, providing insight into future trends in imports within these economies. ARIMA models, which generate predictions based on historical data, enable the identification and projection of future economic developments, thereby supporting the formulation of effective economic and trade policies. These forecasts are essential for economic and trade authorities in these countries, offering valuable information for strategic decision-making that can influence sustainable economic development and deeper integration into the global economy. Therefore, this study represents a significant contribution to understanding the economic dynamics of Central and Eastern Europe, offering both a retrospective analysis of import trends and advanced statistical tools for their future forecasting.

The paper is organized into several sections. The second part provides a review of the literature, presenting the results obtained by other authors related to the themes addressed in this study. In the third part, the research methodology is detailed, including the main statistical tests used for model validation or for comparing time series. The fourth section presents the results obtained from the research, highlighting the innovative aspects of these findings. The paper ends with the section of conclusions and proposals for further developments. Historical data are presented in Annex 1 (see https://data.worldbank.org/indicator/NE.IMP.GNFS.ZS).

2. Literature Review

The creation of the eurozone highlighted the need for quick access to information about short-term fluctuations in economic activity within the region. In the work by Bodo, Golinelli and Parigi (2020), several alternative short-term forecasting models were proposed, ranging from simple ARIMA models to more complex cointegrated VAR models and conditional models, to anticipate the evolution of the industrial production index in the eurozone. The best-performing model in terms of forecasting ability is a conditional error correction model, in which the aggregate industrial production index for the eurozone is explained by the industrial production index of the United States and the business confidence index derived from the European Commission's harmonized survey of manufacturing firms.

Globalization has led to a significant increase in the volume of imports, yet these fluctuate considerably over time, making them difficult to forecast. As a result, reliable indicators are needed to anticipate the evolution of imports. The work of Grimme, Lehmann and Noeller (2021) introduced the first such indicator, called the "import climate." While surveys are frequently used to create forecasting indicators, they typically do not include information about the future import demand of firms and households. Our approach is based on the idea that a country's import demand is reflected in expectations regarding the exports of its main trading partners, an aspect that can be measured through standard surveys. Our study, conducted for six advanced economies, shows that the import climate provides more accurate forecasts than traditional economic cycle indicators, which primarily focus on domestic demand. Thus, the import climate represents a reliable tool for forecasting imports, being useful both for the academic community and for policymakers.

Kos-Labedowicz and Talar (2024) examine the impact of the Russia-Ukraine war on the trade resilience of Central and Eastern European countries, using a Trade Vulnerability Index (TVI) specifically designed for this analysis. The study, based on data from 2016–2023, highlights that, in the first year of the conflict, trade remained largely stable, with the exception of the Baltic States and Poland in 2023. Although Slovakia and the Czech Republic were considered vulnerable according to the TVI, they demonstrated a high capacity for adaptation. The research concludes that trade vulnerability does not necessarily imply low adaptability to external shocks and can

contribute to the development of economic policies aimed at strengthening the region's trade resilience.

Three decades after the fall of communism and over 15 years after the significant expansion of the European Union (2004-2007), the study conducted by Kuc Czarnecka, Saltelli, Olczyk, and Reinert (2021) reassesses the contrasting perspectives on the effects of free trade and EU enlargement on Central and Eastern European (CEE) countries. The research differentiates between EU member states prior to 2004, the CEE countries that joined between 2004-2007, and the states that did not become members, such as Belarus, Moldova, and Ukraine. The study analyzes two time periods: the first, from 1991—the year the COMECON was dissolved, the Eastern European free trade zone—until the present, and the second, the period following the EU enlargement in 2004-2007. The conclusions suggest that the rapid integration of CEE countries into the global and European economy had negative effects, causing significant losses. This dynamic is compared to the processes of deindustrialization and migration in Latin America that occurred following the trade liberalization of the 1970s.

The study conducted by Pilinkiene (2016) analyzes the effects of trade openness on economic growth and competitiveness in 11 Central and Eastern European (CEE) countries from 2000 to 2014. Although these economies have a high degree of trade openness, they follow distinct trajectories in terms of development and competitiveness. Most CEE countries adopt trade policies oriented towards regional cooperation to facilitate integration into the global economy. The empirical research uses correlation analysis, the Granger causality test, and the Vector Autoregression (VAR) model to assess the relationships between trade openness, economic growth, and competitiveness, both in the short and long term. The results highlight an interdependent relationship between these three dimensions: economic growth fosters trade openness, and improvements in competitiveness accelerate economic growth. The econometric analyses show that the effects of economic growth on trade openness are long-lasting, and competitiveness significantly influences GDP per capita in the region.

In the study by Lima, Gonçalves and Costa (2023), the performance of three traditional time series forecasting methods is evaluated and compared: ARIMA models and their extensions, time series decomposition with linear regression, and the Holt-Winters method. These techniques are applied to retail sales data from seven European countries, characterized by pronounced trends and seasonality. The results indicate that all models manage to capture the seasonal structure of the data, but ARIMA provides the most accurate forecasts according to the MSE, RMSE, and MAPE indicators. The Holt-Winters method also proves to be effective, serving as a viable alternative to ARIMA.

The article by Melnychenko, Matskul and Osadcha (2022) analyzes the monthly dynamics of exports, imports and trade balance between Ukraine and Romania in the period 2005-2021. Time series from 2015-2021, since the entry into force of the EU-Ukraine Association Agreement, were used for modeling and forecasting. Appropriate models were built using the Box-Jenkins

methodology: additive models with a seasonal component ARIMA (or SARIMA) and the Holt-Winters method with exponential smoothing and attenuated trend. Forecasts for exports, imports and trade balance for the fourth quarter of 2021 and the first quarter of 2022 showed a small margin of error compared to the actual data. For example, in the case of the Holt-Winters model applied to the trade balance, the relative forecast errors were 1.3% for October 2021, 2.6% for November 2021, and 0.4% for December 2021.

Papazoglou, Pentecost and Marques (2006) use a gravity model to estimate the effects of the 2004 EU enlargement on trade balances and trade flows. The results indicate that around 25% of the candidate countries' trade in 2003 can be attributed to trade creation generated by accession. However, EU integration does not only stimulate trade, but also redirects it, reducing the share of new members' trade with non-EU15 countries. After accession, these countries register larger trade deficits, as imports grow faster than exports. The impact on the trade deficit varies depending on the degree of integration and the income level of the new members. Therefore, the integration process follows specific dynamics, and the EU should take these aspects into account in future enlargements to the Balkans and South-Eastern Europe.

Research by Ghauri, Ahmed, Streimikiene and Streimikis (2020) analyzes two econometric models for forecasting Pakistan's imports and exports in the financial year 2020, using annual data from 2002-2019. The study compares the Box Jenkins (ARIMA) and Auto-Regressive (AR) models with seasonal variables, evaluating the accuracy of the forecasts through the mean absolute error (MAE) and root mean square error (RMSE). The results indicate that the ARIMA model provides a more accurate forecast for exports, while the AR model is more appropriate for imports. According to the estimates, exports could grow by 1.87% in 2020, and imports could decline by 1.61%. The study recommends that Pakistani policymakers implement policies to stimulate exports and reduce business costs to improve competitiveness against regional economies such as India, Bangladesh and China.

The paper by Dziubanovska, Aliluiko and Tymkiv (2024) explores the forecasting of the main indicators of international trade in the European Union (EU) using hybrid models. The study adopts an innovative approach, combining statistical methods, machine learning techniques and econometric models to improve the accuracy of forecasts. It also analyses the influence of external factors on EU international trade and develops hybrid models that integrate these variables. The results obtained contribute to a better understanding of the dynamics of EU trade flows and facilitate their forecasting in the context of complex economic factors.

From the analysis presented above, it can be seen that the ARIMA model is frequently used in the forecasting of economic indicators, a fact that is also found in our work on the import of goods and services in some emerging economies in the European Union.

3. Research Methodology

By using descriptive and inferential statistical methods and techniques, we can gain a more detailed perspective on economic and financial data and extract relevant information for the decision-making process. However, it is essential to consider the context in which the data is analyzed and to apply appropriate methods depending on its nature and distribution.

To determine whether the statistical series follow a normal distribution, we will use the Shapiro-Wilk test, which is more appropriate for small samples, up to 50 observations. If the probability associated with the test exceeds the threshold of 0.05, we can consider that the data are normally distributed at a significance level of 5%. For a series Y_t, t = 1,...,n, the Shapiro-Wilk test (Shapiro and Wilk, 1965) on the normality of the distribution is defined as follows:

$$W = \frac{\sum_{t=1}^{n}(p_t\, y_t)^2}{\sum_{t=1}^{n}(y_t - \bar{y})^2},$$

where y_t represents the values of the initial series Y_t, which are ordered in ascending order ($y_1 \leq y_2 \leq ... \leq y_n$), $\bar{y}$ is the mean of the respective series, and p_t are weights. The hypothesis H_0 of normality of the distribution is rejected if $W \leq W_\alpha$, where the critical thresholds $W\alpha$ are tabulated by Shapiro & Wilk (1965), at the chosen significance level. The test also generates an associated probability and the hypothesis of normality is accepted if the probability is greater than 0.05 at the chosen significance level $\alpha = 5\%$.

The Mann–Whitney test, also known as the Mann–Whitney U test or Wilcoxon rank-sum test (Mann & Whitney, 1947), is a nonparametric statistical test used to compare two independent samples and determine whether they come from the same distribution. It is an alternative to the Student's t-test for independent samples, and is used when normality of the distributions cannot be assumed.

The test evaluates the null hypothesis (H_0), which states that there are no significant differences between the distributions of the two groups, and the alternative hypothesis (H_1), which suggests that there is a significant difference. The test result includes the U statistic, which reflects the degree of difference between the distributions, and the p-value, which indicates the probability that the observed differences are due to chance. If $p < 0.05$, the difference between the groups is considered statistically significant, which leads to the rejection of the null hypothesis and confirmation of a real difference between the samples. Conversely, if $p > 0.05$, the difference is not significant, which means that there is not enough evidence to support the claim that the means of the two groups are different.

To estimate the parameters in the regression models used in the ARIMA forecasting method, we will apply the least squares method. The Student's t-test is used to test the null hypothesis (H_0), according to which the coefficients are not significantly different from zero, and the alternative hypothesis (H_1), which claims that they are significantly different from zero. If the probability associated with the Student's t-test is less than 0.05, the hypothesis H_1 is accepted, indicating that the coefficients are statistically significant at the 5% significance level.

The F-test evaluates the null hypothesis (H_0), according to which all coefficients are insignificant, and the alternative hypothesis (H_1), which suggests the existence of at least one coefficient significantly different from zero. If the probability associated with the F-test is below 0.05, the hypothesis H_1 is accepted, indicating that there is at least one coefficient significantly different from zero, at a significance level of 5%.

Autocorrelation occurs when residuals are correlated with each other, which can lead to underestimation of the standard errors of the coefficients and erroneous interpretations of significance tests. The Durbin-Watson test calculates a statistic (DW) based on the differences between the values of the residuals at two consecutive points in time, according to the definition proposed by Durbin and Watson (1950):

$$DW = \frac{\sum_{i=2}^{n}(e_i - e_{i-1})^2}{\sum_{i=1}^{n}(e_i)^2},$$

where *n* represents the number of observations. The value of *DW* is compared with the lower limit d_L and the upper limit d_U in the Durbin-Watson table for a certain significance level. If *DW* is located in the interval (d_U, 4-d_U) then the null hypothesis H_0 is accepted, that is, the errors are not autocorrelated.

The Breusch-Godfrey test (Breusch, 1978; Godfrey, 1978) is used to check for the presence of higher-order autocorrelation in the errors and provides an associated probability. If this probability exceeds 0.05, the null hypothesis (H_0) is accepted, indicating the absence of higher-order autocorrelation, at a significance level of 5%.

The Dickey-Fuller test (Dickey & Fuller, 1979) is a statistical test used to determine whether a time series is stationary. Stationarity is an essential property of time series, indicating that its statistics, such as the mean and variance, remain constant over time. The Dickey-Fuller test checks for the presence of a unit root in an autoregressive (AR) model, which indicates that the series is nonstationary. If a series exhibits a unit root, it exhibits a tendency to increase or decrease over time, without returning to a stable mean value. The extended version of the test, called the augmented Dickey-Fuller test (ADF), takes into account the presence of a deterministic trend or a constant (intercept) and allows the addition of lag terms to correct for autocorrelation of the residuals. This test is more robust and preferred in practice because it eliminates the effects of autocorrelation, which can distort the results of the simple Dickey-Fuller test.

The test evaluates the null hypothesis (H_0), according to which the time series has a unit root (is non-stationary), and the alternative hypothesis (H_1), which indicates that the series does not have a unit root (is stationary). The interpretation of the results is done by comparing the value of the test statistic with the predefined critical values for significance levels of 1%, 5% and 10%. If the value of the test statistic is less than the corresponding critical value, the null hypothesis is rejected, which indicates the stationarity of the series. In addition, the test generates an associated probability (p-value), and if this is below 0.05, it can be concluded that the series is stationary at a significance level of 5%.

The ARCH test (Engle, 1982) is a statistical test used to detect the presence of conditional heteroscedasticity in a time series. Heteroscedasticity occurs when the variance of the errors of a regression model is not constant. In the conditional context, this means that the variation of the errors depends on their previous values. The test verifies the null hypothesis (H_0), which states that there is no conditional heteroscedasticity, which assumes that the variation of the residuals is constant over time, and the alternative hypothesis (H_1), according to which there is conditional heteroscedasticity, that is, the variation of the residuals depends on their previous values. If the value of the test statistic exceeds a certain critical threshold (established based on the chi-square distribution with the number of degrees of freedom corresponding to the number of lags), the null hypothesis of homoscedasticity is rejected, which suggests the presence of conditional heteroscedasticity. The test also generates an associated probability (p-value). If this probability is greater than 0.05, the null hypothesis is accepted, which means that there is no heteroscedasticity, at a significance level of 5%.

The ARIMA (Auto-Regressive Integrated Moving Average) model is a statistical method used for time series analysis and forecasting. It combines three essential components:

- AR (Auto-Regressive), whereby the model uses past values of the series to predict future values. This is expressed by a parameter *p*, which indicates the number of autoregressive terms included in the model.
- I (Integration), which indicates how many times the series must be differentiated to make it stationary. The parameter *d*, shows how many times the previous values must be subtracted to eliminate the trend.
- MA (Moving Average), whereby the model takes into account past errors to improve the prediction, using the term *q*, which represents the number of past errors taken into account.

Thus, the ARIMA model is denoted as ARIMA (*p*, *d*, *q*). For more details, see Box, Jenkins et al. (2015).

4. Results and Discussion

From the analysis of Figure 1, it can be seen that most countries have recorded a significant increase in imports as a share of GDP during the period 1995-2023. Hungary and Slovakia have

had the highest increases, reaching percentages of over 80-100% of GDP in recent years. Bulgaria, Romania, Poland, the Czech Republic and Croatia have experienced more moderate increases, remaining below the 70% threshold. The graph illustrates a general trend of constant growth, except for notable decreases in 2009 (as a result of the financial crisis) and in 2020 (due to the COVID-19 pandemic).

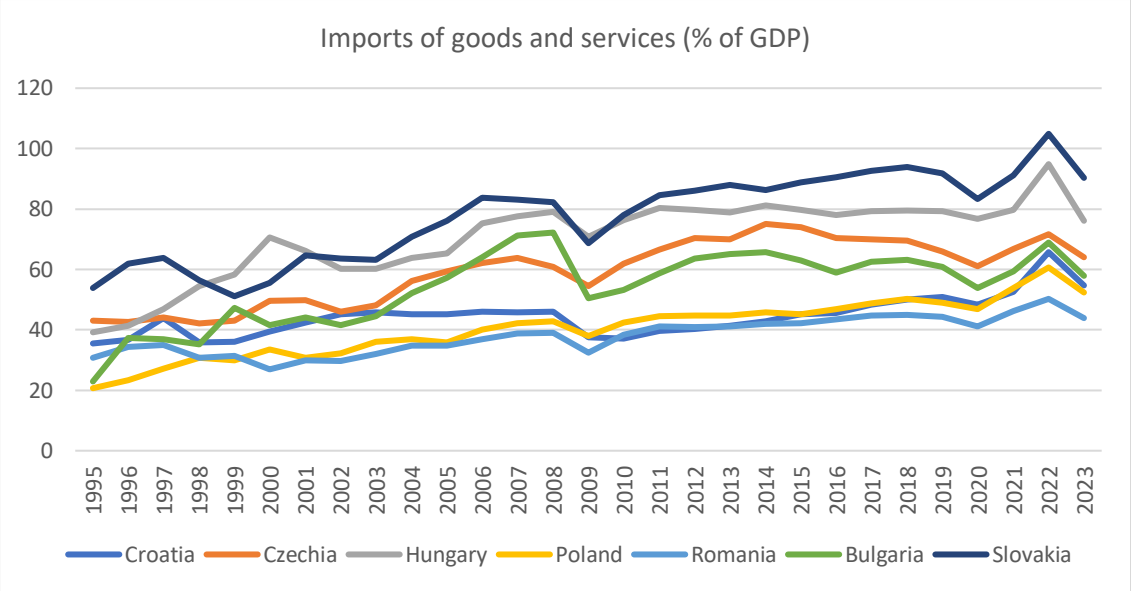

Figure 1. Imports of goods and services (% of GDP)

The correlation matrix between imports (% of GDP) for the countries presented in Table 1, provides important information about the degree of association between their economies in terms of imports. The analysis of this table indicates that the highest correlation is between Romania and Slovakia (0.951), which suggests that the evolution of imports in these two countries is very similar, and between the Czech Republic and Slovakia (0.9352), which shows us a strong interdependence of their economies, probably due to their common history and high economic integration. Poland has a strong correlation with Slovakia (0.9306) and Hungary (0.926), suggesting a significant integration in the Central European region. Croatia has the lowest correlations compared to the other countries, which could indicate a less synchronized import pattern with the rest of Central and Eastern Europe.

Finally, the Central European countries (Czech Republic, Slovakia, Hungary, Poland) have higher correlations with each other, reflecting their integration into European trade chains. Romania and Slovakia are highly correlated, suggesting similar economic models, possibly focused on lower-cost industries and EU integration. Croatia has lower correlations, indicating an economy with a different import profile than the rest of the countries analyzed, probably more oriented towards

tourism and services than towards industry. This analysis can be effective for trade and investment strategies, highlighting which economies are more closely linked from an import perspective.

Table 1. Imports correlation matrix (% of GDP)

	Croatia	*Czechia*	*Hungary*	*Poland*	*Romania*	*Bulgaria*	*Slovakia*
Croatia	1						
Czechia	0.523664	1					
Hungary	0.594766	0.891422	1				
Poland	0.756164	0.880152	0.926845	1			
Romania	0.704113	0.861621	0.749429	0.897251	1		
Bulgaria	0.545647	0.875997	0.890929	0.826318	0.752452	1	
Slovakia	0.724058	0.935265	0.857751	0.93066	0.951476	0.855528	1

***Source**: Authors' calculations*

Table 2 presents the results of the Shapiro-Wilk test for checking the normality of the distributions. It is found that Poland, Romania, Bulgaria and Slovakia have import distributions that tend towards normal distribution, with the probability attached to the test higher than 0.05. For the other countries it results that the import distribution is not normally distributed.

Table. 2 Shapiro-Wilk test for normality of distributions for imports (% of GDP)

	Croatia	*Czechia*	*Hungary*	*Poland*	*Romania*	*Bulgaria*	*Slovakia*
Shapiro-Wilk Test (p-value)	0.022	0.017	0.003	0.904	0.433	0.148	0.073

***Source:** Authors' calculations*

In this situation, we use the Mann-Whitney U test (Table 3), which is a non-parametric test, used to compare two independent samples and to check if there is a significant difference between their means. Slovakia and Hungary have significantly higher values than most countries. Poland and Croatia have lower values and do not differ significantly from each other. The Czech Republic and Bulgaria are intermediate, and Bulgaria does not differ significantly from the Czech Republic. Slovakia has the most distinct import pattern, with significant differences from all other countries. Romania, Hungary and the Czech Republic have strong differences from each other, suggesting that they have distinct import patterns. Poland has similar values to Croatia and Romania, indicating greater economic convergence. Bulgaria is relatively close to the Czech Republic, but differs significantly from Romania and Hungary. These results may reflect economic factors such as trade policy, integration in supply chains and the structure of imports in these countries. These results indicate significant variations in imports between the countries analyzed, suggesting that

the data come from different populations in almost all cases. The order, in terms of average imports, is:

Slovakia > Hungary > Czech Republic ≈ Bulgaria > Croatia ≈ Poland ≈ Romania

Table 3. Mann-Whitney U test for imports (% of GDP)

	Croatia	*Czechia*	*Hungary*	*Poland*	*Romania*	*Bulgaria*	*Slovakia*
Croatia	-----						
Czechia	U = 122.0 p = 3.58×10^{-6}	-----					
Hungary	U = 57.0 p = 1.65×10^{-8}	U = 192.0 p =3.92×10^{-4}	-----				
Poland	U = 516.0 p = 0.1396	U=747.0 p=3.98×10^{-7}	U=797.0 p=5.00×10^{-9}	-----			
Romania	U=652.0 p=3.28×10^{-4}	U=802.0 p=3.12×10^{-9}	U=818.0 p=6.66×10^{-10}	U=515.0 p=0.1438	-----		
Bulgaria	U= 208.0 p=9.78×10^{-4}	U= 530.0 p=0.0901	U= 701.0 p=1.33×10^{-5}	U= 164.0 p=6.86×10^{-5}	U=107.0 p=1.13×10^{-6}	-----	
Slovakia	U = 12.0 p = 2.23×10^{-10}	U = 151.0 p = 2.87×10^{-5}	U = 289.0 p = 0.0416	U=6.0 p=1.21×10^{-10}	U=0.0 p=6.51×10^{-11}	U=107.0 p=1.13×10^{-6}	-----

Source: *Authors' calculations Eviews software*

Table 4 presents descriptive statistics for the analyzed countries, including the mean, standard deviation, coefficient of variation, kurtosis, skewness and extreme values of imports. Table 5 presents the results of the augmented Dickey-Fuller test for the initial series (IMPORT) and the differenced series D(IMPORT), in order to establish stationarity.

Table 4. Descriptive statistics of imports (% of GDP)

	Mean	Standard deviation	Coef. of variation	Kurtosis	Skewness	Minimum	Maximim
Croatia	44.45%	6.54%	14.73%	2.65	1.13	35.49%	65.71%
Czechia	59.41%	10.78%	18.15%	-1.27	-0.36	42.12%	75.06%
Hungary	70.67%	13.04%	18.45%	0.58	-0.96	39.19%	94.85%
Poland	40.55%	9.45%	23.31%	-0.28	-0.20	20.70%	60.66%
Romania	37.99%	5.99%	15.78%	-0.93	-0.02	26.93%	50.66%
Bulgaria	54.25%	12.14%	22.38%	-0.006	-0.71	22.92%	72.71%
Slovakia	77.55%	14.43%	18.61%	-1.003	-0.308	51.12%	94.85%

Source: *Authors' calculations*

Table 5. Augmented Dickey-Fuller test for imports (% of GDP)

	Bulgaria	Croatia	Czechia	Hungary	Poland	Romania	Slovakia
IMPORT	t-Statistic= -2.847725	t-Statistic= -2.733585	t-Statistic= -1.576986	t-Statistic= -2.761128	t-Statistic= -1.287944	t-Statistic= -3.61271	t-Statistic= -3.25472
	p = 0.1934	p = 0.2318	p = 0.4807	p = 0.2220	p = 0.6188	p = 0.0475	p = 0.0947
D(IMPORT)	t-Statistic= -4.823226	t-Statistic= -5.529887	t-Statistic= -4.344669	t-Statistic= -5.565232	t-Statistic= -5.693422		t-Statistic= -5.64042
	p = 0.0035	p = 0.0007	p = 0.0021	p = 0.0006	p = 0.0001		p = 0.0005

Source: Authors' calculations with Eviews software

Next, we will perform a statistical analysis of imports (% of GDP) and use the ARIMA method to make import forecasts for each studied country.

4.1 Bulgaria

Between 1995 and 2023, Bulgaria's imports of goods and services have evolved significantly, reflecting economic developments and changes in the structure of international trade. In 2007, Bulgaria's imports of goods and services totaled approximately USD 30.04 billion, representing 71.17% of the country's GDP. Between 2010 and 2020, Bulgaria's imports of goods and services experienced significant fluctuations, influenced by global and local economic factors, including economic crises and changes in international trade. The global economic crisis of 2008-2009 had a significant negative impact on imports from Bulgaria. The reduction in domestic demand, the decline in industrial production and the devaluation of the Bulgarian lev led to a considerable decrease in imports of goods and services. Imports fell by approximately 18-20% in 2009 compared to the previous year, and this decline was felt throughout the entire period of the global economic crisis. Recovery began to be visible only in 2010, when the Bulgarian economy began to recover.

In 2020, Bulgaria's total imports of goods and services significantly declined compared to the previous year due to the pandemic. Imports amounted to approximately $38.14 billion, marking a decrease of about 10% from 2019, when imports stood at $42.6 billion. This decline was largely caused by reduced economic activity and consumption. In 2021, imports increased by 31.28% compared to 2020, reaching approximately $50.07 billion. This represented a significant recovery, and in 2022 and 2023, imports continued to grow, albeit at a slower pace (see https://macrotrends.net/global-metrics/countrie/BGR/bulgaria/imports).

Next, we will perform an analysis of imports of goods and services as a percentage of GDP for the period 1995-2023, followed by a forecast for the period 2024-2026. On average, imports represent 54.26% of Bulgaria's GDP, highlighting the essential role of this sector in the national economy. With a standard deviation of 12.15, the data show significant variability over the years. However, the coefficient of variation of 22.39% indicates that the average value is relevant.

To apply the ARIMA method in forecasting, it is necessary to check the stationarity of the data series using the Dickey-Fuller test. With a probability of 0.1934, the results indicate that the initial series of imports (IMPORT) is not stationary (Table 5), suggesting the presence of a unit root. By applying the first differencing, the series D(IMPORT) is obtained, which becomes stationary according to the Dickey-Fuller test, with a probability of 0.0035. This result confirms the elimination of unit roots from the differencing series.

Using the correlogram for D(IMPORT), several ARIMA models of type (p,1, q) were tested. Among the evaluated models, ARIMA (3,1,3) was selected as the most appropriate, having the lowest values of the Akaike and Schwarz criteria, which indicates an optimal representation of the data dynamics (Table 6). The estimated coefficients in this model are significant, with probabilities associated with the t-Statistic test below 0.05, confirming their relevance. The F-test, with a value of 4.59 and a probability of 0.02, supports the general validity of the model. In addition, the analysis of the residuals shows the absence of autocorrelation, which is confirmed by the Durbin-Watson test (1.97) and the Breusch-Godfrey test (probability of 0.19). These results demonstrate that the model correctly captures the dynamics of the time series, with no significant autocorrelation between the residuals.

Table 6. ARIMA (3,1,3) model to D(IMPORT) for Bulgaria

Dependent variable: D(IMPORT)			
Variable	***Coefficient***	***t-Statistic***	***Prob.***
C	-0.226435	-0.202527	0.8414
AR(3)	0.495190	2.844356	0.0094
MA(3)	-0.875858	-16.49958	0.0000
R-squared	0.294623	Akaike info criterion	6.630146
Adjusted R-squared	0.230498	Schwarz criterion	6.776411
Durbin-Watson stat.	1.976436	F-statistic	4.594496
		Prob(F-statistic)	0.021510
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.757893	Probability	0.198018
ARCH Test:			
F-statistic	0.250691	Probability	0.621561

Source: *Authors' calculations with Eviews software*

The ARCH test also indicates the absence of heteroscedasticity, with a probability of 0.62, suggesting that the error dispersion is constant over time – an essential aspect for the accuracy of the forecasts. The ARIMA model is stationary and invertible, since the inverse roots of the AR and MA terms are sub-unit, thus fulfilling the conditions necessary for making accurate forecasts. The forecast of the import series is presented in Table 7 and illustrated graphically, with the confidence interval, in Figure 2.

Table 7. Bulgaria imports forecasts

Model	Forecast 2024	Forecast 2025	Forecast 2026
ARIMA (3,1,3)	57.41%	54.22%	57.34%

Source: *Authors' calculations with Eviews software*

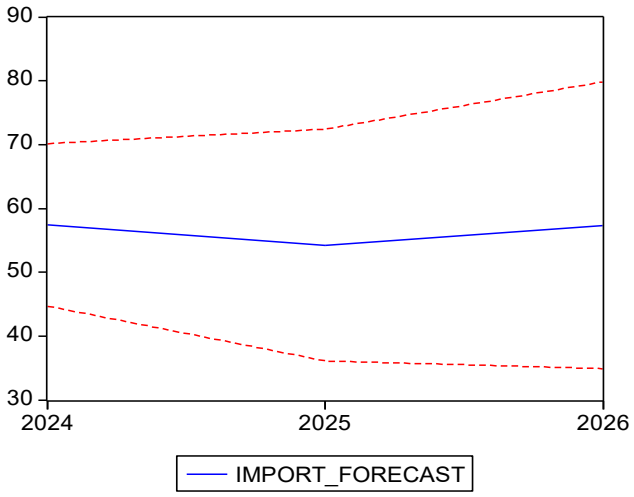

Figure 2. Forecast and confidence interval of imports for Bulgaria (% of GDP)

In addition, the comparison between historical data and forecasts is shown in Figure 3. The ARIMA (3,1,3) model indicates a slight decrease in the share of imports in GDP in the following years.

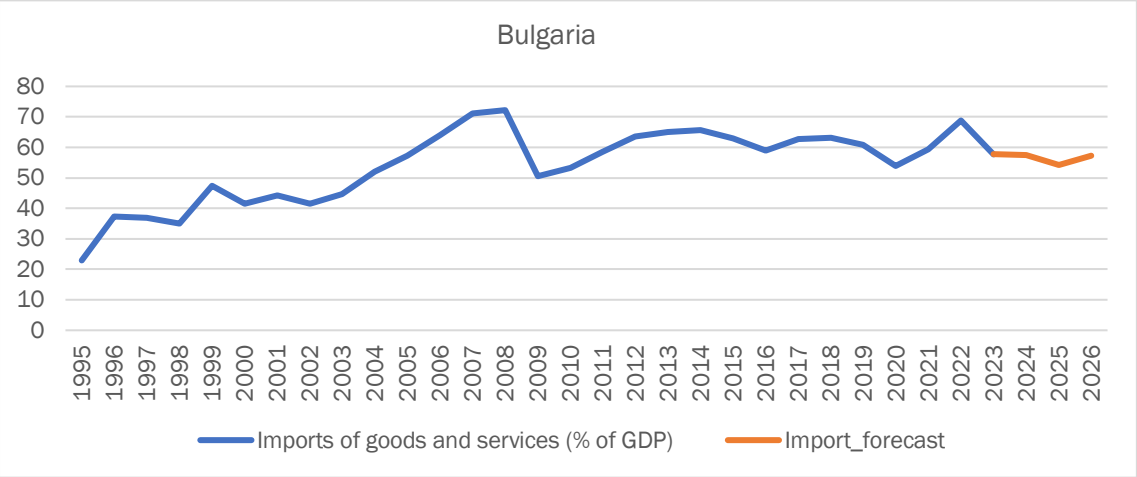

Figure 3. Imports in the period 1995-2023 and forecast for 2024-2026 in Bulgaria (% of GDP)

4.2 Croatia

In the period 1995-2023, Croatia experienced a significant increase in imports, in line with its economic development and integration into the European market. The increase in domestic consumption and economic activity led to a higher demand for foreign goods and services. The global economic crisis of 2008-2009 had a significant impact on economies around the world, including Croatia, affecting both the volume of imports and their share in GDP. During the crisis, imports and exports as a percentage of GDP decreased. Imports of goods and services accounted for 45.77% and 46.07% of GDP in 2007-2008, respectively, and in 2009 they fell to 37.74% of GDP. This decrease reflects not only the impact of the crisis on foreign trade, but also the decline in domestic economic activity.

The COVID-19 pandemic has had a significant impact on the Croatian economy, affecting both imports of goods and services and the country's GDP. In 2020, the value of imports was USD 27.97 billion, representing 48.04% of GDP, a decrease of 10.59% compared to 2019. This decrease is mainly due to the reduction in domestic and external demand, as well as disruptions in supply chains caused by the COVID-19 pandemic. Also, in 2021, the value of imports reached USD 36.25 billion, an increase of 29.59% compared to the previous year, indicating an economic recovery after the pandemic shock. In 2022, Croatia's total imports of goods and services increased significantly compared to the analyzed period, reaching USD 46.79 billion, 64.99% of GDP. In 2023, Croatia's total imports were approximately $46.22 billion, down 1.22% from 2022 (see https://macrotrends.net/global-metrics/countrie/HRV /croatia/imports).

Analyzing the evolution of imports as a percentage of GDP during the period 1995-2023, a general upward trend is noted, with significant decreases during the global financial crisis of 2008-2010

and the COVID-19 pandemic of 2020. The average of imports during this interval is 44.46%, with a standard deviation of 6.55% and a coefficient of variation of 14.73%, which indicates moderate variability and relatively low dispersion compared to the average.

The stationarity of the initial series is verified by the Dickey-Fuller test applied to a model with constant and linear trend. Since the test probability is 0.2318 (Table 5), a value higher than the threshold of 0.05, the null hypothesis is accepted, confirming that the initial series is not stationary and has a unit root. By applying the first differencing, the series D(IMPORT) is obtained, which becomes stationary according to the Dickey-Fuller test, with a probability of 0.0007. Given this result, the use of the differencing series for ARIMA modeling is considered appropriate.

Analyzing the D(IMPORT) correlogram, the ARIMA (1,1,1) model was selected (Table 8), satisfying all validation conditions. The forecast is presented in Table 9 and illustrated graphically, with the confidence interval, in Figure 4. Comparatively, historical data and forecasts are represented together in Figure 5. The ARIMA (1,1,1) model provides estimates for the evolution of imports in the coming years, indicating a trend of stability, without significant variations during this period.

Table 8. ARIMA (1,1,1) model to D(IMPORT) for Croatia

Dependent variable: D(IMPORT)			
Variable	***Coefficient***	***t-Statistic***	***Prob.***
C	0.552398	2.277198	0.0320
AR(1)	0.504071	2.908064	0.0077
MA(1)	-0.934997	-17.91642	0.0000
R-squared	0.181771	Akaike info criterion	5.875864
Adjusted R-squared	0.113585	Schwarz criterion	6.019845
Durbin-Watson stat.	1.793291	F-statistic	2.665816
		Prob(F-statistic)	0.090053
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.081350	Probability	0.922147
ARCH Test:			
F-statistic	0.174405	Probability	0.679939

Source: *Authors' calculations with Eviews software*

Table 9. Croatia imports forecasts

Model	Forecast 2024	Forecast 2025	Forecast 2026
ARIMA (1,1,1)	54.16%	54.13%	54.39%

Source: *Authors' calculations with Eviews software*

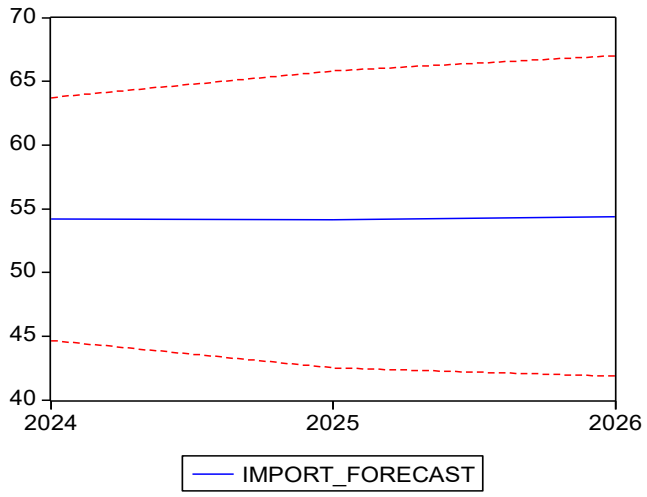

Figure 4. Forecast and confidence interval of imports for Croatia (% of GDP)

Figure 5. Imports in the period 1995-2023 and forecast for 2024-2026 in Croatia (% of GDP)

4.3 Czech Republic

In 2004, the Czech Republic's imports of goods and services totaled approximately USD 67.61 billion, representing 56.43% of the country's GDP. In 2020, imports of goods and services decreased by 9.33% compared to 2019, due to the Covid 19 pandemic. In 2021, the Czech Republic's total imports were approximately USD 196.60 billion, up 26.47% from 2020, when imports were USD 155.45 billion. In 2023, total imports were approximately USD 221.39 billion, up 0.96% from 2022, when imports were USD 219.29 billion (see https://macrotrends.net/global-metrics/countries/CZE/czechia/imports).

The average of imports as a percentage of GDP for the period 1995-2023 is 59.41%, with a standard deviation of 10.79%, indicating a moderate fluctuation. The coefficient of variation of 18.15% confirms a moderate variability around the mean, which remains representative. In order to apply the ARIMA method in making forecasts, the stationarity of the initial series is verified by the Dickey-Fuller test, using a model with constant and trend. Since the probability associated with the test is 0.4807, the null hypothesis is accepted, which confirms that the initial series is not stationary and has a unit root (Table 5). By applying the first differentiation, the series D(IMPORT) is obtained, which becomes stationary, a fact confirmed by the Dickey-Fuller test, with a probability of 0.0021.

Using the D(IMPORT) correlogram, several ARIMA models were tested. Among the valid models, ARIMA (4,1,3) was selected as the most appropriate, which meets all validation conditions (Table 10). The forecast for imports is presented in Table 11 and illustrated graphically, with the confidence interval, in Figure 6. For comparison, historical data and the forecast are represented together in Figure 7. The ARIMA (4,1,3) model indicates a decreasing trend in imports in 2024 and 2025, followed by an increase in 2026.

Table 10. ARIMA (4,1,3) model to D(IMPORT) for Czech Republic

Dependent variable: D(IMPORT)			
Variable	***Coefficient***	***t-Statistic***	***Prob.***
C	0.056408	0.065446	0.9484
AR(4)	0.510666	2.444441	0.0234
MA(3)	-0.893951	-24.93308	0.0000
R-squared	0.296956	Akaike info criterion	5.694351
Adjusted R-squared	0.229999	Schwarz criterion	5.841608
Durbin-Watson stat.	1.605011	F-statistic	4.435048
		Prob(F-statistic)	0.024735
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.582486	Probability	0.568174
ARCH Test:			
F-statistic	0.264189	Probability	0.612623

Source: Authors' calculations with Eviews software

Table 11. Czech Republic imports forecasts

Model	Forecast 2024	Forecast 2025	Forecast 2026
ARIMA (4,1,3)	59.26%	59.32%	67.89%

***Source**: Authors' calculations with Eviews software*

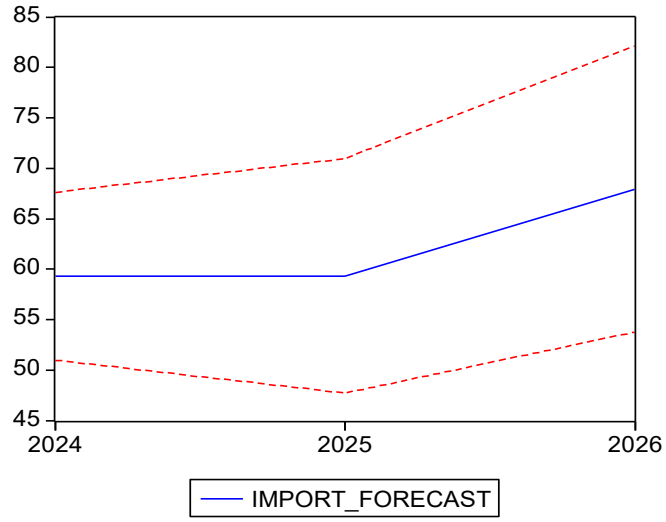

Figure 6. Forecast and confidence interval of imports for Czech Republic (% of GDP)

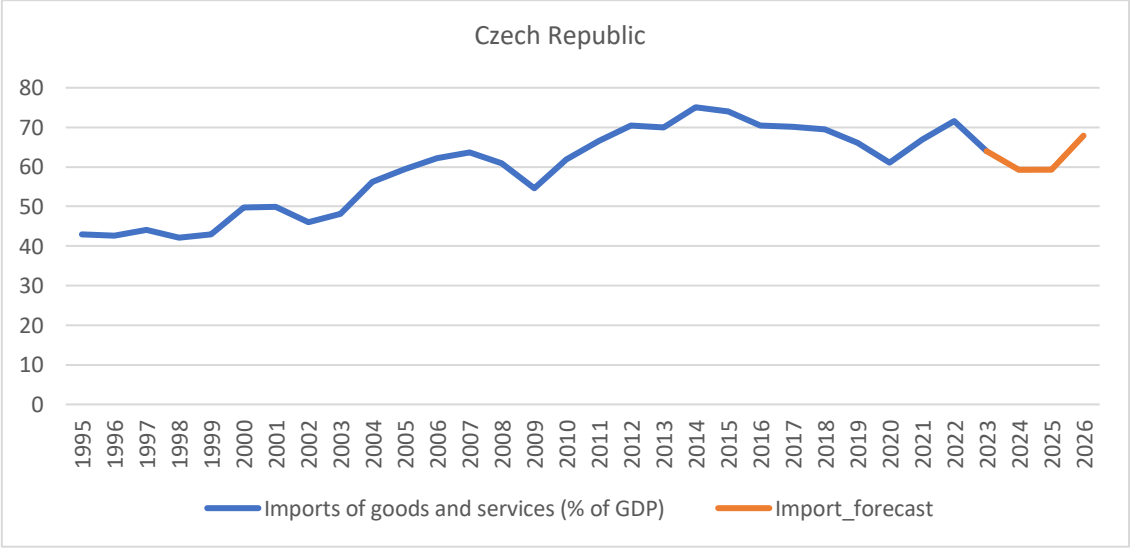

Figure 7. Imports in the period 1995-2023 and forecast for 2024-2026 in Czech Republic (% of GDP)

4.4 Hungary

Between 1995 and 2023, Hungary experienced a significant increase in imports of goods and services, reflecting its integration into the global economy and the European Union. In the period January-September 2023, imports of goods decreased by 5.2%, reaching EUR 105.9 billion compared to the same period of the previous year. This decline in imports was attributed to the adjustment of domestic demand, influenced by inflationary pressures and economic uncertainties. In 2014, Hungary recorded a value of imports of goods and services of approximately 81.27% of its GDP.

In 2022, imports of goods and services recorded a significant increase reaching USD 167.90 billion, representing 94.86% of GDP. Imports were characterized by a significant increase in value, boosted by global inflation and strong domestic demand, but also by geopolitical factors that influenced prices and trade flows (see https://macrotrends.net/global-metrics/countries/HUN/hungary/imports).

From the analysis of imports (% of GDP), it results that the average for the analyzed period 1995-2023 is 70.67%, with a standard deviation of 15.04% and a coefficient of variation of 20.45%, which indicates a moderate fluctuation in imports, the average being nevertheless representative. It is checked whether the initial series is stationary by applying the Dickey-Fuller test for a model with constant and trend. The probability attached to the test is 0.222 and it results that the null hypothesis is accepted, the initial series is not stationary (Table 5). The first difference is calculated and a new series D(IMPORT) is obtained, which is stationary, because the probability attached to the Dickey-Fuller test is 0.0006 and the null hypothesis is rejected.

The analysis of the D(IMPORT) series correlogram led to the identification of ARIMA (6,1,1) model, having all validation conditions satisfied (Table 12). The forecast is presented in Table 13 and graphically illustrated, together with the confidence interval, in Figure 8. Comparatively, the actual values and estimates are represented together in Figure 9, indicating a stabilization of imports in the following years.

Table 12. ARIMA (6,1,1) model to D(IMPORT) for Hungary

Dependent variable: D(IMPORT)			
Variable	***Coefficient***	***t-Statistic***	***Prob.***
C	0.366477	0.698245	0.4935
AR(6)	0.435321	2.192420	0.0410
MA(1)	-0.934167	-21.69789	0.0000
R-squared	0.429822	Akaike info criterion	6.237039
Adjusted R-squared	0.369803	Schwarz criterion	6.385817
Durbin-Watson stat.	1.841091	F-statistic	7.161449
		Prob(F-statistic)	0.004810
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.055140	Probability	0.946521
ARCH Test:			
F-statistic	0.058137	Probability	0.812048

Source: *Authors' calculations with Eviews software*

Table 13. Hungary imports forecasts

Model	Forecast 2024	Forecast 2025	Forecast 2026
ARIMA (6,1,1)	82.63%	82.72%	81.85%

Source: *Authors' calculations with Eviews software*

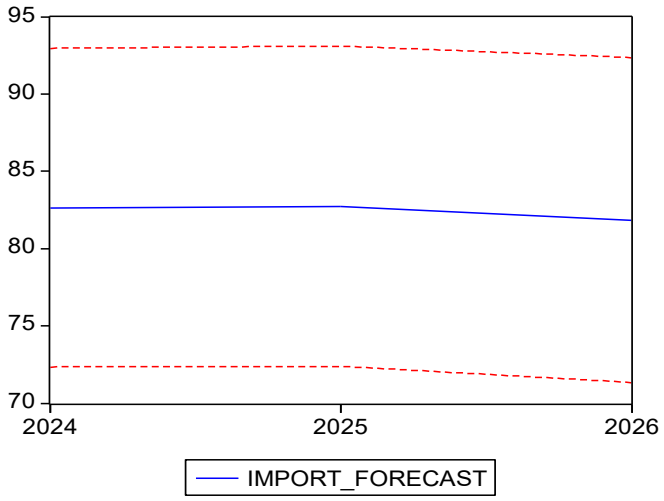

Figure 8. Forecast and confidence interval of imports for Hungary (% of GDP)

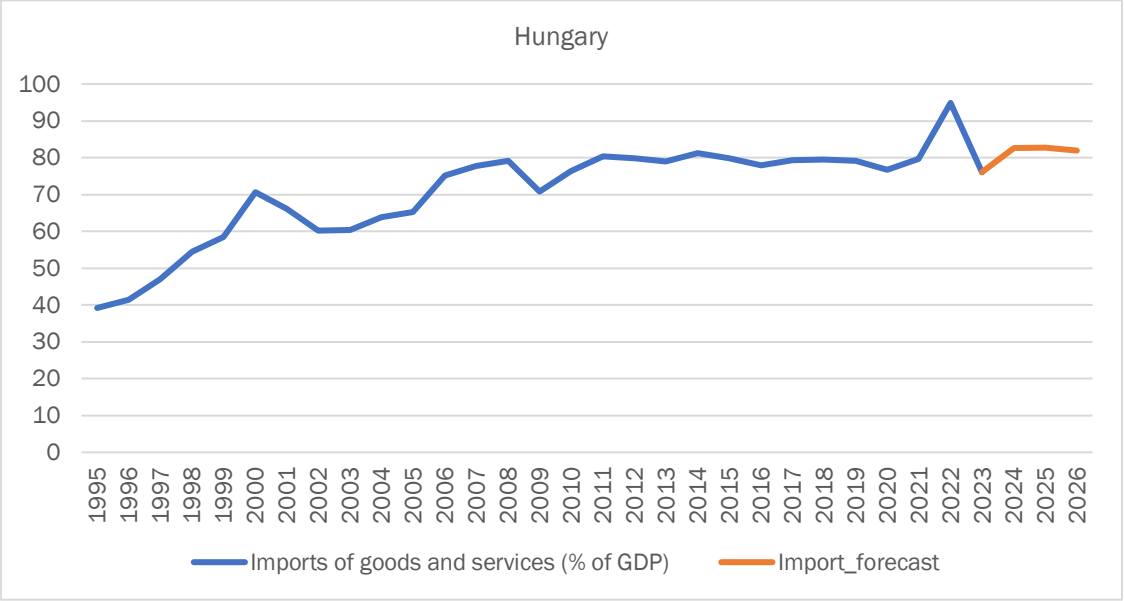

Figure 9. Imports in the period 1995-2023 and forecast for 2024-2026 in Hungary (% of GDP)

4.5 Poland

Poland has enjoyed steady economic growth in recent decades, even during global economic crises. Since the 1990s, the economy has grown significantly, and the country avoided recession during the 2008 global financial crisis. Poland has also been one of the few European economies to experience continued expansion in the post-pandemic period. Between 1995 and 2023, Poland experienced significant changes in the structure and volume of imports of goods and services, reflecting economic development and integration into international markets. Poland's imports have been growing steadily in recent decades as the economy has expanded and local industries have diversified. After joining the EU in 2004, Poland has benefited from wider access to European markets, which has led to an increase in imports of goods and services. In 2004, imports of goods and services accounted for approximately 37.21% of Poland's GDP.

Poland's imports in 2023 were USD 419.60 billion, which represents a small decrease of 0.44% compared to 2022. This suggests a slight stagnation in foreign trade, possibly due to international economic or political factors. In 2022, imports were USD 421.47 billion, recording a significant increase of 13.75% compared to 2021. This indicates a post-pandemic economic recovery, with higher demand for products and raw materials for industry and consumption. Poland's imports in 2021 were USD 370.53 billion, which represents a strong increase of 30.59% compared to 2020. This reflected a significant economic recovery after the impact of the economic crisis generated by the COVID-19 pandemic. In 2020, the value of imports of goods and services was USD 283.74 billion, a decrease of 3.82% compared to 2019. This decrease is in line with the reduction in

global economic activity following the pandemic, which led to a general decrease in international demand for products (see https://macrotrends.net/global-metrics/countries/POL/poland/imports).

From the analysis of imports as a percentage of GDP, it results that the average of the analyzed period 1995-2023 is 40.55%, with a standard deviation of 9.45% and a coefficient of variation of 23.31%, which indicates a significant volatility of imports in relation to the average, which is still representative. To check whether the original series is stationary, the Dickey-Fuller test is applied to a model with constant and trend. The test result indicates a probability of 0.6188, which leads to the acceptance of the null hypothesis, thus confirming that the original series is not stationary (Table 5). To remedy this, the first difference of the series is calculated, obtaining a new series, D(IMPORT), which becomes stationary.

The analysis of the D(IMPORT) correlogram led to the identification of ARIMA (3,1,2) model, having all validation conditions satisfied (Table 14). The import forecast is presented in Table 15 and given, with confidence intervals, in Figure 10. The actual values and estimates are plotted together in Figure 11, highlighting a trend of increasing imports as a percentage of GDP in the coming years.

Table 14. ARIMA (3,1,2) model to D(IMPORT) for Poland

Dependent variable: D(IMPORT)			
Variable	***Coefficient***	***t-Statistic***	***Prob.***
C	0.918056	9.527404	0.0000
AR(3)	-0.626738	-4.462080	0.0002
MA(2)	-0.889744	-22.47087	0.0000
R-squared	0.434121	Akaike info criterion	4.906568
Adjusted R-squared	0.382677	Schwarz criterion	5.052833
Durbin-Watson stat.	2.055374	F-statistic	8.438771
		Prob(F-statistic)	0.001905
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.854271	Probability	0.081194
ARCH Test:			
F-statistic	0.265954	Probability	0.611203

Source: Authors' calculations with Eviews software

Table 15. Poland imports forecasts

Model	Forecast 2024	Forecast 2025	Forecast 2026
ARIMA (3,1,2)	46.99%	50.14%	56.84%

Source: Authors' calculations with Eviews software

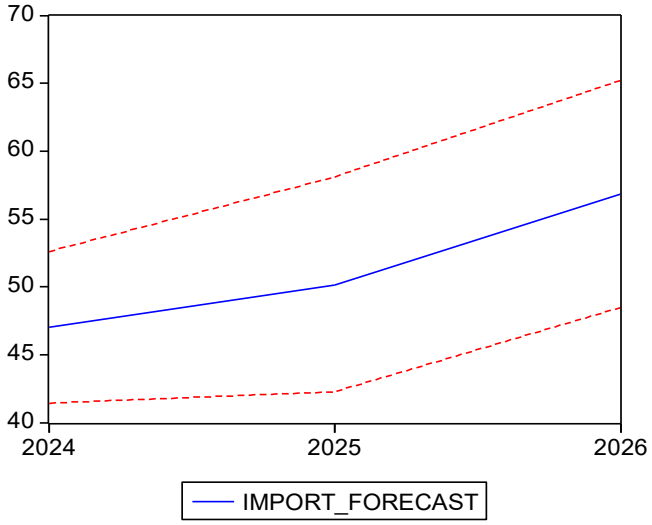

Figure 10. Forecast and confidence interval of imports for Poland (% of GDP)

Figure 11. Imports in the period 1995-2023 and forecast for 2024-2026 in Poland (% of GDP)

4.6 Romania

During 1995-2000, Romania went through a period of transition from a centralized to a market economy. During this period, imports were influenced by the privatization process, the alignment of the Romanian economy with international standards and the requirements of the developing domestic market. Imports focused mainly on raw materials, industrial equipment and new technologies for the modernization of industry. During 2000-2007, Romania made significant progress towards economic integration into the European Union. In 2004, Romania became a member of NATO, and in 2007 it officially joined the European Union. These events had a significant impact on Romania's foreign trade, and imports continued to grow as the country accessed European markets and benefited from European funds for the development of infrastructure and other economic sectors.

Imports from Romania in 2010 were 64.88 billion USD, which represents an increase of 14.85% compared to 2009. This suggests a recovery of the economy after the significant decrease in 2009, registering a slight increase in 2010. In 2009, imports were 56.49 billion USD, which represented a significant decrease of 32.45% compared to 2008. This decrease is due to the effects of the global economic crisis in 2008, which had a negative impact on international trade and domestic demand. In 2008, the value of imports of goods and services was 83.63 billion USD, with an increase of 23.48% compared to 2007. This shows a significant expansion of foreign trade before the global financial crisis, characterized by increased consumption and imports of products and raw materials. The value of imports into Romania in 2007 was 67.73 billion USD, a large increase of 50.38% compared to 2006. This suggests a period of rapid economic expansion, when Romania integrated more fully into international economies, and imports increased significantly, mainly due to domestic demand and foreign investment (see https://macrotrends.net/global-metrics/countries/ROU/romania/imports).

During the period 1995-2023, the imports average is 37.99% (% of GDP), with a standard deviation of 5.99%. The minimum value, 26.93%, was recorded in 2000, while the maximum value, 50.26%, was reached in 2022. The coefficient of variation, 15.78%, indicates moderate variability and a representative mean. To determine the stationarity of the series, the Dickey-Fuller test with constant and trend was applied. The test result indicates a probability of 0.0475, lower than the threshold of 0.05, which confirms that the series is stationary at a significance level of 5% (Table 5). The ARMA (1,3) model was selected as the best fit, which meets all validation conditions (Table 16).

The forecasts are presented in Table 17 and graphically illustrated in Figure 12, together with the 95% confidence interval. In comparison, the actual data and the forecast are plotted in Figure 13, indicating an increase in imports as a percentage of GDP in 2025, followed by a slight decrease in 2026.

Table 16. ARMA (1,3) model to IMPORT for Romania

Dependent variable: D(IMPORT)			
Variable	***Coefficient***	***t-Statistic***	***Prob.***
C	40.51320	9.921435	0.0000
AR(1)	0.790527	6.445276	0.0000
MA(3)	0.414646	2.098804	0.0461
R-squared	0.756155	Akaike info criterion	5.167139
Adjusted R-squared	0.736647	Schwarz criterion	5.309875
Durbin-Watson stat.	2.013457	F-statistic	38.76205
		Prob(F-statistic)	0.000000
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.260791	Probability	0.772689
ARCH Test:			
F-statistic	0.331857	Probability	0.569718

Source: Authors' calculations with Eviews software

Table 17. Romania imports forecasts

Model	Forecast 2024	Forecast 2025	Forecast 2026
ARMA (1,3)	45.11%	46.46%	43.98%

Source: Authors' calculations with Eviews software

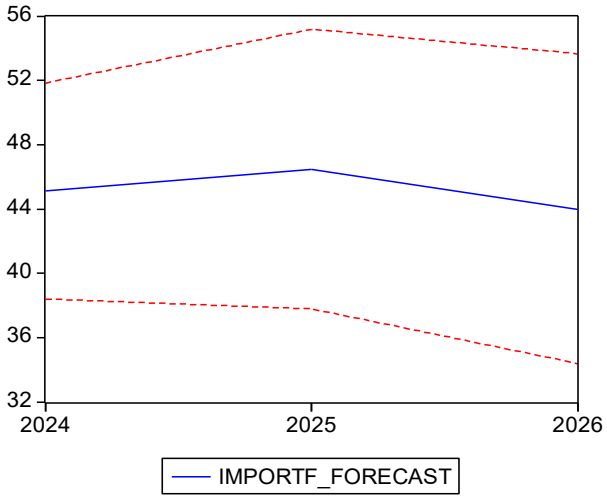

Figure 12. Forecast and confidence interval of imports for Romania (% of GDP)

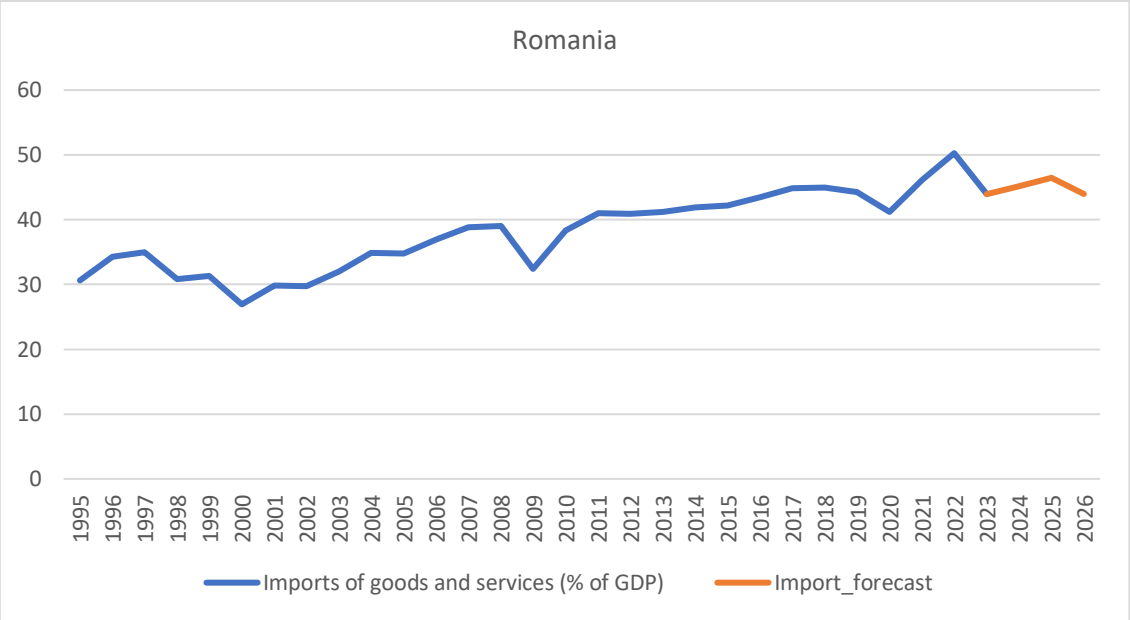

Figure 13. Imports in the period 1995-2023 and forecast for 2024-2026 in Romania (% of GDP)

4.6 Slovakia

After 1995, Slovakia began the transition from a centrally planned economy to a market economy. In 2004, the country joined the European Union, which facilitated the growth of imports and exports due to the elimination of trade barriers and the harmonization of legislation. After joining the EU, Slovakia experienced sustained economic growth, and in 2009 it adopted the euro. This change strengthened economic integration and stimulated international trade. Imports and exports increased, reflecting both domestic demand and integration into global supply chains. Slovakia imports for 2023 were 119.64 billion US dollars, a 1.09% decline from 2022, and for 2022 were 120.96 billion US dollars, a 10.72% increase from 2021 (see https://macrotrends.net/global-metrics/countries/SVK/slovak-republic/imports).

For the analyzed period 1995-2023, the average is 77.55%, with a standard deviation of 14.43% and a coefficient of variation of 18.61%. These indicators reflect a moderate variability, meaning that the values are dispersed from the average, but it remains representative. It is checked whether the initial series is stationary by applying the Dickey-Fuller test for a model with constant and trend. Since the probability attached to the test is 0.0947, the initial series is not stationary (Table 5). The first difference is applied to the initial series and a new series D(IMPORT) results, which is stationary because the probability attached to the Dickey-Fuller test is 0.0005. For prediction, the ARIMA (5,1,5) model was selected, having fulfilled all validation conditions (Table

18). The forecast is found in Table 19 and is graphically represented, together with the confidence interval, in Figure 14. Historical data and forecasts are given in Figure 15. The ARIMA (5,1,5) model generates forecasts for the period 2024-2026, and these indicate a slight increase in the level of imports as a percentage of GDP.

Table 18. ARIMA (5,1,5) model to D(IMPORT) for Slovakia

Dependent variable: D(IMPORT)			
Variable	***Coefficient***	***t-Statistic***	***Prob.***
C	0.360419	0.140685	0.8895
AR(5)	0.609556	2.682566	0.0143
MA(5)	-0.790168	-9.768601	0.0000
R-squared	0.213379	Akaike info criterion	6.687543
Adjusted R-squared	0.134717	Schwarz criterion	6.835651
Durbin-Watson stat.	2.232933	F-statistic	2.712610
		Prob(F-statistic)	0.090709
Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	2.043492	Probability	0.158571
ARCH Test:			
F-statistic	2.162002	Probability	0.144047

Source: *Authors' calculations with Eviews software*

Table 19. Slovakia imports forecasts

Model	Forecast 2024	Forecast 2025	Forecast 2026
ARIMA (5,1,5)	90.94%	92.15%	91.99%

Source: *Authors' calculations with Eviews software*

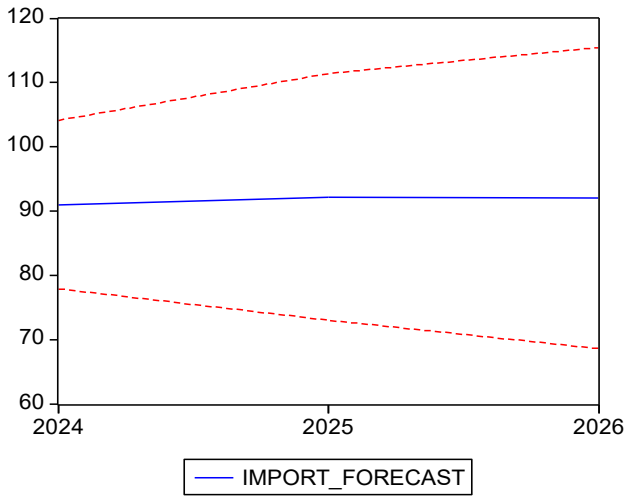

Figure 14. Forecast and confidence interval of imports for Slovakia (% of GDP)

Figure 15. Imports in the period 1995-2023 and forecast for 2024-2026 in Slovakia (% of GDP)

5. Conclusions and Further Developments

The analysis found that most countries experienced an increase in imports as a percentage of GDP, suggesting greater economic integration into international markets. There were also strong correlations between Central European countries: the Czech Republic, Slovakia, Hungary and Poland have a high interdependence in terms of import developments.

In terms of differences, Croatia has an import profile that is less synchronized with the other countries, possibly oriented to tourism and service sector. Slovakia has a distinct import pattern from all other countries and Poland shows greater economic convergence with Croatia and Romania. Bulgaria and the Czech Republic are closer in terms of imports, but differ from Romania and Hungary in terms of economic structure and international integration.

In conclusion, the study highlights that, although there is a general trend of increasing imports in these countries, differences in economic structure, integration into the European Union and the

specificities of each economy influence import patterns and the interdependence between economies.

For Bulgaria, there was an accelerated increase in the 2000s, with peaks exceeding 70% of GDP. In 2022, a high point was recorded (68.8%), followed by a decrease in 2023. The forecast suggests a stabilization below recent peaks, possibly due to reduced external demand or fiscal adjustments.

In Croatia, imports have steadily increased since the 1990s, remaining between 45–50% during the 2000s and reaching a peak of 65.7% in 2022 (post-pandemic). The forecast indicates stabilization following the post-COVID growth and aligns with the average from 2010–2020. There are no signs of major growth, suggesting a consistent level of external openness.

In Czech Republic, a steady trend was observed until 2014–2016, followed by stabilization around 65–70%, with a peak in 2022 (71.6%) and a drop in 2023 (63.9%). The forecast for 2026 suggests a return to historically high levels. The 2023 decline might be transitory, and the model anticipates a new cycle of import growth.

Hungary has shown a very high level of imports since the 2000s (75–80%), with a peak in 2022 (94.9%) and a slight decrease in 2023. It remains at a structurally high level, confirming Hungary's strong dependence on international trade. The forecast is consistent with historical data.

For Poland, there has been a gradual increase from 20% in 1995 to approximately 60% in 2022. After a decline in 2023, the model suggests a gradual return to the 2022 level. This evolution is coherent with the historical trajectory.

In Romania, the level of imports is lower than in the other countries, generally between 30–45%. The forecasts remain between 43.9–46.5%. No major structural changes are expected. The economy seems to be less dependent on imports compared to neighboring countries.

Slovakia shows an extremely high level of imports, frequently above 85%, reaching 104.9% in 2022, with forecasts of 90.9–92.1% for 2024–2026, maintaining historically high values. The Slovak economy remains the most import-dependent among all the countries analyzed.

In terms of further developments, we intend to analyze the exports of these countries and the trade balance, to observe the differences and similarities between them and possible trade policies that can be adopted.

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Annex 1

Imports of goods and services (% of GDP)

Years	Croatia	Czechia	Hungary	Poland	Romania	Bulgaria	Slovakia
1995	35.497557	42.9725596	39.19622485	20.70148189	30.6611831	22.92320078	53.91635502
1996	36.7469841	42.7005209	41.40941732	23.39263968	34.3238758	37.32373663	61.92047243
1997	43.8397827	44.1351316	46.94329995	27.12119449	35.008098	36.88754893	63.76746072
1998	35.8478773	42.1248439	54.49971454	30.68571316	30.8233151	35.10385737	56.41718614
1999	36.1266397	42.9663362	58.38211939	29.90122607	31.3118578	47.32517385	51.12775378
2000	39.5121606	49.6761679	70.54871146	33.53750121	26.9324411	41.5268474	55.63399613
2001	42.3066747	49.9150323	66.16774793	30.82127326	29.8226276	44.20005133	64.67062201
2002	45.269451	46.0995257	60.18313559	32.17340076	29.6972185	41.62230729	63.50078214
2003	45.8969453	48.079537	60.28498886	35.97478121	31.966792	44.59693949	63.22270971
2004	45.0827265	56.2744978	63.88404694	36.91940696	34.8825424	52.10725769	70.87796338
2005	45.0896838	59.4324209	65.29789423	35.78601681	34.8253288	57.18464546	76.07532047
2006	45.9655145	62.1640325	75.22804813	40.04276232	36.9123994	64.06958412	83.71185606
2007	45.7905446	63.7261972	77.67868554	42.27428264	38.7943276	71.17752332	83.20278263

Years	Croatia	Czechia	Hungary	Poland	Romania	Bulgaria	Slovakia
2008	46.1001069	60.8705893	79.14437916	42.90590886	39.0197013	72.21108847	82.26000558
2009	37.5971499	54.5734703	70.77564397	37.96454606	32.4476813	50.47379552	68.6182956
2010	37.1392023	61.8648821	76.35760956	42.33364548	38.3133422	53.28247738	78.0274156
2011	39.7228171	66.5002179	80.35548631	44.60549831	41.0347476	58.62989637	84.54502419
2012	40.3010489	70.3753849	79.76926699	44.80700167	40.885961	63.62504802	86.06009551
2013	41.445201	69.9218352	78.93528785	44.65021908	41.1522496	65.12370434	88.02411425
2014	42.795684	75.0640876	81.27112978	45.81334768	41.898431	65.69756616	86.31630711
2015	45.2154499	74.0058339	79.7939941	45.09379055	42.1713831	62.95022497	88.73217328
2016	45.5142407	70.4386717	77.99918943	46.95947394	43.4761931	58.94458383	90.44569259
2017	48.3080209	70.0664022	79.30895155	48.87336767	44.8217904	62.64390763	92.69227053
2018	49.9586073	69.5319364	79.50519641	50.20988672	44.9948591	63.10043115	93.80613205
2019	50.8927783	66.0297589	79.22160267	48.96814034	44.2883976	60.84767606	91.87852212
2020	48.2564222	61.0194571	76.74758529	46.82520571	41.1591529	53.90000941	83.23582987
2021	52.5287254	66.8280712	79.74713584	53.83630695	46.1329458	59.33669731	91.15650163
2022	65.7168861	71.602066	94.85574347	60.66881661	50.2604124	68.86305611	104.8987103
2023	54.7667601	63.9787561	76.09204416	52.35317982	43.9378668	57.78280437	90.36593294

***Source**: https://data.worldbank.org/indicator/NE.IMP.GNFS.ZS*