

Article

Changing direction to value-based foreign policy and its impact on international trade

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Abstract: Within the last four years, Lithuania has faced different foreign policy challenges due to geopolitical situations such as the Ukraine-Russia war, the migration crisis on the border with Belarus, and the conflict with China. After opening a Taiwanese representative office in Vilnius, China downgraded diplomatic relations with Lithuania. The purpose of the article is to assess the impact of the changes on international economic relations between Lithuania and China. The paper employs descriptive statistics, correlation-regression, sensitivity analysis, and agglomerative hierarchical cluster analysis. The research is based on the impact of international economic relations on international trade by analyzing separately imports and exports. Our research fills a gap in international relations and globalization theory by focusing on international collaboration between small and large countries, while the large country implements economic sanctions. In the context of Lithuania, exports to China and imports from China comprise a small percentage in the structure of international trade. Lithuania's GDP level reacts sensitively to changes in export and import data only if they change drastically (over 50%).

Keywords: Lithuania; China; foreign policy; international trade; value-based foreign policy

1. Introduction

Research on foreign policy and international trade has been pursued continuously for years (Bulley, 2013; Buchowski, 2017; Chandler, 2003; Gilmore, 2014; Grygiel, 2024; Grygiel, 2024; Killian, 2021; Salvatore, 2023; Tuncer and Weller, 2022). For example, Bulley (2013) advocates for a re-evaluation of values in foreign policy, emphasising the importance of viewing foreign policy through an ethical lens. This perspective suggests that ethical considerations should be the foundation of a nation's interactions with other countries, guiding decisions that are in line with moral principles. However, there are a limited number of studies on changes in foreign policy. Some studies find that sanctions as the instrument for the implementation of changed foreign policy cause financial crises (Hatipoglu and Peksen, 2018) and sovereign debt (Tuncer and Weller, 2023), reductions of trade (Salvatore, 2023) and incomes (Gutmann et al., 2023; Neuenkirch and Neumeier, 2015), and declines in foreign direct investment (Mirkina, 2018). While the greatest number of studies focus on international trade and interlinkages with economic growth (Bajo-Rubio and Ramos-Herrera, 2024; Celik et al., 2024; Rubavičius, 2021; Safi et al., 2021; Zheng et al., 2023). Thus, there is a gap in the scientific literature relating to value-based foreign policy and international economic relations. Further, the study provides the methodology for evaluating the impact of international economic relations.

Additionally, it helps to identify the most important and promising business sectors. Obviously, these sectors would be affected the most in the case of changing international economic relations. The paper focusses on a specific situation when a small country imposes values-based foreign policy on one of the most important economies in the world. The research provides interdisciplinary benefits to the science of politics and international economics. The paper is devoted to analyzing how changes in foreign policy would influence economic growth. In the context of Lithuania's foreign policy, the values-based approach has been a significant factor in shaping its diplomatic stance. When considering the broader implications of values-based foreign policy, the research by Pastore (2013) on small new member states in the EU sheds light on strategies that countries like Lithuania may adopt. The concept of a 'small state smart strategy' involves compromise-seeking behavior, persuasive deliberation, and coalition-building, all of which can be influenced by the values and principles that underpin a nation's foreign policy. Furthermore, Buchowski (2017) highlights how President Adamkus and subsequent heads of Lithuanian diplomacy have consistently emphasized the moral foundations of the country's new foreign policy. This underscores the importance of ethical considerations and values in guiding Lithuania's interactions with the international community.

In 2021, Lithuania has strengthened its international economic relationships with Taiwan by opening a Taiwanese representative office in Vilnius. However, this decision has elicited a negative reaction from China. Thus, Beijing stated that Lithuania has violated the one-China principle. Lithuania refused to close Taiwanese representative office, and was faced with China's full de facto embargo on Lithuanian imports. This resulted, in China's downgraded political and economic relationships (Jastramskis and Ramonaitė, 2022). Obviously, the bilateral economic relationships have not been continuing and have been demolished. The main economic factors were expected to decrease significantly. Further, in Germany's foreign policy, values were played off against real-interest. Thus, Lau (2024) questions whether German foreign policy should be value-based or interest-driven. Even more, the question arose about what the costs of morality might be, not only in terms of monetary value, but also in terms of international influence.

The aim of the paper is to assess the impact of the changes in international economic relations between Lithuania and China. This study focusses on one of the factors describing international economic relations, such as exports and imports. Thus, it is the limitation of the study while the complicated international economic relations have an impact on foreign direct investment, the movement of labor, and collaboration in research and development. In order to reach its aim, the paper is divided into four parts. In order, to implement this purpose, we have divided the paper into four parts. The first part is devoted to a literature review; the second is dedicated to the methodology, the third presents the results of the research and discussion, and the fourth is dedicated to the conclusions and recommendations.

2. Literature review

2.1. The concept of foreign policy

International relations reflect world problems and foreign affairs, involving intergovernmental organizations, non-governmental organizations, and multinational corporations. Recently, international relations have been replaced or used as synonyms for world politics, and global politics. Foreign policy and international relations tend to be formed and changed in the context of significant events, especially those associated with a large scale of violence. Thus, in the literature, from one point of view, foreign policy is classified according to the periods as inter-war, post-war, Cold-War period, post-Cold War, hegemony, and globalization. Each period of time is specific and involves different political regimes, systems from autocracy, socialism, and communism to liberal democracy (Tuncer and Weller, 2022). Furthermore, the post-Cold War period stimulated the rise of hegemony and globalization.

Hegemony applies to leadership or dominance (Lauderdale and Amster, 2008). In foreign policy, it refers to the dominance in power of one country over the others. Even more, hegemony involves components of coercion and consent. The hegemony of dominance might exist in political, social, and international economic relations among states while the dominant state maintains its position over consent and coercion. However, hegemony even refers to shared values, ideas, and ethics in society (Novelli, 2023). Further, over the past two decades, the U.S. hegemony has been challenged by the growing strength of China and the aggression of Russia over in West (Grygiel, 2024).

Even though, the post-Cold-War period accelerated the process of globalization, it has been developing for years. The later-known processes have been spreading over the borders, which reflect on the movement of materials, labor, goods, and capital. Thus, obviously, the ties among the countries are getting tighter and stronger. Thus, these strings among countries even negatively impact social, economic, and political environments. It results in dependence on the dominating country. Due to the highly attached supply chains around the world, the delivery of materials and goods has been problematic since the start of the COVID-19 pandemic (Mačikénaitė, 2022). Especially, when China introduced lockdown. For example, at the beginning of the Ukraine-Russia war, it became clear which countries were energetically dependent on Russian gas. Despite, the globalization spread all over the world, the process has been based on Western liberal values. Even more, China, being a communist country, has partially accepted them, and it has become the “world’s factory.” Even though the present international relations between the countries are shaped by the rules-based international order that was developed by Western democracies after the Second World War.

2.2. The significance of value-based foreign policy

Foreign policy values are intricately linked to moral and ethical considerations. Scholars have highlighted the importance of values in shaping foreign policy attitudes (Aggestam et al., 2018; Bulley, 2013; Chandler, 2003; Hanania and Trager, 2020; Kertzer et al., 2014; Schalk, 2024). The integration of morality, values, and ethics into foreign policy decision-making has become increasingly prevalent, with these ideals becoming central to the American foreign policy community (Bulley, 2013). The idea of good international citizenship has been explored in British foreign policy, where

ethical commitments to non-citizens have been justified by national interests and the maintenance of a stable international order (Gilmore, 2014). In the realm of international relations, the concept of moral courage has gained significance, as public opinion, societal values, and morals can exert influence on foreign policy decisions (Schalk, 2024). Additionally, the tension between sovereignty and cosmopolitanism has been debated in the context of European foreign policy, highlighting the challenges of balancing moral obligations and political legitimacy in shaping ethical foreign policy frameworks. Overall, the incorporation of values, ethics, and morality into foreign policy decision-making processes reflects a broader trend towards a more conscientious and principled approach to international relations.

2.3. Foreign policy and trade

International economic relations are utilising economic tools within foreign policy, such as economic aid and sanctions, to further national interests. Countries leverage economic diplomacy to benefit from cross-border economic activities, aiming to achieve economic objectives and enhance national interests (Ruffini, 2016). This strategic approach is particularly crucial in international trade, where nations actively participate in economic activities to foster economic development and integration (Duginets and Omran, 2022). The integration of economic diplomacy into foreign policy frameworks is evident in various countries' strategies. For instance, China is recognized for promoting economic prosperity through its foreign economic policies, underscoring the significance of economic diplomacy in meeting national goals (Busilli and Jaime, 2021). Countries like Australia, Japan, China, and Indonesia have adjusted their foreign policy directions to include economic diplomacy as a key component (Killian, 2021). International economic relations are a cornerstone of foreign policy, enabling countries to navigate the complexities of international economic relations, promote economic growth, and advance their national interests globally.

Countries engage in foreign trade activities to drive economic development, foster international economic integration, and liberalize trade relations (Duginets and Omran, 2022). Trade policies and agreements significantly impact the development of international trade, serving as essential components for the functioning of modern economies. Although the concept of foreign policy might differ, the main functions are the same (**Figure 1**). Hence, countries such as Lithuania are highly dependent on their allies due to their membership in the EU, NATO, and the OECD (Pukšto et al., 2014). For example, the European Union, of which Lithuania has been a part since 2004, is Lithuania's largest trading partner and has a direct impact on Lithuania's international economic relations. Until 2019, the EU's strategy on China has been to "wait and see", and no drastic decisions have been taken. Since then, this relationship began to change drastically when the EU adopted a much tougher foreign policy with China. In addition to the official announcement of sanctions, China began to restrict Lithuanian business activities in import and export matters (Rubavičius, 2021).

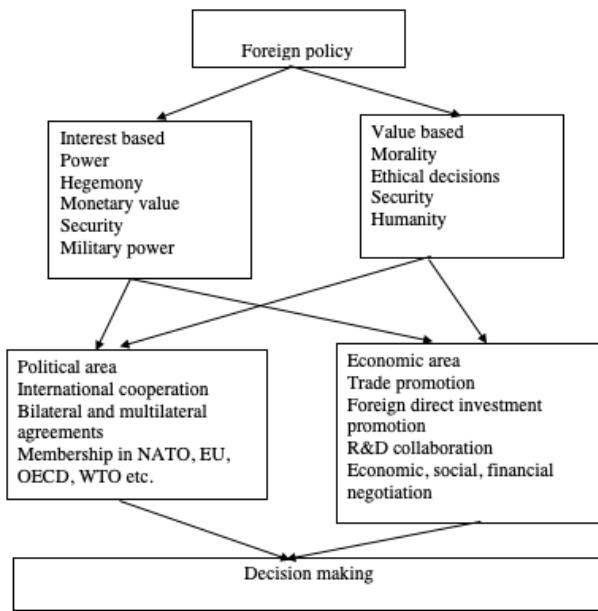


Figure 1. The framework of the foreign policy.

Source: authors.

Further we have developed two hypotheses:

- H1. Export to China has positive impact on the Lithuanian GDP.
- H2. Import from China has negative impact on the Lithuanian GDP.

3. Methodology and data

3.1. Variable selection

A literature review clearly suggests that there is an impact of foreign policy on international trade (Bajo-Rubio and Ramos-Herrera, 2024; Gutmann et al., 2023; Salvatore, 2023). International trade, as it involves exports, and imports has an influence on economic growth. Even more, every country promotes international trade (Salvatore, 2023). International trade is a crucial driver of economic growth across various regions. Numerous studies have consistently demonstrated a positive correlation between international trade and economic growth (Cruz, 2011; Celik, 2024; Frederic et al., 2017; Mitsek, 2015). For example, recent research in Africa has highlighted the significant positive impact of international trade, particularly when combined with the digital economy, on economic growth (Abendin and Duan, 2021). Similarly, in Miami, Florida, international trade has been identified as a key factor influencing both long-term economic growth and short-run business cycles (Cruz, 2011). Research supports the idea that international trade is a fundamental catalyst for economic growth. From Europe, Africa, to Asia, and from small regional economies to major countries like Japan, there is a consensus that trade openness, liberalization, and the digital economy play crucial roles in fostering economic development and prosperity (Table 1).

Table 1. Previous research on economic growth and international trade.

Authors (year)	Analysed period	Territories	Indicators	Methods	Findings
Abendin, S., and Duan, P. (2021)	2000–2018	52 African countries	Export, import, GDP, trade openness (difference of export and import)	ordinary least square, fixed effects, and the system generalized methods of moment's estimation approaches.	Trade openness has a mixed influence on economic growth
Salvatore, D. (2023)	2004–2019	132 countries	Export, GDP, inflation, capital inflows	FIML modelling, dynamic policy simulation	Trade has no impact on growth for large advanced countries. For small advanced countries trade is relatively significant.
Gutmann, J. et al. (2023)	1960–2016	158 countries	Trade, consumption, investment, military expenditures, government expenditures, GDP	Descriptive statistics, OLS panel data modelling, SUR modelling	Significant negative effect of sanctions on the growth rate of GDP and its components (consumption and investment), trade and foreign direct investment.
Bajo-Rubio, O., and Ramos-Herrera, M. (2024)	Different periods (before WWII, after WWII)	20 European countries	Export, import, GDP	panel data models with large cross-sectional and time series dimensions. Granger causality test	Results supported the existence of a bi-directional relationship between both trade variables and GDP, for the whole period and across subperiods.

The previous studies considering the relationship between international trade and GDP applied the following indicators:

- 1) Exports are expressed as a percentage of GDP (Abendin and Duan, 2021), in the monetary value of goods (Bajo-Rubio and Ramos-Herrera, 2024)
- 2) Imports are expressed as a percentage of GDP (Abendin and Duan, 2021), in the monetary value of goods (Bajo-Rubio and Ramos-Herrera, 2024)
- 3) International trade is the difference between exports and imports. The value might be negative as well. International trade is expressed as a percentage of GDP, or in the monetary value (Gutmann et al., 2023).
- 4) Economic growth is expressed as the real GDP per capita (Gutmann et al., 2023), nominal GDP (Mitsek, 2015), real GDP (Bajo-Rubio and Ramos-Herrera, 2024), and a difference in percentage in comparison to the previous year (Salvatore, 2023).

International trade is analyzed in percentage due to the fact that it is the part of GDP estimated in the expenditure approach. Additionally, previous research includes other indicators that might have an impact on economic growth, such as fixed capital formation (Gutmann et al., 2023; Mitsek, 2015; Robinson and Thierfelder, 2024), industrial output (Robinson and Thierfelder, 2024), capital flow, consumer price index (Mitsek, 2015; Salvatore, 2023), consumption (Gutmann et al., 2023), government expenditures (Gutmann et al., 2023), foreign direct investment (Gutmann et al., 2023; Mitsek, 2015), employment (Celik et al., 2024; Mitsek, 2015), and urbanization (Celik

et al., 2024). Some of the studies focus on the sectoral impact as well (Robinson and Thierfelder, 2024).

Thus, for our study, we set limitations and measured only the impact of foreign policy on economic growth while the volume of international trade might change. In addition, the data set for the study is used in quarters and covers the 2013–2022 period.

3.2. Empirical research process

The empirical approach is divided in five steps (Figure 2). First of all, the data has been retrieved from Statistics Lithuania and Eurostat. The descriptive statistics provide the tendency and volume of exports of Lithuanian products to China and imports from China. In addition, the data has been analyzed according to the sectors. The sectorial analysis is based on the classification of Combined Nomenclature (CN) 2024 of European Commission Implementing Regulation (EU) No. 2023/2364.

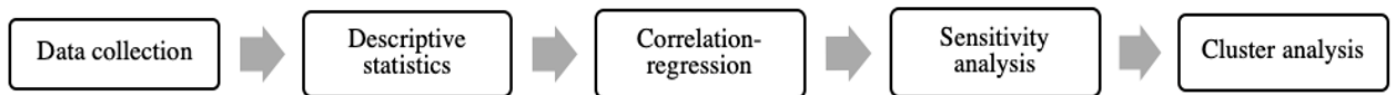


Figure 2. The structure of methodology.

The third step is the estimation of correlation-regression. As mentioned above, a vast of studies prove that international trade is the driver of economic growth. Thus, the correlation has been estimated between GDP and export, GDP and import. Further, two regression models were developed. Since the study is devoted to the impact of international trade, the GDP is set as a dependent variable while exports and imports are independent ones.

$$y_i = \beta_0 + \beta_1 x_i + \varepsilon_i, i = 1, \dots, n \quad (1)$$

y_i is a dependent variable, x_i is an independent variable, β_0 , —an intercept, β_1 — a slope, ε_i —an error.

Further a sensitivity analysis has been performed. For the modelling, Python software has been used. In the context of the study, sensitivity analysis can shed light on how countries' GDP levels will respond to changes in international trade. As the analysis calculates the impact on the level of GDP of countries, it will be expressed in terms of percentage changes. Based on the scientific literature, the following formula is derived in the context of the study (You et al., 2021):

$$SA = \frac{((\Delta X - X))}{X} \times 100 \quad (2)$$

here:

SA is the percentage change in the dependent variable; ΔX is the change in the dependent variable due to changes in the independent variable; X is the baseline value of the dependent variable.

The formula can also be used to assess how a change in several independent variables affects the dependent variable. In this case, ΔX represents the change in the dependent variable due to changes in several independent variables.

When interpreting the analysis, it is worth taking-into-account the strengths and weaknesses of the method. Some advantages of sensitivity analysis in an economic context might be defined. The coefficients on which the independent variables will be

modelled must be determined for the analysis. The choice of coefficients must take-into-account the questions to be answered. The context of the study is international economic relations between Lithuania and China. Thus, the aim is to determine how the level of GDP will react to sudden changes in the parameters. According to the research carried out, it is logical to assume that export and import data will normally change within a range of 5%–10%. However, these changes are driven by natural changes in the economy (Gruss and Kebhaj, 2019). Additionally, the authors believe that in order to investigate how an economy may react to drastic changes (**Table 2**). Sensitivity analysis was performed at three levels. Each level involved four experiments. In the first level, the four experiments checked how GDP would change if export and import as the independent variables were changed by +5% and –5%. In the next level, the four experiments were run to check how GDP would react if exports and imports varied by +10 and –10%, respectively. In the last level, it was modelled how the GDP would react if there were extreme changes of at least +50% or –50%.

Table 2. Values of coefficients of change of sensitivity analysis parameters.

Coefficients:	Coefficient value:
Small increase in exports	+5%
Small increase in imports	+5%
Average increase in exports	+10%
Average increase in imports	+10%
Significant increase in exports	+50%
Significant increase in imports	+50%
Small decrease in exports	–5%
Small decrease in imports	–5%
Average decrease in exports	–10%
Average decrease in imports	–10%
Significant decrease in exports	–50%
Significant decrease in imports	–50%

The last step in our research is the application of clustering analysis. It is a common method of statistical data analysis in many fields, including pattern recognition, image analysis, information retrieval, and computer graphics, and is the main goal of exploratory data analysis (Boulesteix et al., 2021). Cluster analysis is very often used while classifying the objects by some features and prioritizing them. This method is beneficial for comparing countries or business sectors based on the chosen factors. Thus, cluster analysis in the context of foreign policy can provide valuable insights into grouping countries based on similarities in their foreign policy approaches, decision-making processes, or strategic orientations (Fenco and Šabič, 2017; Freire, 2020). In this case, the research focusses on the impact of the changes in international relations between Lithuania and China. The study is based on two variables: international trade and GDP.

Cluster analysis is a general problem to be solved rather than a specific algorithm. In economics, agglomerative hierarchical cluster analysis is commonly used (Ruitenbeek et al., 2023; Wang et al., 2024). The method is based on a similarity

matrix, which contains a similarity score for all pairs of elements. This shows that several similarity or dissimilarity measures can be used for different types of variables (quantitative, qualitative, and binary). In addition, different methods can be used to assess the similarity of clusters: single relationship, full relationship, average relationship, Ward's method, etc. (Boulesteix et al., 2021; Hafeezallah et al., 2024).

The process starts by identifying each object as a separate cluster, then clustering is performed, and then the clusters are merged into larger clusters until the objects fall into a single cluster or a predefined termination condition is reached. There are several ways to perform agglomerative hierarchical cluster analysis (Govender and Sivakumar, 2020). The distance between two clusters in one link is defined as the shortest distance between any single data point in the first cluster and any single data point in the second cluster. Based on this concept of distance between clusters, the two clusters with the shortest single link distance are joined at each step of the process. The formula for this method is given below.

$$d_{(x,y)} = \min_{ij} d(X_i, Y_j) \quad (3)$$

$d_{(x,y)}$ —a distance between observation vector x and observation vector y ; X_i —data of the first monitoring cluster; Y_i —data of the second monitoring cluster.

The distance between two clusters of complete linkage is defined as the maximum distance between any individual data point in the first cluster and any individual data point in the second cluster. Based on this concept of distance between clusters, the two clusters with the shortest connection distance are merged at each step of the process. The formula for this method is given below.

$$d_{(x,y)} = \max_{ij} d(X_i, Y_j) \quad (4)$$

$d_{(x,y)}$ —distance between observation vector x and observation vector y ; X_i —data of the first monitoring cluster; Y_i —data of the second monitoring cluster.

The formula measures the distance between two data points in the cluster with the furthest distance.

In the case of average connectivity, the distance between two clusters is defined as the average distance between the data points in the first and second clusters. Based on this concept of inter-cluster distance, the two clusters with the shortest average connection distance are merged at each step of the process. The formula for this method is given below (Govender and Sivakumar, 2020):

$$d_{(x,y)} = \frac{1}{kl} \sum_{i=1}^k \sum_{j=1}^l d(X_i, Y_j) \quad (5)$$

$d_{(x,y)}$ —distance between observation vector x and observation vector y ; X_i —data of the first monitoring cluster; Y_i —data of the second monitoring cluster.

The distance between two clusters is defined as the average distance between the mean vectors of the clusters. Based on this concept of inter-cluster distance, the two clusters with the shortest average connection distance are merged at each step of the process.

4. Results and discussion

From 2013 to 2020, the volumes of export and import were very similar, 2014–

2015 is the year of Lithuania’s trade balance, but in 2020, Lithuania’s imports from China start to grow drastically several times compared to exports to China. In 2020, China was the 22nd largest Lithuanian goods export market, accounting for 1.1% of all Lithuanian goods exports. Almost 77% of Lithuanian goods exports to China in 2020 were the export of goods of Lithuanian origin, and the rest (23%) were the re-export of goods. Compared to 2019, the export of Lithuanian goods to China increased by 14%, mainly due to the increase in the export of cereals. In January 2021, the total export of Lithuanian goods to China compared to the corresponding 2020 period decreased by 9%. (**Figure 3**).

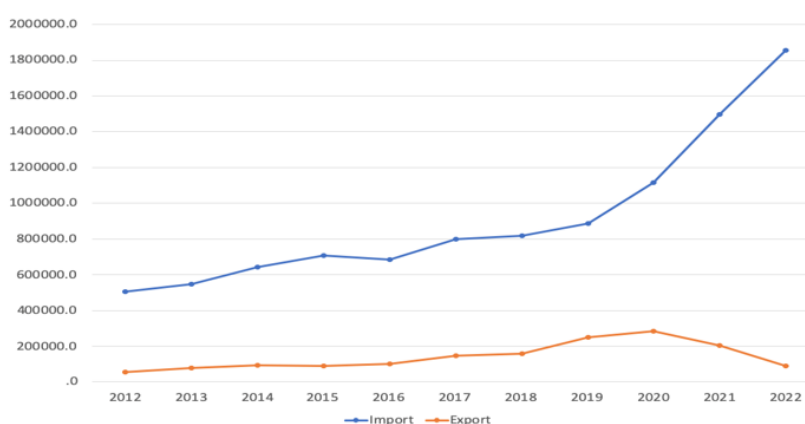


Figure 3. Lithuanian exports to China, and imports from China in Euros during the period 2012–2022 (Eurostat).

In 2021, China was the 25th largest export market for Lithuanian goods, accounting for 0.7% of the total export of Lithuanian goods. Almost 75% of Lithuanian goods were exported to China. Compared to 2020, Lithuania’s export of goods to China decreased by 28%, mainly due to the decrease in grain exports. In 2021, China was the 23rd largest export market, accounting for 0.8% of the total export of goods of Lithuanian origin. In the structure of the export of goods of Lithuanian origin to China, furniture accounted for the largest share (22%), optical, photographic, measuring, medical, or surgical devices accounted for 15% (6th largest export market), various chemical products accounted for 11% (7th largest export market), electrical machines and devices accounted for 9.1% (16th largest export market), wood and wood products; charcoal made 5.9% (21st largest export market). Compared to 2020, the export value of goods of Lithuanian origin to China decreased by 30%. Cereals accounted for the biggest decrease. During 2022 January–February exports of goods of Lithuanian origin to China decreased by 99% compared to the corresponding period of 2021. In 2021, China was the 7th largest import market for Lithuanian goods and accounted for 4.2% of all Lithuanian goods imports. In 2021, China mainly imported electrical machines and devices: 26% (3rd largest import market), machinery and mechanical equipment: 13% (7th largest import market), ground vehicles made 6.9% (9th largest import market), optical, photographic, measuring, medical, or surgical devices accounted for 4.9% (2nd largest import market). Compared to 2020, the imports of goods from China increased by 34%.

The minimum indicator reveals that during the analyzed period, Lithuania exported at least 2.6 million to China euros worth of goods, while China exported a minimum of 1.5 million euros worth of goods (**Table 3**). Calculations for the **Table 3** have been done by using data in quarters from 2013 to 2022.

Table 3. Descriptive statistics indicators.

	Lithuanian Export to China in euros	Lithuanian Imports from China in euros
Min	2.6	1.5
Max	16.7	53.2
Mean	7.8	12.7
Moda	11.7	N/A
Standard deviation	3.6	13.6
Variance	13.4	188.4

The maximum indicator reveals that Lithuania exported the most 16.7 million to China euros worth of goods and the most imported was 53.2 million euros worth of goods. The mean reveals that during the analyzed period, Lithuania exported an average of 7.8 million euros value of goods, and imported an average of 12.7 million euros the value of goods. Such data can be interpreted indicating that historically, Lithuania’s international trade balance with China has been negative. The mode indicator reveals that the only frequently recurring value during the analyzed period is Lithuania’s exports to China of 11.7 euros worth of goods. The standard deviation indicator shows that the data on Lithuania’s exports to China has a small deviation, which means that the data is sufficiently concentrated. The variation indicator provides data, according to which identical conclusions are drawn, that Lithuania’s exports to China are sufficiently centralized. In order to assess how the data on international economic relations between Lithuania and China prevails in the general context of exports and imports, the analysis of descriptive statistics is carried out as a percentage of Lithuanian exports to China out of total Lithuanian exports, Lithuanian imports from China as a percentage of all Lithuanian imports (**Table 4**).

Table 4. Indicators of descriptive statistics of percentage data.

	Lithuania’s Export to China as a percentage of Lithuania’s total export (%)	Lithuania’s Imports from China as a percentage of Lithuania’s total imports (%)
Min	0.182	0.167
Max	1.002	2.155
Mean	0.344	0.723
Standard deviation	0.175	0.582
Variance	0.031	0.339

The minimum indicator reveals that Lithuania’s exports to China during the entire period, in the structure of the variable, accounted for at least 0.182%. Lithuania’s imports from China during the entire analyzed period, in the structure of the variable, accounted for at least 0.167%. The average indicator reveals that Lithuania’s exports to China during the entire period, in the structure of the variable, averaged 0.344%.

Lithuania’s import from China during the entire analyzed period, in the structure of the variable, averaged 0.723%. The variance indicator reveals that Lithuania’s exports to China as a percentage of Lithuania’s total exports are concentrated close to each other. The data on Lithuania’s imports from China as a percentage of Lithuania’s total imports is mostly scattered.

According to the results of the analysis, we can claim that the international economic relations of Lithuania and China are not significant in the general structure of international economic relations. However, during the entire analyzed period, Lithuania’s imports from China occupied the largest percentage share of the entire structure at 2.155%, compared to other international economic relations between Lithuania and China.

Further research examines the bivariate correlation between Lithuanian GDP and exports to China and imports from China (**Table 5**). The results reveal that a moderate relationship exists between GDP and exports ($r = 0.727$); a similar result has been obtained for the relationship between GDP and imports ($r = 0.716$). The results are statistically significant. Thus, regression modelling will include both variables.

Table 5. Correlation ratios.

	GDP	Export	Import
GDP	1	0.727*	-0.716*
Export	0.727*	1	0.756*
Import	0.716*	0.756*	1

Correlation is significant at the 0.05 level.

Both indicators are significant in terms of GDP. Two models have been developed (**Table 6**). In the both models GDP is dependent. However, in model 1, the export is an independent variable, while in model 2, the import is an independent variable. The results reveal that both models are statistically significant. The first model explains 52.8% of all variance. While, the second model explains 51.6% of the total variance. Further, if exports would increase by 1 million, the GDP would increase by 0.013 million. In addition, imports would increase by 1 million, and the GDP would grow by 0.003 million.

Table 6. Regression modelling.

	Model 1	Model 2
Constant	196006.245 (70191)	110727.671 (99479.234)
Export	0.013 (0.004)	
Import		-0.003 (0.001)
R	0.727	0.716
R ²	0.528	0.513
F	8.960	8.149
t	2.993	2.902

Dependent is GDP, predictors export and import.

Further, a sensitivity analysis has been performed. **Table 7** presents the data from the analysis, where exports and imports are the independent variables that were varied by +5% and -5%.

Table 7. Sensitivity analysis results, parameters change coefficient +5% and -5%, Lithuanian GDP sensitivity.

Experiment	No. 1	No. 2	No. 3	No. 4
Parameter	Export data	Import data	Export data	Import data
Coefficient of change of parameters:	+5%	+5%	-5%	-5%
Min (%)	0.0015	-0.0178	-0.0071	0.0009
Max (%)	0.0071	-0.0009	-0.0015	0.0178
Mean (%)	0.0034	-0.0049	-0.0034	0.0049

After changing the data of Lithuania’s exports to China by +5%, Lithuania’s GDP reacts in the interval [0.0015; 0.0071], with an average GDP sensitivity of 0.0034 and GDP sensitivity of less than 1%. After changing the data of Lithuania’s imports from China by +5%, Lithuania’s GDP reacts in the interval [-0.0178; -0.0009], with an average GDP of sensitivity -0.0049 and a GDP sensitivity greater than -1%. After changing the data of Lithuania’s export to China by -5%, Lithuania’s GDP reacts in the interval [-0.0071; -0.0015] with an average GDP sensitivity of -0.0034 and a GDP sensitivity greater than -1%. After changing the data of Lithuania’s imports from China by -5%, Lithuania’s GDP reacts in the interval [-0.0009; 0.0178] with a mean GDP sensitivity of -0.0049 and a GDP sensitivity is less than 1% and greater than -1%. Further, we examine the changed in GDP if exports and imports vary by +10% and -10% (**Table 8**).

Table 8. Sensitivity analysis results, parameter change coefficient +10% and -10%, Lithuanian GDP sensitivity.

Experiment	No. 1	No. 2	No. 3	No. 4
Parameter	Export data	Import data	Export data	Import data
Coefficient of change of parameters:	+10%	+10%	-10%	-10%
Min (%)	0.0029	-0.0357	-0.0142	0.0018
Max (%)	0.0142	-0.0018	-0.0029	0.0357
Mean (%)	0.0068	-0.0097	-0.0068	0.0097

After changing the data of Lithuania’s exports to China by +10%, Lithuania’s GDP reacts in the interval [0.0029; 0.0142], with an average GDP sensitivity of 0.0068. In the analysis, the maximum GDP sensitivity was +1.42%. After changing the data of Lithuania’s imports from China by +10%, Lithuania’s GDP reacts in the interval [-0.0357; -0.0018], with an average GDP sensitivity of -0.0097. In the analysis, the maximum GDP sensitivity was -3.57%.

Table 9 presents the data from the analysis where exports and imports are the independent variables that have been varied by +50% and -50% respectively. Sensitivity analysis was performed on each independent variable separately. According to these criteria, four experiments were performed.

Table 9. Sensitivity analysis results, parameter change coefficient +50% and –50%, Lithuanian GDP sensitivity.

Experiment	No. 1	No. 2	No. 3	No. 4
Parameter	Export data	Import data	Export data	Import data
Coefficient of change of parameters:	+50%	+50%	–50%	–50%
Min (%)	0.0147	–0.1783	–0.0710	0.0088
Max (%)	0.0710	–0.0088	–0.0147	0.1783
Mean (%)	0.0338	–0.0487	–0.0338	0.0487

After changing the data of Lithuania’s exports to China by +50%, Lithuania’s GDP reacts in the interval [0.0147; 0.0710], with an average GDP sensitivity of 0.0338. In the analysis, the maximum GDP sensitivity was +7.10%. After changing the data of Lithuanian imports from China by +50%, Lithuanian GDP reacts in the interval [–0.1783; –0.0088], with an average GDP of sensitivity –0.0487. In the analysis, the maximum GDP sensitivity was –1.78. After changing the data of Lithuania’s exports to China by –50%, Lithuania’s GDP reacts in the interval [–0.0710; –0.0147], with an average GDP sensitivity of –0.0338. In the analysis, the maximum GDP sensitivity was –7.10%. After changing the data of Lithuania’s imports from China by –50%, Lithuania’s GDP reacts in the interval [0.0088; 0.1783], with an average GDP sensitivity of 0.0487. In the analysis, the maximum GDP sensitivity was +1.78%.

The first observation when evaluating the results of the analysis is the difference between the data when the independent variables were analyzed separately and at different times. Analyzing the variables separately, the maximum positive sensitivity of Lithuania’s GDP is 7.10%, when the volume of exports to China is increased by 50%. The maximum negative sensitivity of Lithuania’s GDP is 7.10%, when Lithuanian exports to China are reduced by 50%. On the other hand, when analyzing the variables together, which were changed by the same coefficient, the maximum positive sensitivity of Lithuania’s GDP is 12.25%, when the data of Lithuanian exports to China and imports from China are reduced by 50%. The maximum negative sensitivity of Lithuania’s GDP is 12.25%, when the data of Lithuanian exports to China and imports from China are increased by 50%. Such sensitivity analysis data reveals that Lithuania historically had a negative trade balance with China. This explains why positive coefficients, when independent variables are analyzed together, have a negative effect on Lithuania’s GDP and vice versa.

Exports, as a component of GDP, is a positive indicator of GDP, in other words, the growth of the variable determines the growth of GDP. Imports, as a component of GDP, is a negative indicator of GDP, in other words, the growth of the variable determines the decrease in GDP. This explains why, when the independent variables are analyzed separately, negative coefficients lead to a negative influence when analyzing exports and a positive influence when analyzing imports, and vice versa.

The analysis reveals that Lithuania’s GDP level can react sensitively only to large changes in export and import data. But it is based on the assumption that only imports and exports change significantly, and all other indicators remain identical. In a situation where the indicators change naturally, it is logical to expect that other components of the economy will also change significantly, which in the final version

will determine a much lower actual GDP sensitivity. If exports and imports change unnaturally (meaning the change happened suddenly, and other sectors of the economy were not ready or had not yet reoriented), if we set a limit of 50% of the change coefficient, where the impact on the economy will be sudden and obvious, which can be negative or positive, depending on the situation. Additionally, it is worth noting that exports and imports are indicators that are constantly changing. These standard changes are not determined by the economic relations between Lithuania and China, but based on circumstances, such as the global economic recession or changes in other sectors. Thus, before assessing the international economic relations between Lithuania and China, based on the sensitivity analysis, it has been noted that the existing economic relations are not significant enough. Their impact is not great in the current situation, and in order for them to have a big impact, there must be sudden changes in exports and imports.

An identical analysis was carried out in the context of China's GDP, but the results of the analysis are too insignificant to carry out their separate analysis, most of the results are in the range [0.0000; 0.0004]. According to these data, we can draw the conclusion that the international economic relations between Lithuania and China are absolutely insignificant in the context of China (**Figures 4 and 5**).

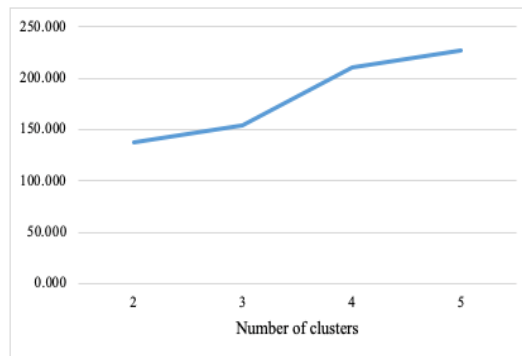


Figure 4. Values of the Calinski and Harabasz index for Lithuanian export cluster analysis (source: created by the authors).

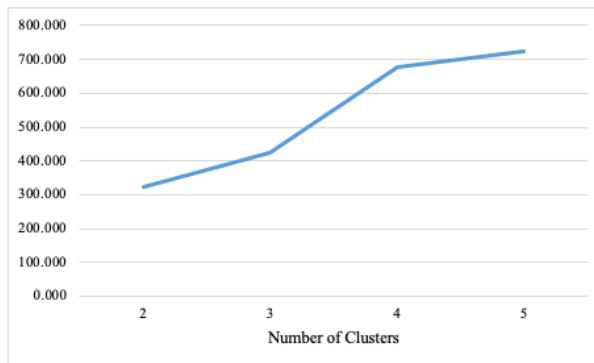


Figure 5. Values of the Calinski and Harabasz index for Lithuanian imports cluster analysis (source: created by the authors).

The data used in the cluster analysis includes Lithuanian and Chinese export and import data by type of goods. The first step in the analysis is to determine which

number of clusters is most suitable for agglomerative hierarchical cluster analysis. The values of the Silhouette index of the first evaluation criterion are presented in **Table 10**.

Table 10. Values of Calinski & Harabasz index, and silhouette index for Lithuanian export cluster analysis.

Number of clusters	2	3	4	5
Calinski & Harabasz index	137.061	153.784	210.997	227.143
Silhouette index	0.864	0.862	0.862	0.853

According to the index data, two clusters are the most appropriate choice, as the index value is the highest at 0.864.

Since the Calinski and Harabasz index values of the two and three clusters are quite similar, but the value of the two clusters of the Silhouette index is higher, two clusters will be used for the analysis. In the analysis of clusters, we can assume that the second cluster includes the types of goods that Lithuania mostly exports to China, and the first cluster includes all other exported types of goods, but their quantities are not exclusive. The results of the agglomeration hierarchical cluster analysis are presented in the **Table 11**, where the general classifications of goods are assigned a number covering a specific quantity of goods.

Table 11. Results of agglomeration hierarchical cluster export analysis, according to general classification.

The first cluster		The second cluster	
Commodities	Number of kinds of the commodities	Commodities	Number of kinds of the commodities
Food products	23	Food products	1
Animal non-food products	4	Chemical goods	2
Raw materials and minerals	7	Timber products	1
Chemical goods	10	Raw materials and materials	1
Medical goods	1	Mechanical goods	2
Films and publishing	2	Films and publishing	1
Timber products	4	Furniture	1
Textile and clothing products	18		
Ceramic goods	2		
Steel products	2		
Mechanical goods	6		
Guns	1		
Other goods	4		

According to the results of the analysis, it is logical to say that Lithuania mainly exports chemical and mechanical goods to China, where both classifications have two types of goods each. Certain classifications of food, wood, raw materials, cinema, publications, and furniture goods also stand out from the others, in the second cluster, they belong to one type of goods each. The types of goods that belong to this significant cluster of Lithuanian exports are the following:

- X10—Cereals
- X27—Mineral fuels, mineral, oils and their distillation products; bituminous materials; mineral waxes
- X38—Various chemical products
- X44—Wood and wood products; charcoal
- X74—Copper and copper articles
- X84—Nuclear reactors, boilers, machines and mechanical devices; their parts
- X85—Electrical machinery and equipment and parts thereof; sound recording and reproducing apparatus, television video and sound recording and reproducing apparatus, parts and accessories for these products
- X90—Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus, parts and accessories thereof
- X94—Furniture; bedding, mattresses, mattress frames, decorative cushions and similar stuffed furniture; lamps and lighting equipment, not elsewhere specified or included; illuminated signs, illuminated signs and similar articles; prefabricated buildings. The second part of the subsection describes the results of the cluster analysis of Lithuanian imports by types of goods.

The first step in the analysis is to determine which number of clusters is most suitable for agglomerative hierarchical cluster analysis. The values of the Silhouette index of the first evaluation criterion are presented in **Table 12**.

Table 12. Cluster analysis silhouette index for cluster analysis of Lithuanian imports.

Number of clusters	2	3	4	5
Calinski & Harabasz index	322.610	423.999	675.789	722.669
Silhouette index	0.926	0.802	0.796	0.628

According to the index data, two clusters are the most appropriate choice, as the index value is the highest at 0.926.

Hence, the Calinski and Harabasz index values of the second and third clusters are quite similar, but the value of the Silhouette index of the second cluster is much higher. Two clusters will be used for the analysis. Thus, the second cluster includes the types of goods that Lithuania mostly imports from China. The first cluster includes all other imported types of goods, but their quantities are not exclusive. The results of the performed agglomeration hierarchical cluster analysis are presented in **Table 13**, where the general classifications of goods are assigned a number covering a specific quantity of goods.

Table 13. Results of agglomerative hierarchical cluster import analysis, according to general classification.

The first cluster		The second cluster	
Commodities	Number of kinds of the commodities	Commodities	Number of kinds of the commodities
Food products	24	Mechanical goods	2
Animal non-food products	4		
Raw materials and minerals	8		

Table 13. (Continued).

The first cluster		The second cluster	
Commodities	Number of kinds of the commodities	Commodities	Number of kinds of the commodities
Chemical goods	12		
Medical goods	1		
Films and publishing	3		
Timber products	5		
Textile and clothing products	18		
Ceramic goods	2		
Steel goods	2		
Mechanical goods	6		
Guns	1		
Furniture	4		
Other goods	1		

According to the results of the analysis, we can claim that Lithuania mainly imports mechanical goods from China, where the classification has two types of goods.

The sectors that are dependent on the significant cluster of Lithuanian exports are the following:

X84—Nuclear reactors, boilers, machines, and mechanical devices, their parts.

X85—Electrical machinery and equipment and parts thereof; sound recording and reproducing apparatus, television video and sound recording and reproducing apparatus, parts and accessories for these products.

Generalizing, we may state that Lithuania’s export interests in China mainly include food products, chemical products, wood and wood products, machines and mechanical devices or their parts, different types of electrical goods, furniture, etc. In the context of China, these goods include its import interests from Lithuania.

Lithuania’s import interests in China mainly include machines and mechanical devices or their parts and different types of electronic goods. In the context of China, these goods include its export interests to Lithuania.

5. Conclusions

Although international economic relations between Lithuania and China are intense. The study revealed that exports to China and imports from China have a statistically significant impact on GDP growth. Our analysis showed that Lithuanian export interests in China mainly include food products, chemical products, wood and wood products, machines and mechanical devices or their parts, electrical goods of different types, furniture, etc. In the context of China, these goods include its import interests from Lithuania. Lithuanian import interests in China mainly include machines and mechanical devices, their parts, and different types of electronic goods. However, it was before the conflict with China. Meanwhile, the exports are dropping. According to our estimations, the cooling of international relations will negatively affect Lithuanian GDP if exports decline by 50% or more. While the impact on China would be insignificant at any level. In the case of Lithuania unfortunately, there is a

great possibility that exports to China will decline more than fifty percent. As China rises as a global power, its engagements with different regions play a crucial role in shaping the contemporary global order. The evolving dynamics between China and Lithuania, as well as other regions, underscore the complexities of contemporary international relations and the interplay of economic, political, and strategic interests.

Theoretical implications. The study fills in the gap in political and economic science by focusing how value-based foreign policy influences on international economic relations which leads to the consequences to economic growth. Furthermore, the study delves into the impact of international trade on economic development and macroeconomic indicators, providing insights into how trade policies can influence a country's economic growth trajectory and foreign relations. The study set the macroeconomic indicators that would have been influenced by value-based foreign policy. In addition, a methodology for evaluating the changes in international economic relations has been created. The methodology might be used to evaluate foreign policy changes of the any other country, specifically focusing the sectors that might have been influenced most. The methodology might be used to measure the impact of other factors that might be dependent on international economic relations, such as foreign direct investment, foreign aid, the international labor movement, unemployment, and others.

Managerial and political implications. By considering moral and ethical dimensions, policymakers aim to navigate the complexities of global politics while upholding principles of good international relations with others in the international community. The multidimensional nature of the relationship between international trade and foreign policy highlights the need for coherent and strategic trade policies that align with broader foreign policy objectives to promote economic development, enhance global competitiveness, and foster international cooperation. The research identified the potential lower point of decreased exports that might have an impact on the shrunk of GDP. Furthermore, it has been identified two clusters that are the most significant in Lithuania-China trade. Thus, this result might be useful for politicians to consider what business sectors would suffer the most due to the changed foreign policy. In this respect, new alternative trade markets are supposed to be opened. Further, this study contributes to the redirection of international economic relations by improving the strategy for international trade, in order to strengthen existing international relations or develop the new ones. **Limitations and future research.** However, we face some limitations in our study because a very short period of time has passed since Lithuania opened a Taiwanese representative office. In the future, it will highly be important and necessary to replicate research. Thus, it would assist to improve and adopt an international relations strategy with China and other countries, not just the EU. Further research is limited to the analysis of trade impacts on GDP. For future research, applying the same methodology, would be interesting to explore other macroeconomic factors such as inward and outward FDI, R&D, inflation, or unemployment.

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formal analysis, AS (Agnė Šimelytė); investigation, AS (Agnė Šimelytė) and AS (Artūras Struca); resources, AS (Agnė Šimelytė) and AS (Andriejus Sadauskis); data curation, AS (Artūras Struca); writing—original draft preparation, AS (Agnė Šimelytė), AS (Artūras Struca) and AS (Andriejus Sadauskis); writing—review and editing, AS (Agnė Šimelytė); visualization, AS (Agnė Šimelytė) and AS (Artūras Struca); supervision, AS (Agnė Šimelytė). All authors have read and agreed to the published version of the manuscript.

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