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FOREIGN TRADE POLICY AND ITS IMPACT ON ECONOMIC GROWTH

ABSTRACT

The empirical research on the various effects of international trade in periods of a steady world economy, crisis phenomena and post-crisis recovery enables the formation of generalized principles of foreign trade policy aimed at economic growth. The purpose of the paper consists in the determination of the impact of foreign trade factors on economic growth in each of the periods of the economic state and the substantiation of the hypothesis regarding the expediency of adapting foreign trade to the economic situation in the country. The authors of the paper use the tool of fuzzy neural networks for spatial data for 82 countries of the world at time intervals of stability, crisis and post-crisis recovery. This made it possible to find a rational approach to the formation of foreign trade guidelines under different macroeconomic conditions. The results of the research revealed that during periods of a steady economy, the maximization of realistically achievable rates of economic growth (about 10-20%) occurs at average and relatively equal levels of export and import (from 30% to 60%). At the same time, a potential surge in the rate of economic growth may be achieved due to a reduction in the level of exports while maintaining the average level of imports. During crisis phenomena, countries that have limited imports and maintained the average level of export of their products are the most stable, and the potential opportunities for increasing the rate of economic growth are seen in the increase of imports to the pre-crisis level. During post-crisis recovery, the greatest potential rates of economic growth are achieved with the maximum possible increase in exports and a reduction in the level of imports. It is determined that the export of high-tech products is an influential factor in economic growth. However, its level should be rationally adapted to the macroeconomic conditions and the structure of international trade, based on the theory of mercantilism.

Keywords: economic growth, foreign trade, export, import, high-tech export, macroeconomic situation, stability, crisis, post-crisis recovery, fuzzy neural network

JEL Classification: C45, F18, F63

INTRODUCTION

Under the conditions of globalization, international trade is considered a characteristic and indispensable attribute of economic activity and a driver of economic growth. One can agree with the well-known thesis that international trade largely curbs the problem of irregular availability and distribution of resources around the world, facilitating the uninterrupted flow of raw materials and finished products. At the same time, the degree of trade liberalization in the world economy remains a relatively debatable point due to the expediency of determining its direction (import or export), state intervention and the introduction of protectionism policy. The criticism of neoliberal views, in particular, Washington Consensus policy, is known to have led to the development of post-Washington Consensus provisions, which were based on support for targeted trade liberalization.

However, according to GTA (Global Trade Alert, 2023), government intervention in trade policy increased significantly during the pandemic in 2020; and restrictions on foreign interests and incentives to protect the interests of national producers took the main share of these measures. Moreover, in the times of post-crisis recovery (2021-2022), their level remains incomparably higher than measures to liberalize international trade, despite a certain decrease in the number of restrictive measures. In the structure of

liberalization measures, the majority is devoted to tariff regulation and licensing, setting quotas. Restrictive measures in the world are mainly related to the supply of cast iron and steel, cars, pharmaceutical products and electricity, and liberalization measures – to the supply of high-tech equipment and machinery.

Despite the declaration of the goals of liberalization and market regulation, the trends of state intervention in the economy consist in the strengthening of state intervention in the economy in periods of crisis to the advantage of supporting companies, industries, workers, owners of capital, preserving jobs within the country, which is implemented through restrictive measures on the commercial activities of other countries in their territory. The policy of protectionism of the foreign trade policy, which is ascertained according to GTA data (Global Trade Alert, 2023), may lead to the exacerbation of international trade wars and the narrowing of international trade, and therefore to the drop in exports of many countries, the deterioration of their balance of payments and the limitation of economic growth. At the international level, the recourse to measures of nationally oriented economic intervention can be a potential source of tension and conflict.

Accordingly, the scientific topicality of the paper lies in substantiating the dependence of economic growth on the level of liberalization of international trade, since, on the one hand, the policy of protectionism of trade policy can lead to a reduction in the level of international trade and a drop in exports of many countries, on the other hand, the country's openness to imports may also negatively affect the outflows of the balance of payments and significant import dependence. It may cause shocks to individual national economies in periods of crisis or restrictive measures (an example is the pandemic of 2020 when restrictive measures were the most severe). Of course, state intervention in the economy is necessary to overcome financial and economic crises. However, the consequences of interference in international trade may outweigh its benefits in the medium and long term. Therefore, a scientifically based approach to this process, capable of minimizing the negative consequences after the end of the crisis and the stabilization of the economy, is extremely important.

The topic of this research is especially relevant for the economy of Ukraine, which is an active participant in international trade as an importer and exporter, but is experiencing times of military intervention and crisis phenomena.

LITERATURE REVIEW

The expediency of international trade was considered as far back as ancient times by Greek philosophers (Plato, Xenophon, Aristotle). They emphasized in their writings that it is necessary to establish certain rules for the implementation of this form of economic relations (commodity structure of import and export, conclusion of contracts with countries). Later, in the period of the 13th and 15th centuries, the substantiation of the problem was formed in terms of the availability of resources and the need to control global trade. Subsequently (views of mercantilism in the 17th and 18th centuries), national interests and economic growth through increasing exports and limiting imports became the criteria for the effectiveness of international trade. In the modern world, countries such as Japan and China follow this approach.

Another point of view as to the role of international trade began to develop after the publication of the paper by A. Smith (1977), in which the position of the dependence of economic growth on international specialization and division of labour was put forward, and the negative consequences of export restrictions were called a decrease in competition (the theory of absolute advantages). D. Ricardo (1817) introduced the concept of comparative advantages and substantiated the expediency of international trade from the point of view of their presence in the country. These provisions, as well as the theory of absolute advantages, were grounded on certain specializations of production based on the needs of liberal international trade relations. The theory of Heckscher-Ohlin (Heckscher, 1919; Ohlin, 1933) is also oriented towards comparative advantages and the liberalization of international trade but determines the rules of export due to excess production and import due to the need for raw materials.

The theories of the similarity of countries (Linder, 1961), the product life cycle (Vernon, 1966), global strategic rivalry (Krugman, 1986), and Porter's national competitive advantage (Porter, 1990) determine competition, the volume of domestic production and the availability of resources as criteria for the feasibility of international trade liberalization, prices, trade barriers, development of transnational corporations and others.

The Prebisch-Singer hypothesis (Prebisch, 1950; Singer, 1950) suggests that it is more rational to export manufactured goods, and trade in raw materials limits economic growth.

The connection between potential trade relations and economic growth is outlined through the international movement of technologies and incentives for the creation of new knowledge, increasing the volume of the sales market, and balancing prices (Grossman and Helpman, 2015).

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Empirical research and the application of economic and mathematical modelling tools for developing countries illustrate the presence of a number of results. Thus, the research on the impact of trade openness on economic growth in Egypt, Greece, Italy, Morocco, Portugal, Spain, Tunisia, and Turkey shows that the variables of trade openness (in particular, through the conclusion of the Agreement with the European Union) contribute to economic growth and economic integration (Bardi, Hfaiedh, 2021). Similar results regarding the positive impact of international trade on economic growth were obtained for Libya (Farag, Ab-Rahim, & Mohd-Kamal, 2021).

Scientists confirm that export is a determining factor of economic growth, which stimulates the growth of imports, that is, the relationship between international trade and economic growth is two-way (Ji, Dong, Zheng, Bu, 2022).

S. Kozmenko, M. Korneyev (Kozmenko, Korneyev, 2017) and K. Onopriienko, K. Lovciová, M. Mateášová, A. Kuznyetsova, T. Vasylieva (Kateryna Onopriienko, Kornélia Lovciová, Martina Mateášová, Anzhela Kuznyetsova and Tetiana Vasylieva, 2023) prove the feasibility of an open economy due to its positive impact on economic growth in the long term in the countries of Central and Eastern Europe.

T. Hossain and B. Maitra determine that trade openness contributes to the growth of incomes in the short term, while in the long term, its impact is negative (Hossain, Maitra, 2020). At the same time, other scholars point out that trade openness can significantly improve the quality of economic growth in both the short and long term, but such positive effects of trade openness have significant regional heterogeneity (Burange, Ranadive, Karnik, 2019; Kong, Peng, Ni, Jiang, Wang, 2021).

Other researchers find that foreign direct investment and exports have a negative effect, while the amount of population, imports and final consumption expenditure have no statistically proven effect on economic growth (Bakari, Sofien, 2019). The negative impact of trade openness on the economic growth of the Middle East and North Africa (MENA) countries during the study period is highlighted in the paper by S.T. Onifade, A.Q. Khatir, A. Ay, M. Canitez (Onifade, Khatir, Ay, Canitez, 2022). Other scientists justify the need to mobilize additional financial resources for the implementation of investment projects in the context of ensuring the development of the country's export potential, which requires expanding the cooperation of state institutions and banks in the framework of efforts to manage economic crises, optimal distribution of state support, increasing financial stability and equality of financial development (Kolodiziev, Tyschenko, Azizova, 2017).

The conditions of the digital economy lead to the transformation of factors of competitive struggle and opportunities for economic growth in the country (Kolodiziev et al., 2021).

So, a review of the scientific literature of recent years has revealed that international trade can both have a positive impact and limit economic growth. An increase in exports can potentially reflect a reduction in unemployment and the attraction of capital in the national economy, as it means higher volumes of domestic production, and the result of exports is an inflow of foreign exchange earnings, which strengthens the balance of payments and creates the potential for expanding imports. We can also agree that the influence of international trade on economic growth depends on the nature of external demand, the structure of exports and imports, and the stability of the macroeconomic environment (Farahane, Heshmati, 2020).

The empirical research on the various effects of international trade in periods of a stable world economy, crisis phenomena and post-crisis recovery enables the formation of generalized principles of foreign trade policy aimed at economic growth.

AIMS AND OBJECTIVES

The purpose of the paper is the determination of the influence of international trade factors on economic growth in each of the periods of the economic state and the substantiation of the hypothesis regarding the expediency of adapting international trade to the economic situation in the country.

The following tasks were set and solved to achieve the purpose:

- to form a spatial database of input indicators by countries of the world during the period of economic stability, crisis and post-crisis period;
- to determine the influence of international trade factors on economic growth in each of the periods;
- to substantiate the hypothesis regarding the expediency of adapting the parameters of international trade to the economic situation in the world and in the country.

METHODS

To model the international trade impact on economic growth, a fuzzy neural network tool built into the MATLAB environment was used. In recent years it has proven its effectiveness in the research of economic processes (Kolodizieva et al., 2022).

A sample of 82 countries of the world was chosen as panel data by the following indicators:

- economic growth (GDP as a percentage of the previous period);
- the level of imports as a percentage of GDP;
- the level of exports as a percentage of GDP;
- the level of high-tech exports as a percentage of industrial exports (to test the Prebish-Singer thesis).

The year 2018 was chosen as the stable period – the period of the absence of significant shocks in the world economy since the rates of global economic growth during 2012-2018 were relatively stable without significant fluctuations. The year 2020 was chosen as the crisis period –the period of the pandemic and restrictive measures, which caused a drop-in world GDP by 3.1% (World Bank Group, 2023). 2021 was chosen as the post-crisis period of recovery of economic growth rates of the world economy – the period of recovery of international trade and global economic growth (its level was 5.9% (World Bank Group, 2023)).

The data from the World Bank (World Bank Group, 2023) is the source of information for the formation of initial data.

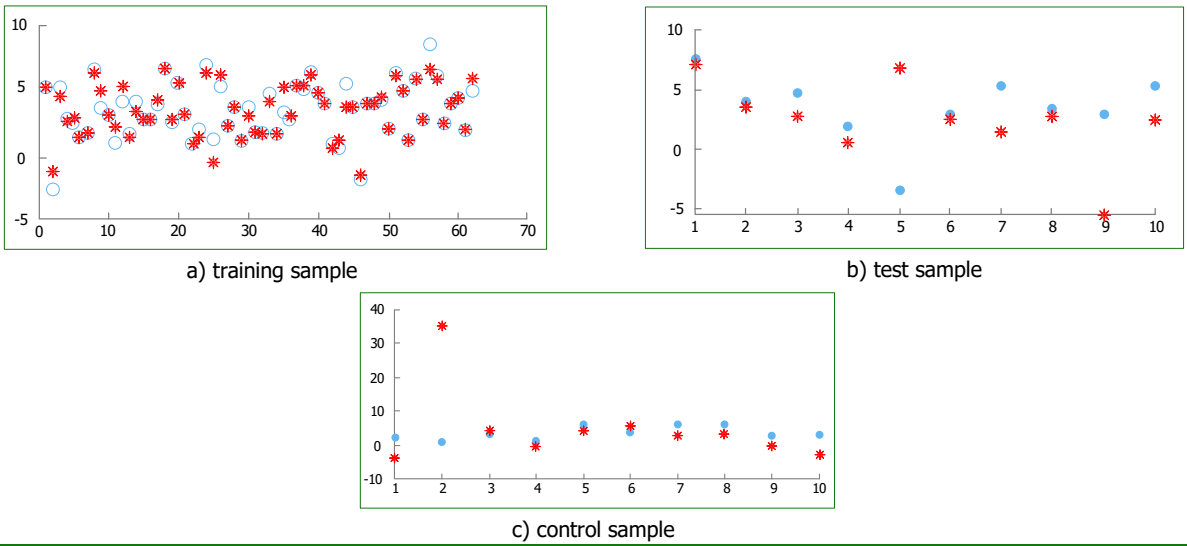
To build fuzzy neural networks, a training sample (62 observation points), test and control samples (10 observation points each) were formed for each of the periods.

The fuzzy neural network model was generated using the grid method without clustering (Grid partition). There are three terms for each input variable –"low level", "medium level" and "high level". The membership functions for input variables are trapezoidal. The rules of association in fuzzy neural networks are formed according to Sugeno's principle.

During the training of fuzzy neural networks, a hybrid method was used, which combines the method of backpropagation of the error with the method of least squares.

RESULTS

As a result of fuzzy neural network modelling of the economic growth dependence on factors of international trade in periods of economic stability, a model and training, testing and control errors were obtained (Figure 1). They are acceptable for further application of the model. In Figure 1, the visual proximity of the actual data and forecast data demonstrates only single cases of emissions (on the test sample (Figure 1b - observations 5 and 9), and on the control sample (Figure 1c –observation 2).



a) training sample

b) test sample

c) control sample

Figure 1. The results of the generation of fuzzy neural network modelling of the economic growth dependence on international trade factors in periods of economic stability. Note: the figures show actual data from the training, test and control samples (blue marks) generated by the fuzzy neural network model (red marks).

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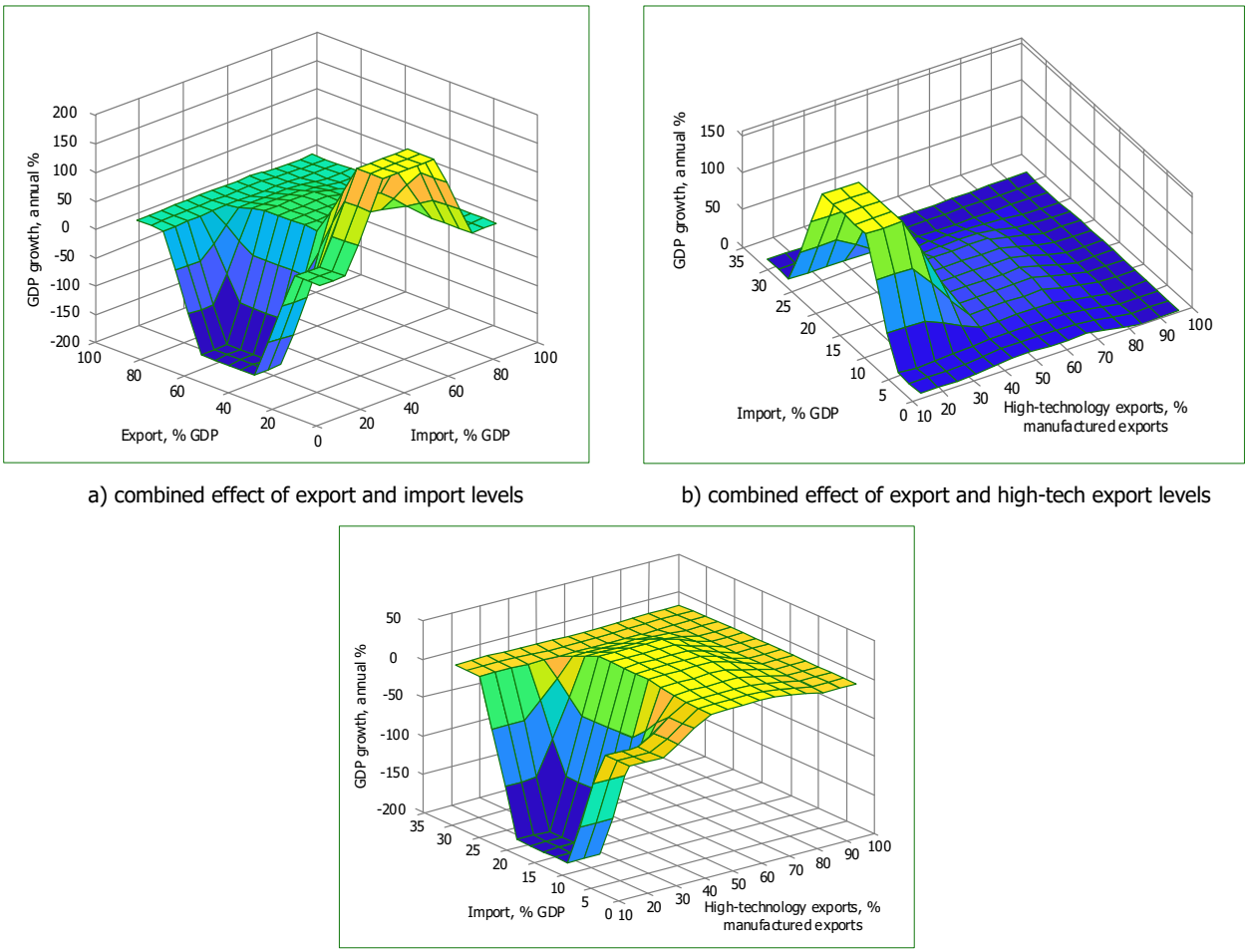
Surfaces reflecting the researched factors combined influence on economic growth during a stable economy are shown in Figure 2.



a) combined effect of export and import levels

b) combined effect of export and high-tech export levels

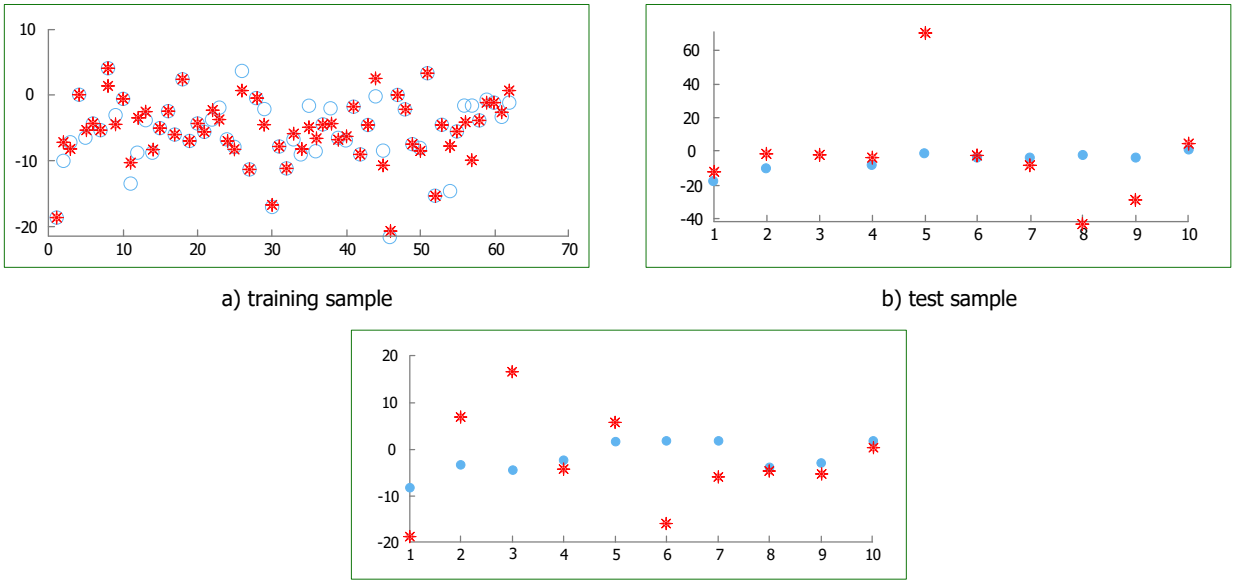
c) combined effect of import and high-tech export levels

Figure 2. International trade factors effect on economic growth during the period of the stability of the world economy stability.

With regard to the level of export and import effect on economic growth, it was determined that in periods of stable economy, the maximization of realistically achievable rates of economic growth (about 10-20%) occurs at average and relatively equal levels of export and import (from 30% to 60%) (Figure 2a). At the same time, a potential surge in the rate of economic growth may be achieved due to a reduction in the level of exports while maintaining the average level of imports (Figure 2a). Negative policy in times of a stable economy is characterized by a low level of imports with an average level of exports.

The share of high-tech exports to maximize the rate of economic growth in a period of stability should be 10-40% of industrial exports at a low level of exports in GDP (Figure 2b) and more than 50% at a low level of imports (Figure 2c). In the event when of a low level of imports the share of high-tech exports is also low, and the policy of economic growth is negative.

Fuzzy neural network modelling of the economic growth dependence on factors of international trade in crisis periods showed a slightly higher testing error (outliers are seen in observations 5, 8 and 9 (Figure 3b)), however, training and control errors are within the normal range, and the model is acceptable for further application.



a) training sample

b) test sample

c) control sample

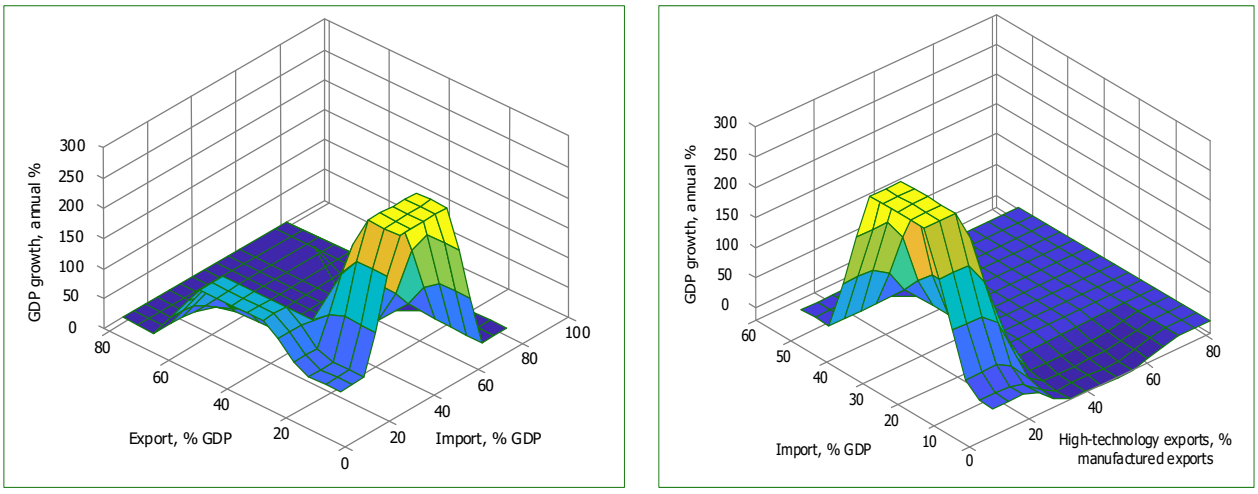
Figure 3. The results of the generation of fuzzy neural network modelling of the economic growth dependence on factors of international trade in crisis periods. Note: the figures show actual data from the training, test and control samples (blue marks) generated by the fuzzy neural network model (red marks).

The influence of each of the investigated factors of international trade dependence on economic growth during the crisis economy is shown in Figure 4. It is known that in the period of 2020, restrictive quarantine measures were applied to logistics processes, international trade was almost stopped, and countries experienced a significant drop in the rate of domestic production. Therefore, the presented modelling results are useful for maintaining economic growth and levelling the negative impact of crisis phenomena.

Thus, in periods of crisis, economic growth is ensured by limiting imports (down to 30%) while maintaining the average level of exports (Figure 4a). Maximization of economic growth can be achieved by reducing the level of exports while increasing imports to the level of 60% (Figure 4a).

The surface of the simultaneous effect of the level of export and high-tech export during the crisis period demonstrates that the potential for increasing economic growth can occur when the level of high-tech export is reduced to 20% and the share of total exports in GDP is at the level of 15-50% (Figure 4b).

The simultaneous effect of the levels of import and high-tech export in a crisis is negative only with a small level of import and high-tech export (Figure 4c).



a) combined effect of export and import levels

b) combined effect of export and high-tech export levels

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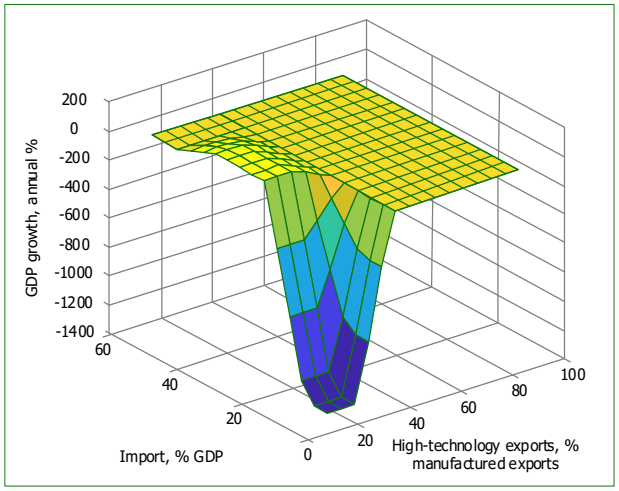
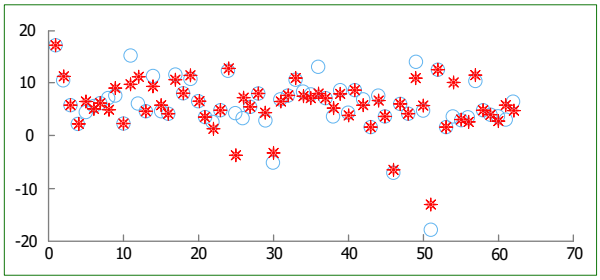


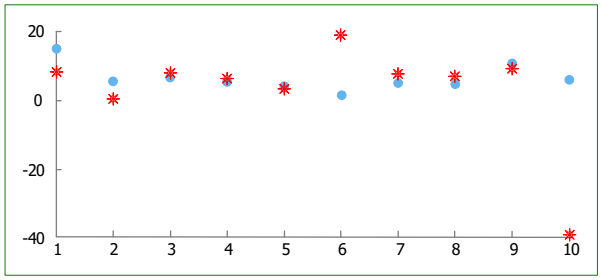
c) combined effect of import and high-tech export levels

Figure 4. The international trade factors effect on economic growth during the crisis period.

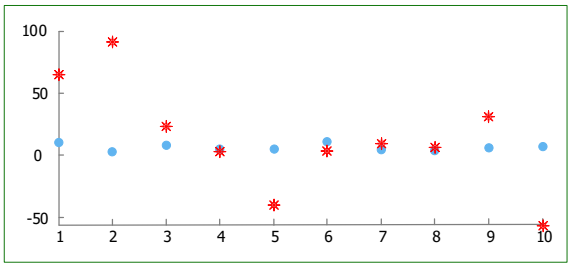
In the process of generating a fuzzy neural network model of the economic growth dependence on factors of international trade in the period of post-crisis recovery, the control sample showed the highest error (outliers according to observations 1, 2, 5, 10 (Figure 5c)), but the training and testing errors are within the normal range, and the model is acceptable for further use.



a) training sample



b) test sample

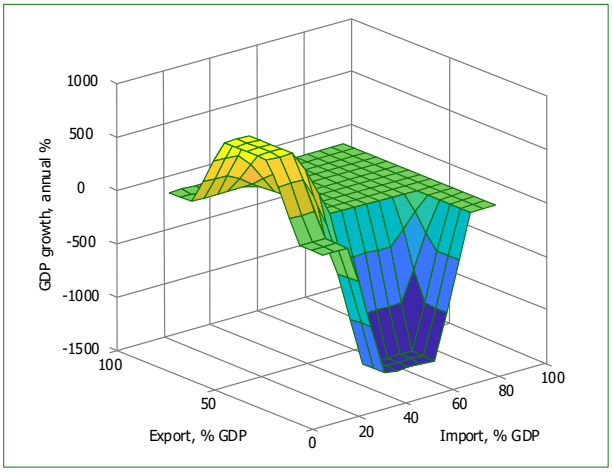


c) control sample

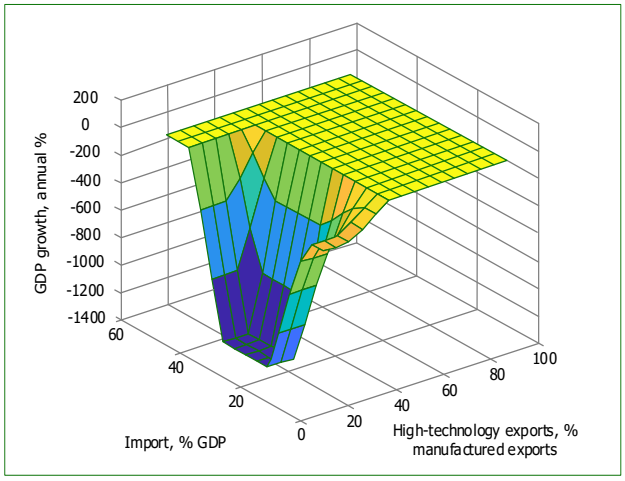
Figure 5. The results of the generation of fuzzy neural network modelling of the economic growth dependence on international trade factors in the period of post-crisis recovery. Note: the figures show actual data from the training, test and control samples (blue marks) generated by the fuzzy neural network model (red marks).

The paired impact of the level of import and export on economic growth in the post-crisis period is presented in Figure 6. The period of 2021 was characterized by the recovery of international trade and domestic production, and the obtained simulation results reflect the priorities of the structure of foreign trade relations in this period.

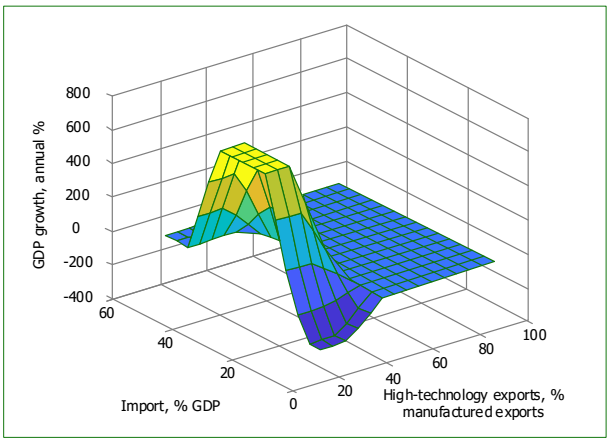
During the post-crisis recovery of the economy, in contrast to the crisis period and the period of stability, it is advisable to increase the general level of exports and high-tech products in particular, and imports should be limited (Figures 6a, 6b). In turn, under the conditions of growth in the level of imports, it is advisable to limit high-tech exports to the level of 40% of industrial exports (Figure 6c).



a) combined effect of export and import levels



b) combined effect of export and high-tech export levels



c) combined effect of import and high-tech export levels

Figure 6. The international trade factors effect on economic growth in the post-crisis period.

The obtained modelling results can be included in further discussion regarding the formation of an effective foreign trade policy in different periods of the macroeconomic state of the country.

DISCUSSION

Unlike researchers of the temporary impact of international trade on economic growth (Hossain, Maitra, 2020; Burange, Ranadive, Karnik, 2019; Kong, Peng, Ni, Jiang, Wang, 2021; Kuznyetsova, Sydorchenko, Zadvorna, Nikonenko, Khalina, 2021), the authors of the proposed research base on the hypothesis of the need to take into account the stability factor of the macroeconomic environment. Therefore, spatial data for 82 countries of the world are grouped by time intervals of stability (2018), crisis (2020) and post-crisis recovery (2021).

With regard to the influence of the level of export and import on economic growth, it was determined that in periods of steady economy, the maximization of realistically achievable rates of economic growth (about 10-20%) occurs at average and relatively equal levels of export and import (from 30% to 60%) (Figure 2a). At the same time, a potential surge in the rate of economic growth may be achieved due to a reduction in the level of exports while maintaining the average level of imports. It follows from this that under the conditions of stability in countries prone to internal consumption and internal investment it is possible to pay attention to the development of a powerful national economy, its internal markets and infrastructure, which can stimulate economic growth, and to import really necessary resources for these needs (confirmation of the theory of mercantilism). The specified research results are also within the limits of the Heckscher-Ohlin theory (Heckscher, 1919; Ohlin, 1933) and confirm the rules of export due to excess production and import due to the need for raw materials, but it should be emphasized that such performance is justified only in periods of stability of macroeconomic conditions and the world economy.

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During crisis phenomena, countries that have limited imports and maintained the average level of export of their products are the most stable (Figure 4a), and potential opportunities for maximum increasing economic growth rates are seen in increasing imports to the pre-crisis level, which makes it possible to create a resource base to support domestic production. Therefore, the financial possibility of increasing the level of raw material imports during shocks makes the national economy less susceptible to the crisis due to the fact that employment of the population is ensured and its income and solvent demand are supported by maintaining domestic processing production.

The situation is the opposite during post-crisis recovery – the highest potential rates of economic growth are achieved with the maximum possible increase in exports and reduction in the level of imports. The indicated results for the period of post-crisis recovery were obtained earlier using the methods of intellectual data analysis (Telnova, Popov, 2023). Therefore, countries with a lower level of imports during the crisis and post-crisis periods really do not spend currency resources (and the crisis often causes exchange rate fluctuations), but by exporting products, they provide foreign currency income. However, such a situation cannot be long-lasting, as it requires significant reserves of resources for domestic production, which before the crisis (in stable times) were purchased abroad and can be realistically implemented only under the conditions of a developed raw material industry, the products of which are used for exported goods.

According to the obtained results, it is proposed to resolve the debate among scientists regarding the influence of the parameters of international trade, and its openness, on economic growth, which is explained by the duration of the effect (Hossain, Maitra, 2020; Suslenko, Zatonatska, Dluhopolskyi, Kuznyetsova, 2022) or regional features (Burange, Ranadive, Karnik, 2019; Kong, Peng, Ni, Jiang, Wang, 2021), through the detailing of the macroeconomic state: trade openness contributes to economic growth and economic integration, however, such influence depends on the nature of export and import levels, the stability of the macroeconomic environment and requires permanent adaptation to the interests of national economies and their characteristics. If the average level of export orientation of the country's domestic production is a fundamental factor and contributes to economic growth under any conditions of the macroeconomic state, the level of imports is a more adjusted indicator. A low level of imports determines the stimulation of domestic production, which may lead to an increase in the general level of economic activity and, thus, contribute to the growth of GDP. In addition, countries with lower levels of imports may be more focused on developing domestic industry to meet local demand, which may also stimulate economic growth. Finally, countries with a lower level of imports can pursue policies aimed at developing domestic industry and restraining the import of foreign goods, which can also contribute to an increase in average GDP growth rates (Telnova, Popov, 2023). At the same time, the increase in the level of imports is expedient to support the resource base of economic development and domestic production of high-tech products, etc.

The verification of Prebisch-Singer's hypothesis (Prebisch, 1950; Singer, 1950) that it is more rational to export manufactured goods as trade in raw materials limits economic growth, has been somewhat clarified by emphasizing and including the factor of the level of high-tech exports in the model.

Thus, it is advisable to limit the high-tech exports level to 40% of industrial exports at a low level of exports in times of stability (Figure 2b) and to 30% of industrial exports at an average level of exports in times of crisis phenomena (Figure 4b). This makes it possible to develop the internal technological base and have competitive advantages on the world market, without selling innovative products at reduced prices. On the other hand, with increasing import dependence, in order to prevent a decrease in economic growth rates, the share of high-tech exports should increase in times of a stable economy and crisis.

For the period of post-crisis recovery, at any level of export, it is advisable to increase the export of high-tech products, and with increasing import dependence, it is rational to limit high-tech exports to the level of 40% of industrial exports.

The given results develop the Prebisch-Singer hypothesis (Prebisch, 1950; Singer, 1950) and make it possible to state that the export of high-tech products is an influential factor in economic growth. However, its level should be rationally adapted to macroeconomic conditions and the structure of international trade, based on the theory of mercantilism. Keeping high-tech products within the country and limiting such exports in periods of stability and crisis directly affects GDP growth, as it stimulates economic activity and increases domestic productivity through the expansion of the production of goods and services that create high-added value. In the period of active economic growth after the crisis phenomena of the world economy, increasing competition, it is rational to increase the export of high-tech products.

Summarizing the results, it is possible to propose foreign trade policy formats that promote economic growth during different macroeconomic conditions:

- in the period of stability, it is advisable to maintain the level of export and import at the level of 30%-60% of GDP, and the structure of exports should be based on the high-tech component of industrial exports (about 40%), and the product composition of imports should include mainly raw materials and resources for domestic production;

- during the period of crisis, economic support and average rates of economic growth are ensured by a reduction in imports (to the level of 30%) and an average level of exports, and proactive economic growth is achieved through a reduction in the level of exports, its high-tech component while increasing imports, which makes it possible to avoid the sale of innovative products at the world market at reduced prices and the formation of an internal technological base for post-crisis recovery;
- in the period of post-crisis recovery, it is recommended to increase the general level of exports and high-tech products in particular, and imports should be limited in order to support the domestic producer.

Proven provisions of the foreign trade policy of the countries, in contrast to the existing ones, confirm the proposed hypothesis regarding the expediency of adapting international trade to the economic situation in the country, detailing the rational correlations of the level of export and import in GDP, as well as high-tech exports to maximize the rate of economic growth in each of the periods – stability, crisis and post-crisis recovery. In addition, the obtained results explain the statistical data provided by the GTA (Global Trade Alert, 2023) regarding state intervention in trade policy and the restriction of foreign interests and the stimulation of the protection of national producers during the period of crisis phenomena in 2020 and the recovery of the economy in 2021.

In addition, the obtained results can be applied to the realities of the Ukrainian economy during the period of martial law, which can be considered a crisis period. In 2022, imports made up 52.3% of Ukraine's GDP, and exports - 35.5% of GDP (World Bank Group, 2023). According to the conducted research, in order to maintain the pace of economic growth, it is necessary to reduce imports to 30%, and the level of exports should be at an average level of 40-60% (Figure 4a). The realities of the Ukrainian economy corresponded to another alternative option – proactive economic growth (Figures 4a, 4c), when the maximization of economic growth is achieved at an average level of imports and a reduction in exports while observing the condition of limiting high-tech exports. So, it is possible to ascertain that the state foreign trade policy of Ukraine is quite effective under the conditions of martial law. However, the conditions for Ukraine's post-war recovery will require an increase in the level of exports and its high-tech component, the prerequisites for which must be laid today. Even under the conditions of martial law, this requires an emphasis on the development of science and innovation, the formation of the foundations of an effective state policy of supporting scientific and technological progress, the interaction of the state, science and industry through the creation of clusters and ecosystems, appropriate personnel support, which is complicated by modern migration processes. Since the efficiency of the intensification of scientific research and development appears with a time lag, the levelling of support for the country's innovative development during martial law will limit the possibilities of rapid recovery of Ukraine and ensure the growth of the level of competitive high-tech exports in the post-war period. Strengthening the national innovation system of Ukraine, taking into account the features of martial law and the sectoral structure of the domestic economy, the formation of the foundations of the innovation process from scientific developments to the sale of high-tech products for export should form the basis of Ukraine's economic development strategy.

Therefore, the proposed theoretical-methodical approach based on the comprehensive and simultaneous consideration of the influence of import, export and high-tech export factors develops the scientific basis of foreign trade policy, the orientation of its parameters on economic growth, makes it possible to determine the principles of industrial and budgetary policy, and conditions the need for innovative development of countries. The implementation of the recommended provisions will allow the Ukrainian economy to overcome the difficulties of the country's post-war recovery and will make it possible for the economies of the world to adapt the foreign trade policy to the current macroeconomic situation.

CONCLUSIONS

The empirical research on the various effects of international trade in periods of a stable world economy, crisis phenomena and post-crisis recovery enables the formation of generalized principles of foreign trade policy aimed at economic growth. The purpose of the paper consists in the determination of the international trade factors' impact on economic growth in each of the periods of the economic state and the substantiation of the hypothesis regarding the expediency of adapting international trade to the economic situation in the country.

The use of modern modelling apparatus, in particular, the tool of fuzzy neural networks for spatial data for 82 countries of the world for the time intervals of stability (2018), crisis (2020) and post-crisis recovery (2021), made it possible to find a rational approach to the formation of guidelines for international trade under different macroeconomic conditions.

In periods of a stable economy, the maximization of realistically achievable rates of economic growth (about 10-20%) occurs at average and relatively equal levels of export and import (from 30% to 60%). At the same time, a potential surge in the rate of economic growth may be achieved due to a reduction in the level of exports while maintaining the average

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level of imports. During crisis phenomena, countries that have limited imports and maintain the average level of export of their products are the most stable, and the potential opportunities for increasing the rate of economic growth are seen in the increase of imports to the pre-crisis level. In times of post-crisis recovery, the greatest potential rates of economic growth are achieved with the maximum possible increase in exports and a reduction in the level of imports. In general, one can agree that trade openness contributes to economic growth and economic integration; however, such influence depends on the nature of export and import levels, and the stability of the macroeconomic environment, and requires permanent adaptation to the interests of national economies and their characteristics.

The Prebish-Singer hypothesis has been developed due to the emphasis on attention and the inclusion of the factor of the level of high-tech exports in the model. It has been determined that the export of high-tech products is an influential factor in economic growth. However, its level should be rationally adapted to macroeconomic conditions and the structure of international trade, based on the theory of mercantilism.

The research has certain limitations that must be taken into account when using its results, namely the need to determine the impact of the detailed sectoral structure of international trade and the protectionism measures of some countries on their economic growth.

ADDITIONAL INFORMATION

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ЗОВНІШНЬОТОРГОВЕЛЬНА ПОЛІТИКА ТА ЇЇ ВПЛИВ НА ЕКОНОМІЧНЕ ЗРОСТАННЯ

Проведення емпіричного дослідження різного впливу міжнародної торгівлі в періоди стабільної світової економіки, кризових явищ та посткризового відновлення вможливлює формування узагальнених засад зовнішньоторговельної політики, спрямованої на підвищення темпів економічного зростання. Метою роботи є визначення впливу факторів міжнародної торгівлі на економічне зростання за кожним із періодів економічного стану та обґрунтування гіпотези щодо доцільності адаптації міжнародної торгівлі до економічної ситуації в країні. У роботі використано інструмент нечітких нейронних мереж щодо просторових даних 82 країн світу за часовими інтервалами стабільності, кризи та посткризового відновлення, що дозволило знайти раціональний підхід до формування орієнтирів міжнародної тор-

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гівлі за різних макроекономічних умов. Результати дослідження показали, що в періоди стабільної економіки максимізація реально досяжних темпів економічного зростання (близько 10-20%) відбувається при середніх і порівняно однакових рівнях експорту та імпорту (від 30% до 60%). При цьому потенційний сплеск темпів економічного зростання може буде досягнутий шляхом скорочення рівня експорту при збереженні середнього рівня імпорту. Під час кризових явищ найбільш стабільними є країни, що обмежили імпорт і зберегли середній рівень експорту своєї продукції, а потенційні можливості нарощення темпів економічного зростання вбачаються в підвищенні імпорту до докризового рівня. У часи посткризового відновлення найбільші потенційні темпи економічного зростання досягаються при максимально можливому нарощенні експорту та скороченні рівня імпорту. Констатовано, що експорт високотехнологічної продукції є впливовим фактором економічного зростання. Проте його рівень доцільно адаптувати до макроекономічних умов і структури міжнародної торгівлі, орієнтуючись на теорію меркантилізму.

Ключові слова: економічне зростання, міжнародна торгівля, експорт, імпорт, високотехнологічний експорт, макроекономічна ситуація, стабільність, криза, посткризове відновлення, нечітка нейронна мережа

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