

## Romania's Bilateral Trading Relationships during the Health Crisis

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### **Abstract**

*This paper starts from the influences that the health crisis determined by the COVID-19 virus had on economies of the world. The economic crisis that has evolved from the health crisis affected economic life at all levels (global, national, industry, and company levels). The purpose of the paper is to analyze how one aspect of the economic life in Romania has been affected by the COVID-19 health crisis, namely its international trade activity. An analysis of bilateral trading relationships between Romania and its main trading partners in terms of both exports and imports is conducted for the year 2020. The research method used is multiple regression with exports and imports as dependent variables and the COVID-19 burden and other economic indicators as independent variables. The findings of the paper illustrate that both the GDP of Romania and the COVID-19 burden in both Romania and the partner countries influenced the bilateral trading relationships of Romania with its main trading partners. Romanian imports were more affected by the COVID-19 burden, especially by the number of deaths due to COVID-19. Therefore, based on the country case studied, it can be concluded that global sanitary crises do influence the international trade relationships of countries and specific measures need to be taken to support and maintain international trade flows during such crises.*

### **Keywords**

*International trade; bilateral trade relationship; economic impact of the COVID-19 health crisis; Romania.*

## **Introduction**

The present COVID-19 health crisis is seen as affecting the entire world at unprecedented and unexpected levels (Tudorache & Nicolescu, 2021). Authors (Bremmer, 2020; Manyika, 2020) believe that the COVID-19 health crisis impacts economies and societies at multiple levels while transforming itself rapidly in a global economic crisis. The economic effect of the health crisis is seen to manifest at levels such as world level, national level, industry level, company level, and individual level (Ibn-Mohammed et al., 2021; Belhadi et al., 2021).

In this study, the global and the national levels are approached, by analyzing the influence of the COVID-19 crisis on economic interdependencies between countries, namely for foreign trade. The purpose of the paper is to identify what is the extent to

which the COVID-19 crisis impacted the foreign trade relationships between countries, based on the case study of Romania.

The paper is organized as follows: the next section looks at foreign trade and some common influencing factors for this economic activity, as they are presented in the literature. This section is followed by the methodology section that presents the model used for the analysis. The findings of the analysis are included in the third section that illustrates how the bilateral top trade relationships of Romania for the year 2020 were influenced by the COVID-19 crisis. The paper ends with the conclusion section that emphasizes the practical contributions of the paper.

### **Foreign trade, influencing factors, and the COVID-19 crisis**

The year 2020, as the year in which the COVID-19 health crisis debuted, showed according to specialists, that economic interdependencies at the world level have been affected by the health crisis. Among the main influences of the COVID-19 crisis on the economic connections between countries, as identified in the literature, are the disruption of global supply chains (Garofali, 2020), global production processes have been also disrupted (Rebelo, 2020), international business networks becoming dis-functional (Zahra, 2020) and trade flows between countries were influenced negatively by the health crisis (Gruszczynski, 2020).

In this context, the present study tries to analyze how international trade evolved during the health crisis, by taking into consideration two categories of influencing factors:

- a) The sanitary factors represent the first category of factors considered. In the present case, the sanitary factors are represented by the COVID-19 burden, as defined by Hayakawa and Mukunoki (2020): the number of COVID-19 cases in a country and as the number of COVID-19 deaths in a country and
- b) The classical economic factors, considered influencers of the foreign trade activity of a country represent the second category of factors looked at. Examples of classical factors identified in the literature are the GDP (Hayakawa & Mukunoki, 2020; Whitten et al., 2021), political relations among countries (Whitten et al., 2021), inflation (Bi et al., 2019), but also geography and physical distance, a country's population, exchange rate, trade agreements (Umutesi, 2018). Among those, GDP is the most important factor, as the evolution of a country's GDP represents an indicator of the economic growth of that country that further influences the country's foreign trade (Umutesi, 2018).

The COVID-19 health crisis is a very recent event that is still ongoing at the global level and the phenomenon caught the interest of numerous researchers due to its multiple effects. So, many studies started to be conducted in relation to the COVID-19 crisis and its influences on the whole world, but very few studies were concerned with the effect of the COVID-19 crisis on foreign trade (Tudorache & Nicolescu, 2021). At the same time, specialists consider that is necessary and call researchers to conduct studies about the influence of the COVID-19 crisis at all levels (Zahra, 2020) to better understand how the health crisis influences economic life.

The present research comes to fill in some of the existing research gaps, by analyzing the impact of the COVID-19 on bilateral foreign trade, on the example of Romania's foreign trade relationships for the year 2020 with its top trading partners.

### Methodology

The main goal of the present paper is to measure the impact that the COVID-19 health crisis on international trade activity. The country of analysis is Romania and its main bilateral trading relationships are analyzed for the year 2020, the starting year of the COVID-19 health crisis. For this purpose, it is used a model has been advanced and tested by Hayakawa and Mukunoki (2020). Based on this trade model, the models of analysis for the present paper are designed and presented in equations 1a) and 1b).

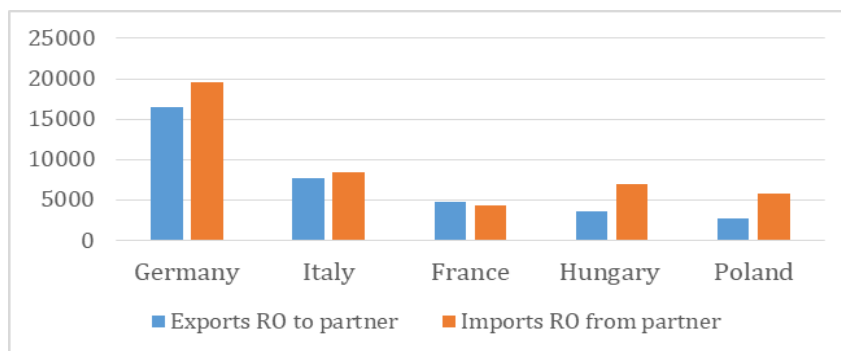
$$\log \text{EXP}_{\text{RO-}i,t} = \beta_0 + \beta_1 \log \text{GDP}_{\text{RO},t} + \beta_2 \log \text{GDP}_{i,t} + \beta_3 \log \text{COVCASES}_{\text{RO},t} + \beta_4 \log \text{COVCASES}_{i,t} + \beta_5 \log \text{COVDEATHS}_{\text{RO},t} + \beta_6 \log \text{COVDEATHS}_{i,t} + \varepsilon_{it} \quad (1a)$$

$$\log \text{IMP}_{\text{RO-}i,t} = \beta_0 + \beta_1 \log \text{GDP}_{\text{RO},t} + \beta_2 \log \text{GDP}_{i,t} + \beta_3 \log \text{COVCASES}_{\text{RO},t} + \beta_4 \log \text{COVCASES}_{i,t} + \beta_5 \log \text{COVDEATHS}_{\text{RO},t} + \beta_6 \log \text{COVDEATHS}_{i,t} + \varepsilon_{it} \quad (1b)$$

where,  $\text{EXP}_{\text{RO-}i,t}$  represents the exports from Romania to partner country  $i$  at moment  $t$  and  $\text{IMP}_{\text{RO-}i,t}$  represents the imports of Romania from the partner country  $i$  at moment in time  $t$  (a month in our case), while  $\beta_0$  is the intercept and  $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5,$  and  $\beta_6,$  are the regression coefficients for the GDP in Romania, GDP in the partner country, the number of cases of COVID-19 in Romania, the number of cases of COVID-19 in the partner country, the number of deaths due to COVID-19 in Romania, the number of deaths due to COVID-19 in the partner country and  $i$  and  $t$  subscripts represent the partner country and the year.  $\varepsilon_{it}$  is the error term.

The COVID-19 burden was measured by the use of two indicators, respectively the number of COVID-cases and the number of COVID-19 deaths. The GDP was also considered as one important economic factor that can influence the international trade of a country (Umutesi, 2018). There were used monthly data that were collected from databases of the international organizations as follows: exports and imports: World Trade Organization; COVID-19 burden: the European Centre for Disease Prevention and Control of EU; quarterly GDP (that has been decomposed in monthly data): Eurostat.

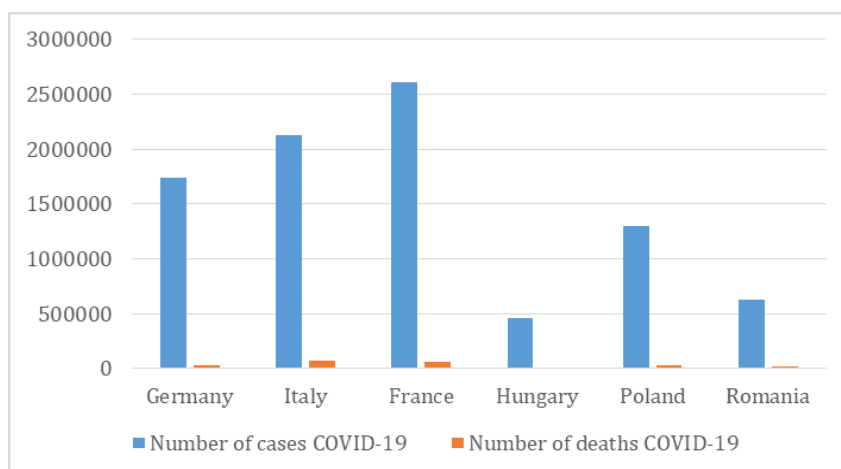
The top five trading partners of Romania for both exports and imports in the year 2020 have been selected to analyze the bilateral trading relationships of Romania with them and the extent to which they have been influenced by the evolution of the sanitary crisis. Figure 1 presents the top five trading partners (for exports and imports) of Romania and the corresponding level of trade (mill. Euros) during 2020. It can be noticed that the main top five partners of Romania for exports were Germany, Italy, France, Hungary, and Poland, whereas for imports were Germany, Italy, Hungary, Poland, and France.



**Figure 1. Top 5 trading partners of Romania in 2020**  
(IMF, 2021, interactive database)

The bilateral trading relationships of the five countries were analyzed using the presented trade models.

Figure 2 presents the COVID-19 burden in the five countries whose trading relationships with Romania were analyzed for the year 2020, in terms of both the total number of COVID-19 cases and the total number of COVID-19 deaths.



**Figure 2. COVID-19 burden in Romania and its top 5 trading partners in 2020**  
(European Centre for Disease Prevention and Control EU, 2021, interactive database)

### Validity of the regression models

The first step in the analysis process is to see if the considered trade models have been validated by the data collected and analyzed. Table 1 presents the validity of the regression models applied to the five countries considered.

**Table 1. Validity of the regression models**

Trade partners countries of Romania 2020	Exports RO to partner		Imports RO from partner	
	R <sup>2</sup>	P-value	R <sup>2</sup>	P-value
<b>Germany</b>	0.9627	0.0300	0.993	0.000
<b>Italy</b>	0.7898	0.323	0.9076	0.109
<b>France</b>	0.9404	0.0591	0.990	0.003
<b>Hungary</b>	0.9897	0.0044	0.9935	0.002
<b>Poland</b>	0.9648	0.0276	0.9900	0.004

*Authors' calculation*

It can be observed that there were four out of five countries for which the models were valid for both exports and imports (and the way they were influenced by the COVID-19 burden), respectively Germany, France, Hungary, and Poland, while only for Italy the regression model for imports was valid at a 10% threshold, while the model for exports had no statistical validity. At a general level, the proposed statistical model validates this research, as well.

### **The influence of the COVID-19 burden on the top five bilateral trading relationships of Romania**

The COVID-19 burden was measured by the number of cases of COVID-19 and the number of deaths due to COVID-19 according to Hayakawa and to Mukunoki's (2020) model. Also, the models include the GDPs of the two countries whose trading relationship is analyzed, as one important influencing factor for the foreign trade of a country (Umutesi, 2018).

Table 2 presents the results of the regression analysis for Romania's exports to top partners. The study of the extent to which the bilateral exports of Romania, during the health crisis year 2020, was influenced by both GDPs of the two countries entering the bilateral relationship and the COVID-19 burden in the two countries revealed the following:

- Romania's GDP represented an influencing factor of all bilateral trading relationships of Romania with its top trading partners (except Italy). The relationship is positive and the higher the GDP of Romania, the higher the exports of Romania towards the respective country.
- in the case of the partner country in trade, the GDP has a statistically verified relationship only in the case of Hungary and the relationship is negative, as an increase in Hungary's GDP with 1 mill. Euros determines a decrease in Romania's exports towards Hungary with around 11 mills. Euros. The trading relationship in terms of Romanian exports with France and Poland has a weaker statistical significance, but a similar negative relationship between the size of the partner country's GDP and Romania's exports towards the respective country.

**Table 2. The influence of the COVID-19 burden on Romania's top 5 exporting partners - results**

Exporting top 5 partners of Romania 2020	Factors											
	GDP - RO		GDP - partner		COVID-19 cases RO		COVID-19 cases partner		COVID-19 deaths RO		COVID-19 deaths partner	
	$\beta_1$	P-value	$\beta_2$	P-value	$\beta_3$	P-value	$\beta_4$	P-value	$\beta_5$	P-value	$\beta_6$	P-value
<b>Germany</b>	3.405	0.0625	-4.096	0.416	0.3137	0.1913	-0.0790	0.6075	-0.4980	0.0470	0.0148	<b>0.8880</b>
<b>Italy</b>	6.7121	0.2596	-11.535	0.342	0.3012	0.5141	0.1338	0.6194	-0.4896	0.2456	-0.10590	<b>0.6139</b>
<b>France</b>	8.8592	0.0385	-12.160	0.136	0.3647	0.3799	-0.0083	0.9548	-0.8250	0.0620	-0.01255	<b>0.8863</b>
<b>Hungary</b>	8.418	0.0067	-11.675	0.0219	0.2524	0.0760	0.0377	0.3545	-0.6073	0.0053	0.01528	<b>0.5982</b>
<b>Poland</b>	<b>5.5486</b>	<b>0.0260</b>	<b>-3.7350</b>	<b>0.1800</b>	<b>-0.1307</b>	<b>0.6499</b>	<b>0.1533</b>	<b>0.4684</b>	<b>-0.3429</b>	<b>0.2158</b>	<b>-0.05821</b>	<b>0.7272</b>

*Authors' calculation***Table 3. The influence of the COVID-19 burden on Romania's top 5 importing partners - results**

Importing top 5 partners of Romania 2020	Factors											
	GDP - RO		GDP - partner		COVID-19 cases RO		COVID-19 cases partner		COVID-19 deaths RO		COVID-19 deaths partner	
	$\beta_1$	P-value	$\beta_2$	P-value	$\beta_3$	P-value	$\beta_4$	P-value	$\beta_5$	P-value	$\beta_6$	P-value
<b>Germany</b>	3.0377	0.0005	1.3121	0.1568	0.0849	0.0655	-0.0946	0.0235	-0.3642	0.0007	0.09416	<b>0.0090</b>
<b>Italy</b>	7.1402	0.1100	-8.0706	0.3161	0.0934	0.7501	-0.0708	0.6859	-0.3872	0.1809	0.09216	<b>0.5104</b>
<b>France</b>	4.3701	0.0062	-0.8289	0.6242	0.1020	0.3368	-0.1295	0.0324	-0.4541	0.0079	0.11693	<b>0.0104</b>
<b>Hungary</b>	0.9139	0.2766	3.4653	0.0987	-0.0761	0.2399	-0.0456	0.0957	-0.1178	0.0825	0.04867	<b>0.0425</b>
<b>Poland</b>	<b>3.0576</b>	<b>0.0126</b>	<b>-0.1551</b>	<b>0.8746</b>	<b>-0.0396</b>	<b>0.7414</b>	<b>-0.0224</b>	<b>0.7921</b>	<b>-0.2946</b>	<b>0.0497</b>	<b>0.0892</b>	<b>0.2579</b>

*Authors' calculation*

It can be stated that in the case of Romania, its exports (from bilateral trading relationships) are rather influenced by the Romanian level of development (measured by the GDP) than that of the partner countries' level of development. The more developed Romania is, the higher the level of its exports to partners and the more developed the partner is, the lower the level of exports of Romania towards them.

At the same time, the COVID-19 burden influence on Romania's exports was the following:

- Romania's exports were more influenced by the number of deaths due to COVID-19 in Romania, than the number of COVID-19 cases from Romania, while the relationships between Romania's exports and the COVID-burden (cases and deaths) in the partner countries were not statistically significant.
- the Romanian cases of COVID-19 only influenced Romania's exports in Hungary, while the exports towards the other top partners seem not to be influenced by the number of COVID-19 cases.
- on the other hand, the number of deaths due to COVID-19 from Romania, influenced Romania's exports towards some of its main trading partners (Germany, France, and Hungary) and the relationship is negative, with exports decreasing with the increase in the number of COVID-19 deaths.

The Romanian imports were influenced more by the considered factors in comparison with its exports, during the year 2020 of the health crisis. Table 3 presents the results of the regression analysis for Romania's imports that can be summarized as follows:

- Romania's bilateral trading relationships in terms of imports were influenced by the size of the Romanian GDP for the relationship with Germany, Italy, France, and Poland, while for the imports from Hungary, the Romanian imports did not depend on the size of the Romanian GDP. At the same time the Romanian imports from Hungary in 2020 were influenced by the GDP in Hungary with a statistical significance of 10%: the higher the GDP in Hungary, the higher the level of imports of Romania from Hungary.
- in the case of the number of Romanian cases of COVID-19, only the imports of Romania from Germany were influenced by this factor at a 10% significance level. The relationship is positive, illustrating that an increase in the number of COVID-19 cases in Romania determined an increase in the total value of imports from Germany (at one more case of COVID-19 in Romania, the Romanian imports coming from Germany increased by 84.900 Euros).
- the number of cases of COVID-19 in the partner countries had an influence on the Romanian imports from those respective countries for Germany, France, and Hungary, for Germany and France with a higher probability (95%), and for Hungary with a 90% probability.
- the number of deaths due to COVID-19 both in Romania and in the partner countries did influence the Romanian imports. The COVID-19 deaths from Romania affected the Romanian imports from Germany, France, and Poland at a 5% threshold, while the imports from Hungary were influenced at a 10% threshold. For the Romanian imports from Italy, the influence of the COVID-19 deaths from Romania was even weaker but still existent. For all countries the relationship was negative, suggesting that at an increase in the number of deaths due to COVID-19 in Romania, the Romanian imports from those respective countries decreased, with the highest decrease in the case of France.

- as far as the number of COVID-19 deaths in the partner country is concerned, the Romanian imports coming from Germany, France, and Hungary were influenced by this factor with a 95% probability. This relationship is positive, suggesting that at an increase in the number of COVID -19 cases in these countries, the Romanian imports from these countries increased, with no economic explanation. For France and Poland, the relationship was not statistically significant, suggesting that there is no influence between the Romanian imports and the number of COVID-19 deaths in these countries. Overall, it can be stated that the Romanian imports were more affected than the Romanian exports by the considered factors (GDP and COVID-19 burden) during the year 2020 of the health crisis. For both Romanian exports and Romanian imports, the Romanian GDP influenced more the relationship than the GDP of the partner country. In terms of the COVID-19 burden, the number of deaths due to COVID-19 in both countries entering the bilateral trading relationship was more influential than the number of COVID-19 cases in both countries of the bilateral trading relationships. And the number of COVID-19 deaths in Romania influenced more, both Romanian exports and Romanian imports than the number of COVID-19 deaths in the partner countries.

## Conclusions

This paper analyzed the influence of the COVID-19 burden on the trading relationships of Romania, both exports and imports, for the year 2020 of the health crisis, for the main top trading partners of Romania, namely Germany, Italy, France, Hungary, and Poland. The model used to test this relationship was developed by Hayakawa and Mukunoki (2020), was based on the regression analysis, and included as independent variables and influencing factors the GDPs of the two partners in the bilateral trading relationship and the COVID-19 burden in all countries of each bilateral trading relationship. The COVID-19 burden that a country bears was measured as the number of cases of COVID-19 and the number of deaths due to COVID-19.

The results illustrate that the regression model used was valid for four out of the five partner countries included in the study, namely for Germany, France, Hungary, and Poland. The Romanian situation in all respects (GDP, number of COVID-19 cases, and number of COVID-19 deaths) influenced more its bilateral trading relationships than the situation in the partner countries. The GDP of Romania mainly, but also the GDP of the partner countries (to a lower extent and rather for Romania's exports to those countries) influenced positively the bilateral trading relationships of Romania with its top five partners.

The number of COVID-19 deaths was a more influential factor than the number of COVID-19 cases, for both the Romanian bilateral exports and imports. The Romanian imports were more influenced by the COVID-19 burden (cases and deaths) in both countries of the bilateral relationship than the Romanian exports. In other words for the year 2020, the Romanian exports were influenced by Romania's GDP, the partner countries' GDP, and by the COVID-19 burden (mainly deaths caused by COVID-19). At the same time, the Romanian imports were influenced by Romania's GDP, the COVID-19 deaths from Romania, and the COVID-19 deaths from the partner countries.



It can be concluded that Romania's bilateral trading relationships were affected by the health crisis during 2020 and this needs to be considered for future country-level decisions. The practical implications of this analysis relate to measures of public policy, both in terms of sanitary measures as well, as foreign trade policy. According to the results of the present case study - Romania, the more affected a country is by the COVID-19 crisis (rather in terms of deaths than in terms of cases), its foreign trade (both exports and imports) decreases. Governments need to take such measures to deal with both the health crisis and especially with the most influencing factor (the number of COVID-19 deaths), but also with the trading policy by facilitating exports and imports or at least not impeding them during the health crisis.

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