The Impact of Russian Import Ban on the International Peach Trade Network

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Abstract: In 2014, the destabilisation of eastern Ukraine and Russian aggression led the United States and its Western allies, to impose diplomatic and economic sanctions against Russia. In response, Russia imposed counter-sanctions against some Western countries. The sanctions imposed consisted of a total ban, by Russia, on imports of some agricultural products, including peaches and nectarines, from the sanctioning countries. In this study the authors analysed the impact of Russian embargo on the international trade network. The impacts for fresh peaches, including nectarines, as an agricultural product group, under tariff heading 080930, were examined. For analysis in this article, the Social Network Analysis (SNA) was used. According to the authors, the Russian embargo has had a great impact and has significantly altered the global trade network for peaches, as an agricultural product.

Keywords: destabilization of Ukraine; impact of sanctions; Social Network Analysis; peach international trade

1 Introduction

1.1 Impact and Effectiveness of Sanctions

To maintain a competitive edge against other businesses, companies must ensure that the most effective strategies are in place [1]. Over the last ten years, the number of studies on the effectiveness of sanctions has increased significantly. The earliest studies on this topic conclude that the sanctions' only purpose is to change the

perceived inappropriate behaviour of the target country [2-4]. These authors agree that sanctions have minimal political effectiveness. Barber and James have argued that sanctions may have not just one, but several different purposes [5] [6]. According to the first large sample quantitative research, the authors conclude that one third of the 174 studied sanctions were effective [7]. Pape has criticised these research findings. In his view, sanctions should not be considered if any change is essentially the result of military intervention [8]. Baldwin argues that sanctions should be treated like any other diplomatic and economic means available. In his view, when considering effectiveness, the costs, risks and consequences of alternative options should be included in the analysis [9]. Drezner makes the seemingly surprising and contradictory observation in his study that although sanctions are imposed on enemy states, in fact sanctions are much more effective against our allies [10]. Another literature listed similar argument, namely that the multilateral UN sanctions tend to have a stronger impact on GDP growth in the target country than sanctions imposed just by a single country [11]. Larger-scale and multilateral sanctions have a greater impact on financial stability due to the possibility of 'speculative attacks' based on the political risks associated with sanctions [12]. A study on the long-term effects concludes that trade sanctions can lead to protectionism, as the target country can strengthen its domestic production and maintain domestic market protection after sanctions are lifted [13]. Trade activities affected both directly and indirectly by several factors [14] [15]. Before 2014, sanctions imposed on North Korea have 'deepened' business relations between North Korean and Chinese firms and have led to more effective economic cooperation [16]. It is difficult to draw conclusions on the effects of sanctions due to the different methodological approaches used in studies. Some researchers build game-theoretic models of sanctions [17]. Others use conflict management theory to analyse the effectiveness of sanctions [18]. Sanctions are more likely to be effective when there is greater interdependence between the target country and the countries issuing sanctions [19]. Some previous studies have already applied the social network approach to explore the effects of economic sanctions [20] [21]. Özdamar and Shahin argue in their paper that the application of network theory of interdependence can answer many questions of the researchers and provide a clearer analytical method for analysing the effects of sanctions [19]. Sultonov demonstrates how sanctions have affected the Russian economy and foreign exchange market and how their impact may spill over to the economies and foreign exchange markets of other CIS countries. The author used seasonally adjusted real quarterly time series, monthly nominal exchange rate time series, exogenous dummy variables for sanctions, and a combination of the vector autoregressive model and the Granger causality test for estimations [22]. In another study, the authors analysed the global impact of sanctions against Russia on fossil energy trade, using complex network theory as a methodology [23]. Klomp examined the impact of Russian sanctions on the return of agricultural commodity futures in the EU [24]. The study explores whether the retaliation sanctions taken by Russia were already expected by investors. The results show that the publication of news about the sanctions, prior

to the official announcement, caused a significant drop in the futures yield of many banned agricultural commodities. Timofeyev argues that the sanctions introduced against Russia will not be effective enough for the countries that initiated them to achieve their political goals [25]. The sanctions have not changed Russia's policy towards Ukraine, and for the time being there is no chance that it will change. In addition, some efficiency is visible in terms of damage to the Russian economy. Although the Russian economy avoided immediate collapse, the sanctions are affecting the performance of Russian companies.

1.2 Restrictive Measures in Response to the Ukraine Crisis

After the economic and political destabilisation of eastern Ukraine, the United States and its Western allies have decided to impose progressively diplomatic and economic sanctions on Russia. The first step of targeted sanctions was imposed on 17 March 2014, when 21 Ukrainian and Russian officials were banned from entering the EU countries and their assets were closed - the list of sanctioned individuals was later expanded. There was a general ban on exports and imports of items on the EU Common Military List. Sanctions were also extended to the exports of dual-use goods and technology. Subsequently, restrictions on Foreign Direct Investment (FDI) into Russia were also imposed, mainly on investments in transport, telecommunications, and energy sectors, including projects related to oil and gas exploration and mining. This restriction has been complemented by a ban on the export of key products and technologies to strategic sectors, and then to related financial financing and insurance services [26].

In response, Russia has announced an embargo on imports of entire categories of products from countries that have announced economic sanctions against Russian entities and individuals. Russia imposed a complete ban on imports of some foodstuffs, including peaches and nectarines, from these countries. On 5 September 2014, a ceasefire agreement was reached in Minsk, however it did not live up to expectations and fighting resumed from January 2015 [26]. The events in February 2022 marked a new situation when Russia launched an operation against Ukraine. The Western European countries initially imposed only targeted sanctions on travel and property restrictions on individuals, and then extended them to control access to capital and financial markets. On 24 February 2022, the EU Heads of State and Government agreed on further restrictions covering a range of sectors. These measures were followed by a further package of sanctions, in which the EU excluded seven Russian banks from the SWIFT system [26]. On 2 March 2022, the EU imposed a third package of sanctions on Russia, which included the suspension of the broadcasting activities of certain Russian media outlets. Then, the EU agreed to a fourth package of restrictive measures against Russia, i.e., a far-reaching ban on new investment across the Russian energy sector, moreover, the list of sanctioned persons and entities has been further extended [26].

1.3 International Trade in Fresh Peaches and Nectarines

Table 1 shows the world's largest importers of peaches, like Germany, Russia, France, Italy, the United Kingdom and Poland [27]. These six countries contribute nearly fifty percent of the world's peach trade. In 2014, Russia imposed import restrictions on the United States and its allies for several agricultural products, including fresh peaches and nectarines. According to publicly available data, the Russian imports have fallen significantly after the embargo. Russia imported more than 230,500 tonnes of peaches in 2013, however its import volume was less than 200,000 tonnes in 2015 [27]. In the period between 2018 and 2021, Russia increased its imports year by year. 2021 was a record year for import. Russia had imported 225,000 tonnes of peaches, which was close to the 2013 level.

Table 1

The world's largest peach importing countries (in 2021)

Country	Global import (%)
Germany	16%
Russia	11%
France	9%
Italy	6%
United Kingdom	5%
Poland	4%

Source: [27]

Before the embargo, Russia's largest supplier of peaches was the European Union, mainly Spain, Greece and Italy (see Table 2). Outside the European Union, Belarus, Turkey and Serbia were also important trading partners. After 2014, the sanctions meant that Russian traders were unable to buy from Western countries, and nowadays the largest trading partners are Turkey, Morocco, Serbia and China [27].

Table 2

Russia's largest peach exporters

Country name	Russia's peach imports (%)	Country name	Russia's peach imports (%)	Country name	Russia's peach imports (%)
2013		**2015**		**2021**	
Spain	51%	Turkey	27%	Turkey	57%
Greece	19%	Morocco	16%	Uzbekistan	13%
Belarus	7%	Serbia	11%	Azerbaijan	10%
Turkey	5%	China	8%	Georgia	9%
Italy	5%	Egypt	7%	Serbia	4%

Source: [27]

Spain remains the largest peach and nectarine exporter worldwide, with a share of 26% in terms of the global volume in 2021 (see Table 3).

There are significant export volumes from Turkey, Greece, Italy, Chile and the United States, as well [27]. These six countries contribute almost 50% of global peach export volumes. The Russian embargo has led to a significant drop in peach export volumes from Spain, Italy and Greece, but the export trends of these three countries have followed a completely different path since 2018.

While the export volumes of Spain and Greece almost reached the 2013 level by 2021, Italy's exports dropped significantly. Turkey, Serbia and China have seen their peach export volumes increase several times, after the sanctions.

Table 3
The world's largest peach exporting countries (in 2021)

Country	Global export (%)
Spain	26%
Turkey	6%
Greece	4%
Italy	4%
Chile	4%
USA	3%

Source: [27]

2 Methodology of Research

In this study, Social Network Analysis (SNA) is used to analyse the impact of the Russian embargo on trade networks of peaches and nectarines. All data in this study refers to HS Code 080930, peaches and nectarines. Data for tariff heading 080930 were extracted from the UN Comtrade database, which contains key export and import data for global trade by year, by trading partner and by commodity code [27]. The compiled database by the authors includes data from countries whose annual peach trade reached USD 1,000,000 in the years under review, according to the UN Comtrade database.

The international trade of the products under analysis can be described as a network, where the nodes are the countries that trade with each other, and the edges are the trade links between countries. Data of the yearly trade networks are constructed for the period 2011-2021. The network is a directed graph, i.e., country A exports and country B imports peaches, therefore the movement’s direction is important. Weighted edges were considered, i.e., the volume of exports from a country to another was taken into analysis. Among the global network indicators, network diameter, average clustering coefficient and network density were calculated.

For the local network metrics and for each node the following measures were calculated: degree, indegree, outdegree, weighted degree, weighted indegree and weighted outdegree. In addition, betweenness centrality, closeness centrality, local clustering coefficient were measured. Finally, analysis of modularity was performed to examine clusters. Patterns of trade networks before and after the sanctions were explored.

The network visualization and network analysis software Gephi 0.9.7 was used to carry out the research [28]. Gephi is a visualization and exploration software for all kinds of graphs and networks. There were created the trade network from the compiled database, calculated the network indicators and produced a network diagram with this software. ISO Alpha-3 country codes were used in the tables and network diagrams in this study for transparency.

3 Results

3.1 Analysis of the Network's Global Indicators

The nodes in the network are the countries. A link between two countries is established when country 'A' exports peaches to country 'B'. If country 'A' has not exported to 'B', no edge appears between them. The global indicators of the network do not provide us with information on the role of each node in the network, but on the network as a whole.

The networks were constructed consisted of 183 edges (links) and 78 nodes (countries). The average network density was 0.03, which means that only 3% of all possible connections were achieved. With so few potential connections, it can be concluded that there is likely to be significant clustering in the network. The average clustering coefficient is 0.23 (see Table 4). This indicator can be characterised as the average number of connections between neighbours of each node in the network being around 23%. Each year the network forms a coherent large component, i.e., there are no isolated smaller clusters, which means that the network is coherent.

Table 4

Global indicators of the network

Name of network indicator	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**
Avg. Clustering Coefficient	0.239	0.234	0.260	0.267	0.233	0.212	0.208	0.190	0.220	0.240	0.222
Network Density	0.030	0.031	0.033	0.029	0.028	0.028	0.030	0.030	0.031	0.031	0.032

3.2 Analysis of the Network's Local Indicators

Local network indicators do not provide information about the network as a whole, but about the role of each node in the network. In this research, the authors examined each country in terms of its role in the trading network. The node degree is the number of relations (edges) of the nodes. However, in the case of directed networks, we distinguish between indegree (number of incoming neighbours) and outdegree (number of outgoing neighbours) of a vertex.

The edge count shows how many other nodes (countries) a selected node (country) has direct connections with. For this indicator, both incoming and outgoing connections were taken into consideration, therefore in our case both exports and imports.

Spain has the highest number of connections in all years considered, therefore the number of outgoing edges is significant, however the number of incoming edges is not negligible for the network as a whole. Spain is a major exporter of peaches, with diversified partnerships throughout the world. This important position remained despite of the loss of the Russian market. Italy comes second in the ranking of countries. As in the case of Spain, Italy also has a diversified partner network and it has not lost its 2nd place after the sanctions.

Overall, the top two countries have not been affected by the sanctions and remained in the top two for the edge count indicator. Russia was the third country with the highest edge score between 2011 and 2014, but since 2015, it has fallen back to 9th and 10th due to the sanctions, as the number of possible trading partner countries have been limited. Greece has been in contact with more export partners after the sanctions. While in the pre-sanctions period it was in the 5th and 6th place, since 2015 it reached a permanent 3rd place.

Degree has generally been extended to the sum of weights when analysing weighted networks and labelled node strength, so the weighted degree and the weighted in- and outdegree was calculated. The weighted degree of a node is like the degree. It is based on the number of edges for a node, but pondered by the weight of each edge. In our case, the weights are the export volumes. If a country exports and imports many peaches, it has a high weighted degree. Therefore, if weighted edges are considered, the order is almost the same as for unweighted edges, with two exceptions. The exceptions are the cases of Germany and Russia.

Table 5 shows that Germany was already in the 3rd place in the ranking of countries before the sanctions, ahead of Russia, and in the post-sanctions period it moved up to the 2nd place, ahead of Italy. If the weights are ignored, Germany only ranked the 8th in the pre-sanctions period and 6th in the post-embargo period. Therefore, Germany has fewer countries to trade with than Italy, but a much larger volume of trade with them. Russia has dropped significantly in the ranking of countries in terms of unweighted edges in the post-embargo period, however if the weight of the edges (i.e., the trade volume) is taken into consideration, it can be seen that it has

dropped only one place from the 3rd to 4th. The reason for this situation is that Russia has trade relations with far fewer countries in the post-embargo period, but the trading volume is much larger than before the embargo.

Table 5
Local indicators of the network: Weighted Edge Count

Ranking and values of the countries in terms of weighted degrees*								
in 2011			**in 2014**			**in 2021**		
1	ESP	799679522	1	ESP	970922865	1	ESP	1104770798
2	ITA	407973774	2	DEU	390838125	2	DEU	485310457
3	DEU	339427042	3	ITA	343191963	3	ITA	303949734
4	RUS	280171045	4	RUS	251962775	4	FRA	255671587
5	FRA	219806825	5	FRA	244118025	5	RUS	239141807

*: DEU (Germany), ESP (Spain), FRA (France), ITA (Italy), RUS (Russia)

The indegree indicator shows that how many countries does one country import peaches from. Before and after the sanctions, Russia has the largest number of importing partners. However, there has been such a significant decline in the number of Russian relationships, that Germany has the biggest number of relationships with other countries by 2021, and Russia moved back to the 2nd place (see Figure 1 and Figure 2).

The colours of the nodes show the clusters, the size of the nodes represents the number of imports, the edges show the connections between the two countries.

Unlike the indegree indicator, the weighted indegree also takes weights into consideration. In our case, the weight is the import volume. Therefore, countries that import a lot have a high weighted indegree.

If weights are also taken into consideration, Germany was in the 1st and Russia was in the 2nd place in the pre-sanctions period and in the post-sanctions period (see Table 6), however by 2021 Russia dropped down to the 5th place. Therefore, Germany may have had fewer import relations with countries than Russia before the embargo, but it imported a much larger volume of peach.

The counterpart of the indegree indicator is the outdegree, which shows the number of countries to which a country exports peach. Spain is the biggest exporter of peach in the world.

Figure 3 shows that Italy ranked 2nd place in 2012. However, due to sanctions, Italy's outdegree has fallen on average by 20% per year.

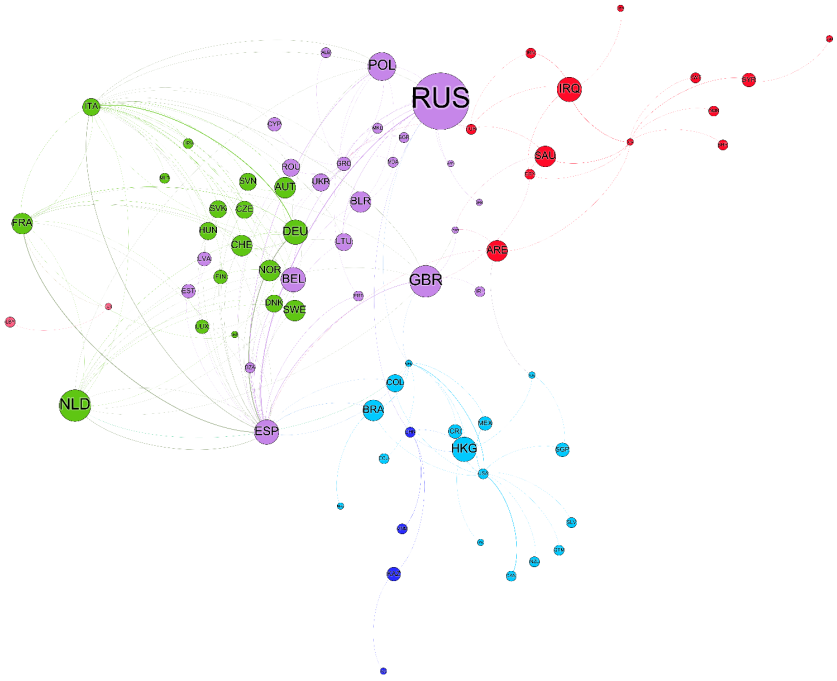

Figure 1

International peach trade network in 2011. Node weight: indegree

Greece remained on the 3rd place both before and after the embargo. Greece was able to increase its trading partners' number by about 10% in the post-sanctions period.

The US was generally ranked 4th before the embargo, then saw its export relations' number drop significantly after the embargo resulting a fall to the 11th place in the outdegree ranking by 2021. The number of US relations has shrunk by almost half compared to the period before the sanctions were imposed.

China and Turkey were able to grow export relations slightly after the embargo. Germany has seen a decline in its relations after the sanctions.

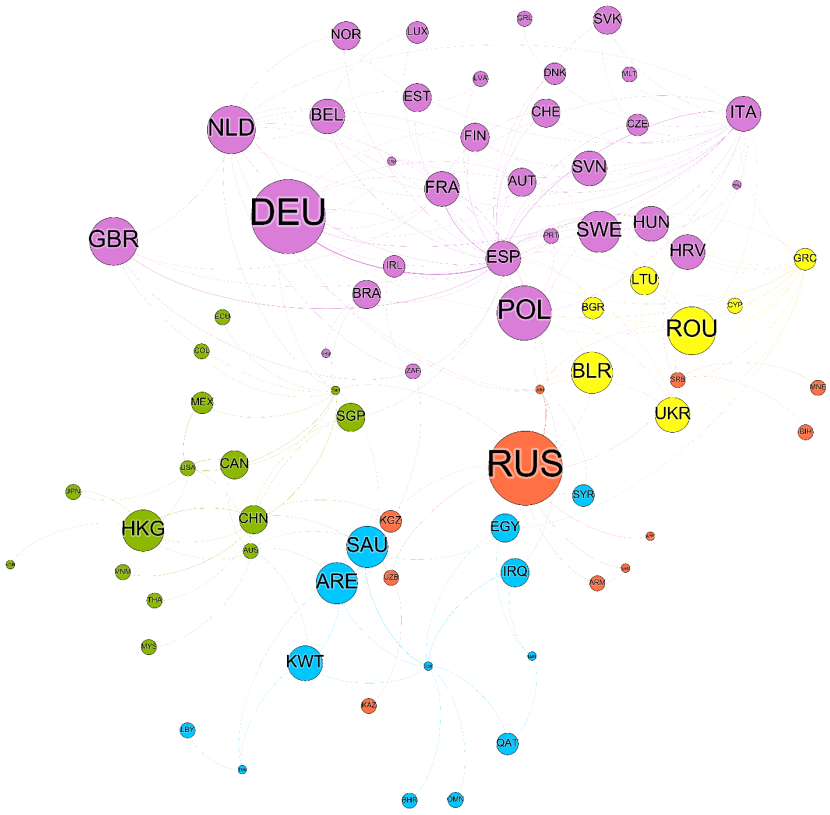

Figure 2
International peach trade network in 2021. Node weight: indegree

Table 6
Local indicators of the network: Weighted Indegree

Ranking and values of the countries in terms of weighted indegrees*					
in 2011		**in 2014**		**in 2021**	
1	DEU	1	DEU	1	ESP
2	RUS	2	RUS	2	DEU
3	FRA	3	FRA	3	ITA
4	GBR	4	GBR	4	FRA
5	ITA	5	ITA	5	RUS

*: DEU (Germany), ESP (Spain), FRA (France), GBR (United Kingdom), ITA (Italy), RUS (Russia)

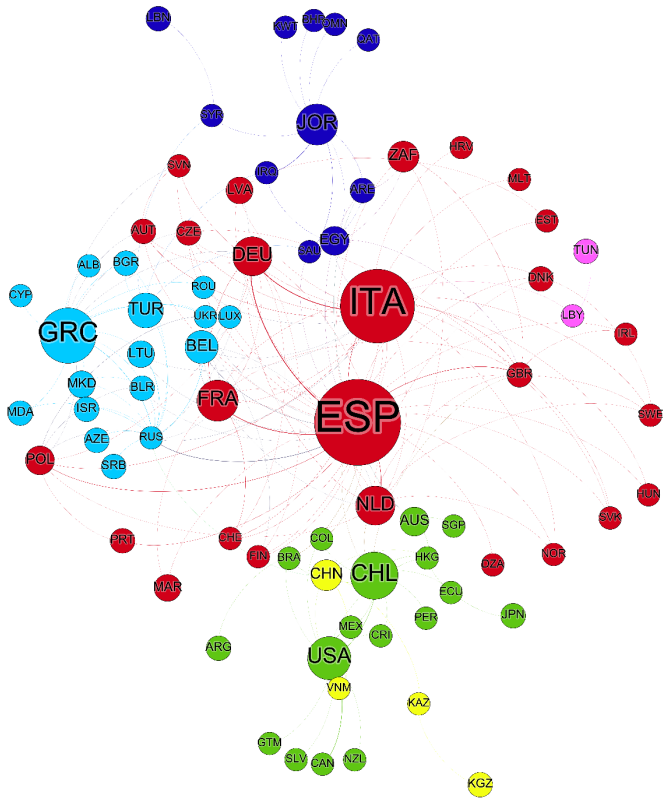

Figure 3
International peach trade network in 2012. Node weight: outdegree

The weighted outdegree shows how many countries does the examined country export to, while taking into consideration the weights. In this case the weights are export volumes. Thus, countries with high outdegree values are those with a significant volume of peach exports to many countries. The data in Table 7 and Figure 4 clearly shows that Spain was in 1st place, both before and after the embargo. Italy was in the 2nd place before the sanctions, but afterwards it slipped back to the 3rd place and Turkey took over the 2nd place. It can be seen that Turkey is one of the winners of the embargo in the sense that it has managed to acquire part of the Russian imports. The weighted outdegree of the US and Greece initially decreased, however it increased from 2019 onwards, reaching 2011 levels by 2021. China's weighted outdegree nearly doubled by 2021. For Germany, the outdegree indicator decreased after the embargo but the weighted outdegree remained unchanged. Serbia is the other biggest beneficiary of the Russian sanctions, as its Weighted Outdegree almost doubled following the embargo.

Table 7
Local indicators of the network: Weighted Outdegree

Ranking and values of the countries in terms of Weighted Outdegrees*								
in 2011			**in 2014**			**in 2021**		
1	ESP	786342641	1	ESP	958571429	1	ESP	1098617742
2	ITA	318444301	2	ITA	234607045	2	TUR	161502773
3	USA	129551968	3	USA	160248611	3	ITA	160704703
4	CHL	114076126	4	GRC	107973939	4	USA	135164936
5	FRA	85233265	5	CHL	94248054	5	JOR	128979573

*: CHL (China), ESP (Spain), FRA (France), GRC (Greece), ITA (Italy), JOR (Jordan), TUR (Turkey), USA (United States of America)

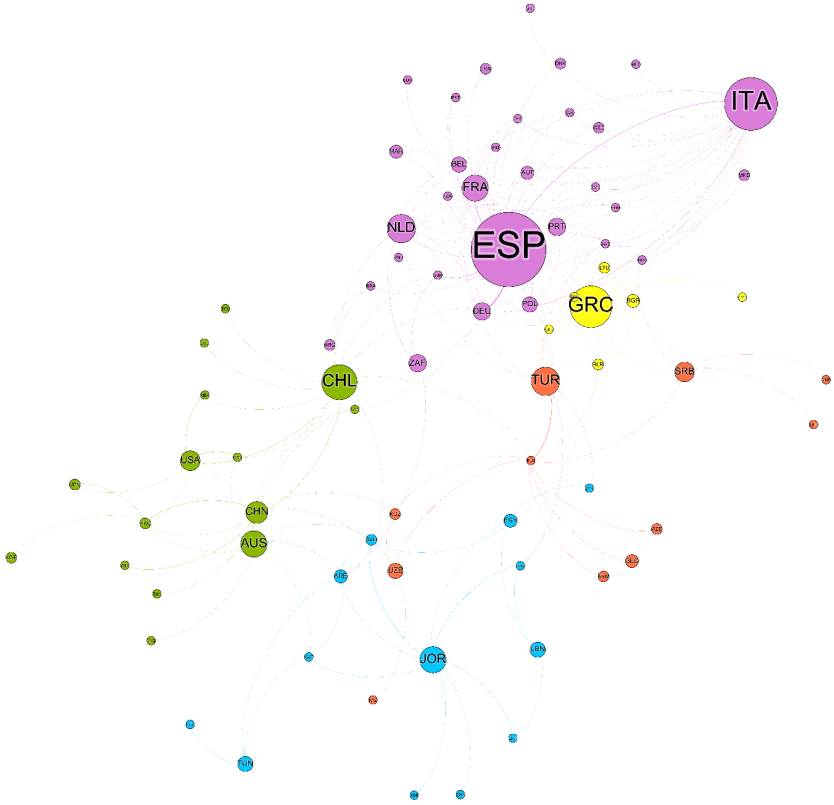

Figure 4
International peach trade network in 2021. Node weight: outdegree

Betweenness centrality indicator was also examined, which measures how often a node occurs on all shortest paths between two nodes. If the node has a significant mediating role in the network, it can be considered as central. In the examined network, this means that there are groups of countries that trade mainly between each other and if there is a country that connects a group of countries with other groups of countries, this country is called the hub. Of the countries with significant export links, only Spain was able to increase the value of the betweenness centrality indicator as a result of the embargo (see Table 8).

Table 8
Local indicators of the network: Ranking of Betweenness Centrality*

Ranking	2011	2014	2021
1	ESP	ESP	ESP
2	NLD	NLD	NLD
3	GRC	ITA	FRA
4	ITA	DEU	GRC
5	FRA	FRA	ITA

*: DEU (Germany), ESP (Spain), FRA (France), GRC (Greece), ITA (Italy), NLD (The Netherlands)

The clustering coefficient is calculated as the number of actual connections between the neighbors of the node under consideration, divided by the total number of possible connections. The value is 1 if everyone is connected to everyone else, and 0 if neighbors are not connected to each other. In the case of the examined network, this means that if the country under study exports to other countries, then the partner countries are connected. If this relationship is significant, the value of the indicator is high, otherwise it is low. In terms of results, neither Spain nor the Netherlands have a high clustering coefficient. The reason for this is that both countries are well embedded in international trade and, due to their central role, they tend to act as a bridge between clusters rather than as exclusive members of clusters. In general, small countries and countries with few connections have a high clustering coefficient.

3.3 Network Modularity

The Louvain method [29] was integrated into the network analysis and visualization software Gephi, which is designed to detect, analyze, evaluate and visualize clusters. The algorithm developed for cluster detection generates a modularity class value for each cluster, which is used to denote the communities within the network. The procedure detected 5-6 sub-networks annually. Unsurprisingly, the clusters that emerge show that countries belonging to a cluster share a common characteristic of geographical proximity to each other. Thus, with a few exceptions, neighboring countries were generally classified into one group. The individual clusters are

described below. Clusters are identified by the name of the central country in the cluster.

Spanish community: In general, it was the cluster with the most nodes in each year examined, i.e., it is the cluster with the most countries. Almost all the EU Member States belong to this community, and until 2012, Russia did too. The Spanish community was a giant cluster within the network until the introduction of Russian sanctions in 2014. Since then, the number of nodes in other clusters has been approaching, sometimes even reaching, the number of members of the Spanish community.

USA community: This community includes almost without exception the countries of North America, Central America and South America.

Egypt community: This group includes Egypt and its surrounding Arab countries with a few exceptions.

Greece community: This community did not exist until 2012, but it was a part of the Spanish community. Each year from 2012 to 2021 (as long as the data is publicly available) it had its own cluster. Russia was also part of this cluster from 2012 to 2016.

Chinese community: This cluster includes most of Asia, and since 2016, Russia.

It is also important to note that in each of the years studied, there were some isolated countries that did not belong to any of the clusters or formed a mini-community in pairs. These countries included Afghanistan, Pakistan, Tunisia, Libya, and for several years India.

Conclusions

In 2014, Russia imposed counter-sanctions on imports of some agricultural products – including peaches and nectarines – from countries that had imposed economic sanctions against it. In our study, Social Network Analysis (SNA) was used, to explore the impact of the Russian embargo on the trade network. Our research examined the impact for one product group only, namely products under tariff heading 080930. This product group consists of fresh peaches, including nectarines. Trade networks per year were prepared for the time period 2011-2021. The imposed Russian embargo in 2014, has completely changed the international trade network for peaches, as an agricultural product. Not only was the network of countries affected by the sanction change (Russia as an emitter and Western allies as a destination), but also the network of third countries. As a result of the embargo, many new relationships were established and significant and traditional relationships built up over decades were destroyed.

In our modularity analysis of the global trade network for peaches, it can be concluded, that the Russian embargo has led to an increase in the number of clusters and the disappearance of the former giant cluster, which has been replaced by a number of smaller clusters, including countries with strengthened intra-cluster peach trade links and trade with countries, outside the cluster, on a smaller scale or not at all. This phenomenon was less prevalent in the world peach trade network before the Russian embargo, where there was a giant cluster of countries across continents, regardless of geographical proximity. This cluster was the main driver of the global peach trade. The disintegration of this giant cluster had already begun before the 2014 embargo, but the Russian sanctions severely damaged the existing links and started the process of 'blocking'. Today, analyzing the global trade network of peaches in 2021, the primary determinant of cluster formation is geographical proximity. It seems perhaps conclusive that the closer a country is geographically located to another country, the greater the likelihood of trade links is. Far more counter-examples appeared in the network before the 2014 Russian embargo than after its release.

The global trading system of peaches, built up over decades, has been severely damaged by import restrictions on agricultural products. This is reflected in the immediate negative impact on trade in peaches for all countries affected by the sanction, including both the sending and the destination countries. In fact, the seven to eight years that have passed, have not been sufficient to restore Russian import volumes and export volumes from Western allies, to the levels of the period prior to 2014. Although Spain and Greece's peach export volumes have nearly reached the pre-2014 levels, in 2021, they are still lower. In any case, the embargo has had a severe impact in the short term, with a significant drop in trade volumes for all countries concerned, during the 3-4 years following the introduction of the sanctions. It took time to build new relationships with the rest of the global trading network.

As a result of the embargo in 2014, Russia's peach import relations have seen a significant reduction in diversification. This means that the number of countries with which it has import relations is much smaller when weights are taken into consideration, since this phenomenon is proving to be permanent, as the lower level of the weighted indegree, compared to the pre-embargo period is persistently evident, until the end of the period under review.

It was reasonable to assume that the Russian embargo has had the most negative impact on international trade in Spanish peaches, as Spanish peaches represented more than half of Russian imports. In our research, we concluded that this assumption is not correct, because although in the short term, the volume of Spanish exports and trade relations did decrease, this was not to the same extent as in the case of other major peach exporting countries, such as Italy. In fact, by 2021, the volume of Spanish peach exports and the number of trade relations was close to the 2013 level, while Italy is still far from the previous level. Analyzing the global peach trade network, it can be concluded that Spain has not built new export

relationships to counter the impact of the Russian embargo, but has strengthened its existing trade partnerships and increased export volumes with countries already in export relationships. This does not mean that the population of existing trading partners (i.e., Germany, France) consumes more peaches, but those trading partners have reduced the volume of imports from their former import partners (i.e., Italy) and have bought more Spanish peaches. This phenomenon has been observed in several countries. Greece was also able to nearly reach their volumes of 2021, compared to the period before the Russian embargo, but achieved this in a completely different way than Spain. Greece has established completely new trade relations, mainly with Romania, Ukraine and Bulgaria.

To sum up, the biggest winners from the Russian embargo are Serbia, Turkey and China. All three countries were able to increase export volumes significantly as a result of the Russian embargo. These countries immediately took advantage of the opportunities in the Russian market, as a result of the embargo against Western countries, thus, multiplying export volumes to Russia, which they were able to maintain, until the end of the period under this study. Serbia was also able to increase the number of partners significantly, following the imposition of the sanctions.

Further research is needed to investigate the reasons for the break-up of the giant cluster known as the 'Spanish community', prior to the Russian embargo and the process of blocking that started to erode the diversified trade links that had previously existed between Global Countries.

References

[1] Fenyvesi, É., Vágány, J. B. Knowledge-Sharing is One of the Guarantees of Success in Family Businesses, In: Bencsik, A. (ed.) Knowledge Management Initiatives and Strategies in Small and Medium Enterprises, Hershey (PA), USA, 2017, pp. 291-315

[2] Doxey, M. International Sanctions: A Framework for Analysis with Special Reference to the UN and Southern Africa, International Organization, Vol. 26 (3), 1972, pp. 527-550

[3] Galtung, J. On the Effects of International Sanctions, World Politics, Vol. 19 (3), 1967, pp. 378-416

[4] Wallensteen, P. Characteristics of Economic Sanctions, Journal of Peace Research, Vol. 5 (3), 1968, pp. 248-267

[5] Barber, J. Economic Sanctions as a Policy Instrument, International Affairs, Vol. 55 (3), 1979, pp. 367-384

[6] Lindsay, J. M. Trade Sanctions as Policy Instruments, International Studies Quarterly, Vol. 30 (2), 1979, pp. 153-173

[7] Hufbauer, G. C., Schott, J. J., Elliott, K. A., Oegg, B. Economic Sanctions Reconsidered, Peterson Institute for International Economics, Washington, 1990, p. 233

[8] Pape, R. A. Why Economic Sanctions Do Not Work, International Security, Vol. 22 (2), 1997, pp. 90-136

[9] Baldwin, D. A. Economic Statecraft, Princeton University Press, New Jersey, 1985, p. 409

[10] Drezner, D. W. The Sanctions Paradox, Economic Statecraft and International Relations, Cambridge University Press, Cambridge, 1999, p. 342

[11] Neuenkirch, M., Neumeier, F. The Impact of UN and US Economic Sanctions on GDP Growth, European Journal of Political Economy, Vol. 40, 2015, pp. 110-125

[12] Peksen, D., Son, B. Economic Coercion and Currency Crises in Target Countries, Journal of Peace Research, Vol. 52 (4), 2015, pp. 448-462

[13] Pond, A. Economic Sanctions and Demand for Protection. Journal of Conflict Resolution, Vol. 61 (5), 2015, pp. 1073-1094

[14] Kozár, L., Vasa, L., Neszmélyi, Gy. I. The Opportunities and Challenges of Combined Use of Futures Commodity Exchange and Public Warehouse in the Crop Sector of Vietnam European Research Studies Journal, Vol. 26, Special Issue 1, 2021, pp. 1260-1286

[15] Mehtiyev, J., Magda, R., Vasa, L. Exchange rate impacts on international trade, Economic Annals-XXI, Vol. 190 (5-6(2)), 2021, pp. 12-22

[16] Park, J. S. The Key to the North Korean Targeted Sanctions Puzzle, The Washington Quarterly, Vol. 37 (3), 2014, pp. 199-214

[17] Lacy, D., Niou, E. M. S. A Theory of Economic Sanctions and Issue Linkage: The Roles of Preferences, Information, and Threats, Journal of Politics, Vol. 66 (1), 2004, pp. 25-42

[18] Garoupa, N. R., Gata, J. E. A Theory of International Conflict Management and Sanctioning, Public Choice, Vol. 110 (1-2), 2002, pp. 41-65

[19] Özdamar, Ö., Shahin, E. Consequences of Economic Sanctions: The State of the Art and Paths Forward, International Studies Review, Vol. 23 (4), 2021, pp. 1646-1671

[20] Cranmer, S. J., Heinrich, T., Desmarais, B. A. Reciprocity and the structural determinants of the international sanctions network, Social Networks, Vol. 36 (1), 2014, pp. 5-22

[21] Dorff, C., Minhas, S. When Do States Say Uncle? Network Dependence and Sanction Compliance, International Interactions, Vol. 43 (4), 2017, p. 563

[22] Sultonov, M. Regional Economic and Financial Interconnectedness and the Impact of Sanctions: The Case of the Commonwealth of Independent States, Journal of Risk and Financial Management, Vol. 15 (12), 2022, 15120565

[23] Zheng, S., Zhou, X., Tan, Z., Zhang, H., Liu, C., Hao, H., Hu, H., Cai, X., Yang, H., Luo, W. Preliminary study on the global impact of sanctions on fossil energy trade: Based on complex network theory, Energy for Sustainable Development, 71, 2022, pp. 517-531

[24] Klomp, J. The impact of russian sanctions on the return of agricultural commodity futures in the EU, Research in International Business and Finance, Vol. 51, 2020, 101073

[25] Timofeev, I. N. Sanctions on russia: A new chapter, Russia in Global Affairs, Vol. 20 (4), 2022, pp. 103-119

[26] Council of the European Union, 2022, https://www.consilium.europa.eu/hu/policies/sanctions/restrictive-measures-against-russia-over-ukraine/history-restrictive-measures-against-russia-over-ukraine/

[27] UN Comtrade, 2023, https://comtrade.un.org

[28] Bastian M., Heymann, S., Jacomy, M. Gephi: An Open Source Software for Exploring and Manipulating Networks, Proceedings of the Third International Conference on Weblogs and Social Media, ICWSM 2009, San Jose, California, USA, May 17-20, 2009

[29] Blondel, V. D., Guillaume, J. L., Lambiotte, R., Lefebvre, E. Fast Unfolding of Communities in Large Networks, Journal of Statistical Mechanics Theory and Experiment, 10, 2008