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UKRAINE'S POST-WAR ECONOMY: INTERNATIONAL AID AND GROWTH POLICY

The full-scale war unleashed in 2022 by the Russian Federation against Ukraine is accompanied by massive destruction of infrastructure and industrial facilities. Their rapid recovery is impossible without international assistance. However, it is known from history that the use of such aid did not always lead to accelerated post-war recovery of countries whose markets and economies are developing. Knowledge of such facts urged Western scientists to search for a mechanism of aid's impact on economic growth. Researches that began in the 1960s did not shed light on this mechanism. However, they did show that aid speeded up economic growth and recovery in countries that conducted better fiscal, monetary, and trade policies and succeeded in establishing the rule of law.

In the article, a slightly different scientific approach is substantiated. It assumes that when the country implements not only a better fiscal, monetary, foreign trade, institutional, but also structural economic policy, the impact of international aid on postwar economic growth can significantly increase. The proposed approach gives grounds for the statement that the limited amount of aid in Ukraine should not be dissipated on the reconstruction of all industrial facilities destroyed and damaged by the war, but it is advisable to concentrate it on the restoration of enterprises that are able to start production and sale of increased technological complexity products on international markets within a short period. The advantages of such use of the aid are shown by calculation. It shows that directing international aid at expanding exports of high technological complexity items would create in Ukraine favorable conditions for increasing the post-war annual growth rates of commodity production to 10% and reduce the period of recovery of this indicator to the 2021 level from 12 to 6 years.

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At the same time, arguments are given that the proposed use of aid is only a means of shortening the terms of the economy's exit from the crisis and its transition to a state of accelerated growth. It will be possible to turn this state into a long-term economic trend only if an effective mechanism is introduced for encouraging the companies' innovative activities and attracting foreign investments in industries producing items of increased technological complexity. Modeling possible scenarios of the post-war recovery of Ukraine's economy somewhat expands the scientific understanding of the mechanism of aid's effect on a country's economic growth. In particular, it is supplemented by the idea that in the post-war period, international aid plays the role of a driver of high rates of a country's economic growth to the extent that it contributes to economic restructuring of the production from military to civil mode transforming it from technologically simple to more technologically complex.

Keywords: *post-war economy, international aid, commodity production, economic policy, export, import, unit value, products of increased technological complexity*

The Russian Federation's war against Ukraine is taking place on Ukrainian soil and leaves devastated areas and flows of refugees. Under these conditions, the future of this country's economy cannot be predicted even in the short term. Until hostilities and war are over, economists will not be able to identify the peak of economic recession and use it as a reference point for assessing the condition of the economy and welfare.

With uncertainty regarding the war duration, the state authorities shape public opinion in such a way that people who live on relatively safe unoccupied areas increase the output of meat, milk, and vegetables and, if possible, also sell surplus products on the markets. Such state policy is logical and does not require scientific justification. And no recommendations are needed on how to restore trade in Kharkiv, Irpen, Gostomel or Bucha and other cities that have suffered large-scale destruction. It is clear that the trade will not recover until the housing stock, and infrastructure facilities recover and people return. There is also the understanding that during the war there is a market compression in the economy, an increased centralization in the distribution of products and the deployment of a war economy, which processes are not publicly discussed or analyzed using open databases.

At the same time, there are a number of issues which, even during martial law, require discussion and debate among economists who intend to look into the post-war period, when economic recovery will begin. This is necessary in order for the state authorities to receive maximum possible information about feasible alternatives to their decisions regarding the solution of priority problems and defining the guidelines in the reconstruction and development of Ukraine's economy.



1. Terms and initial conditions of the study

1. Restorative structural economic policy is a set of measures of the state to attract its own resources and international aid for the reconstruction and creation of new enterprises in priority sectors, which could ensure a quick exit of Ukraine's economy from the crisis and its transition to accelerated growth in the post-war period.

2. Commodity production - production of goods and provision of services in the economy for sale on the market. Commodity output in an economy can be calculated using the formula: $Q^i = \text{GDP} - \text{final collective consumer spending}$, where Q^i is commodity output in the economy in the i -th period. Unlike GDP, this indicator characterizes the value of only market goods produced in the economy.

3. Technological complexity of exported/imported products is a set of properties acquired by goods depending on the technology of their manufacture. Economists indirectly estimate the consumer utility of such a set using the index of unit value (UV) (unit value index). The index is usually given in US dollars for 1 kilogram of the weight of goods of a certain group j . The unit value of the aggregate of all commodity groups in the country's exported/imported products is described using the indices UV_{ix} and UV_{im} . The economic sense of their comparison is based on the assumption that raw materials and semi-finished products have lower unit costs compared to products with a more useful set of properties obtained as a result of deeper processing of raw materials with the use of more advanced or unique technologies [1, p. 16].

4. Export products of increased technological complexity are product groups of export products whose unit value index is higher than the value of the index of average unit value of the country's total merchandise imports.

5. After the full-scale invasion of the Russian Federation to Ukraine, more than 8 million internally displaced persons were registered in this country added by about 5.9 million forced migrants abroad [2].

6. In Ukraine's economy, the supply of products has decreased both due to the destruction and cessation of the companies' operations in the area of hostilities, the government's currency restrictions on the purchase of imports and problems with logistics (blocking of maritime trade routes by the Russian military), and due to the forced unilateral introduction by producers of new work practices on the market. It assumes that products can be sold only on the condition of full prepayment. Under the shortage of working capital among retailers and wholesalers, this accelerates the decrease in turnover and increase in domestic prices.

2. Some theoretical aspects of the study on the impact of international aid on economic growth

After a war or an armed conflict, the governments always face two key tasks - to recover the economy and to accumulate the necessary resources in order to prevent new hostilities. The guarantee of the latter is high economic dynamics. Its post-war expansion is usually complicated by large-scale destruction of

infrastructure and industrial facilities. For example, specialists of the Kyiv School of Economics working within the "Russia will pay" project, have found that as of the end of May 2022, the total amount of documented losses in Ukraine's infrastructure sector in Ukraine is about 105.5 billion USD.

It is known from history that after military conflicts, international aid had contributed to the successful reconstruction of countries. In Ukraine, its provision is increasingly associated with the launch of an analogue of the Marshall Plan, that is, the program of economic assistance to European countries after the Second World War. Individual intentions to support this idea are also demonstrated by well-known Western politicians who proposed the creation of the European Solidarity Fund for the recovery of Ukraine. State authorities too do not remain aloof from the problems of the future recovery of Ukraine's economy. In order to solve them, a consultative and advisory body has been created under the President of Ukraine - the National Council for the Recovery of Ukraine from the Consequences of the War.

Given that Russia has been waging war against Ukraine since 2014, the idea of attracting international aid to restore the economy has been a topic for active promotion by Ukrainian scientists for many years. In particular, thanks to the works by T. Bohdan [3], V. Ivanov [4], V. Yemets [5], and Ya. Zheleznyak [6], the experience of implementing the Marshall Plan in European countries (West Germany, Italy) has been summarized, as well as that of the use of international aid for economic recovery of the countries that suffered destruction caused by hostilities (Japan, South Korea, Israel, Georgia, and Bosnia and Herzegovina). Besides, some foreign [7] and domestic scientists, including T. Bohdan [8], V. Vlasjuk [9], and V. Novikov [10], as well as international scientific research teams [11] offer their vision of the organizational form, structure, sources of funding and tasks of the institution to be the main executor of the "Marshall Plan for Ukraine". Some of these researchers are inclined to believe that the amount of international aid for Ukraine's recovery may amount to 200-500 billion euros.

The above mentioned researchers have one thing in common - they all are based on the same hypothesis. It assumes that international aid has a positive effect on economic growth during post-war reconstruction. However, this hypothesis is not perfect. Its infallibility is questioned by the facts from the economic history of individual countries. For example, the US aid provided in 1953-1961 to South Korea did not affect both either the standards of living of this country's population nor the growth of its economy. Based on this negative experience, skeptics put forward a somewhat different hypothesis, which says that in developing countries, aid does not affect economic growth, because it can be used for illegal enrichment of the ruling elites.

If we do not touch the past of other countries and take a closer look at our own history, we can reveal similar facts. For example, in 2011-2020, the Ukrainian authorities raised 31.03 billion USD worth of foreign credit resources, which increased this country's state and state-guaranteed debt to 90.25 billion USD [12].



However, the results of using these funds turned out to be far from desirable. During the above mentioned decade, Ukraine's average annual GDP growth rate was -0.67%. It follows that additional funds resources, which the state attracts from outside, do not always serve as a guarantee of the country's accelerated economic growth.

The above mentioned fact raises the logical question: if this was the case in Ukraine in the past, do we have any grounds to claim that things will be different in the future? What are the guarantees that international aid, which can also be provided in the form of international loans, will necessarily bring accelerated economic growth in the post-war period? So far, there is no convincing answer to this question, although science has gained a certain arsenal of knowledge to find it.

The accumulating of modern knowledge on the subject began in the 1960s with collecting statistical data on international aid. They opened up the opportunity for scientists to describe empirical facts and look for their interpretation. The history of the cognitive process on international aid for developing countries was described in detail by the American scientist David Rudman [13]. He gathered evidence that economists did not only refine hypotheses about the importance of international aid, but also tried to identify the mechanism of its impact on economic growth and the peace dividend.

Theoretically, economists use the term "peace dividend" to denote the concept of benefits received by countries from reducing defense expenditures and transforming military production into civilian production [14, c. 70-79], and from the applied point of view - to generalize the trend observed in many countries after the war, namely the increased economic growth to a rate that exceeded the average pre-war level. In 1995, scientists M. Knight, N. Loaiza, and D. Villanueva gathered evidence of the negative impact of military spending on capital formation and resource allocation [15]. This allowed them to explain why, in the post-war period, countries that had reduced defense spending often saw peace dividends and higher economic growth. However, the question of the impact of international aid on the size of the peace dividend remained unexplained.

In 2000, American scientists Craig Burnside and David Dollar published the article "Aid, Growth and Politics", whose new and at the same time controversial ideas shook and involved in the discussion not only the scientific community, but also professional in the government structures of leading countries and international organizations. Subsequently, the discussion forced the authors to additionally confirm the article's position with data of the 1990s. The primary achievement of the researchers' efforts was the proposal and empirical proof of the hypothesis that the impact of international aid on economic growth in developing countries depends on the quality of institutions and policies. In particular, the authors provided evidence that aid only speeds up economic growth if the country's institutions and policies are effective. In addition, they concluded that large financial aid to a country with inefficient economic institutions and policies *will stimulate no reforms* [16, p. 3].

In 2004, researchers V. Easterly, R. Levin, and D. Rudman provided evidence that international aid does not always contribute to economic growth in the countries that implement even comparatively efficient policies. For a detailed analysis of this situation, they proposed to investigate in the future the following topics: whether the aid can stimulate reforms in politics and institutions that promote economic growth, whether certain mechanisms of international aid work better than others, etc. [17, p. 780].

The British scientist Anke Heffler comes a little closer to answering these questions. Summarizing the empirical data, she makes the conclusion that about 56% of international aid was directed to the recovery of economic and social infrastructure and only 8% to the recovery of production. This allows her to make a cautious assumption that aid might contribute to a country's economic growth because it somehow performs the role of public investment in the post-war period [18, p. 12]. However, A. Heffler was unable to confirm the correctness of this opinion by econometric methods, so the question of the mechanism of the aid's influence on the growth of economies remained debatable.

In modern science, no less debatable are the researches on the features of policies and institutions that enable the positive impact of international aid on economic growth in developing countries. In particular, K. Burnside and D. Dollar has found that aid speeds up economic growth if the government implements relatively better fiscal, monetary and trade policies, and succeeds in creating the institution of the rule of law. The signs of such a policy include low budget deficit and inflation, free trade and effective rule of law.

The present article aims to use the example of Ukraine to scientifically substantiate the assumption that in the post-war period, the positive impact of international aid on recovery and growth of Ukraine's economy can be considerably increased if this country has not only comparatively better fiscal, monetary, foreign trade, and institutional policies, but also a comparatively better restorative structural economic policy.

3. Main results of the applied research

3.1. The condition of commodity production in Ukraine

In the territories of Donetsk, Zaporizhzhya, Kyiv, Luhansk, Mykolaiv, Sumy, Kharkiv, Kherson, and Chernihiv oblasts', hostilities were accompanied by the destruction of housing stock, infrastructure, enterprises, land mining and migration. Fighting also took place around Kyiv, which prompted some of the city's residents to migrate to other regions and countries. The overall impact of these developments on the economy is usually assessed with indicators characterizing GDP dynamics. In GDP structure, the share of the above mentioned regions is 29.5%, and that of the city of Kyiv - 24%.

In 2021, Ukraine's GDP in dollar terms was about 200.5 billion USD [19]. According to the estimates by this country's Ministry of Economy, in the first quarter of 2022, GDP probably decreased by 16% compared to similar period of



previous year [20]. If by the end of the current year in the above mentioned regions, gross regional product remains close to zero, and in the city of Kyiv at 65% of year [21], and in other above mentioned oblasts' - at the level of previous year, then under this scenario one can expect, that total Ukraine's GDP will decrease by 32.9% compared to 2021. Experts of the National Bank of Ukraine provide similar estimates regarding the DGP drop (33.4%) [22]. If GDP decreases by a third, then in 2022 its value will amount to nearly 134.5 billion USD. According to World Bank data, it is close to Ukraine's GDP in 2018 [19].

The above mentioned estimate is based on the assumption that the structure of the Ukrainian economy will remain unchanged in 2022. However, it is known from war-time experience of other countries that during a war, government spending on defense tends to sharply increase, while production largely transforms from civilian to military. For Ukraine, this means that in 2022, the output of non-market products will start to grow, while that of commodity (market) products will start to decrease. Under these conditions, overall GDP will decrease at a somewhat slower pace relative to the output of market goods and services. The lack of the latter will cause their shortage on the market and/or encourage their replacement by more expensive imported analogues, which would lead to inflation and reduce welfare even stronger than the overall GDP reduction. Under these circumstances, the commodity output becomes a more accurate indicator of the economy's condition compared to the pre-war year of 2021. The possibilities of the use of this indicator can be briefly presented as follows.

Calculations based on statistical data show that in 2021, commodity output in Ukraine was 91.9% of GDP. In dollar terms, its value was about 184.3 billion USD. According to the statements by representatives of central authorities, in 2022, the war with Russia will require Ukraine to raise its military expenditures to 20 billion USD [23]. If Ukraine can mobilize such an amount of funds, it will lead to a redistribution of production resources in favor of the Armed Forces, defense industries and all those who produce non-market goods and services. Their combined share in the GDP structure will increase to 16.9%. Under these circumstances, in 2022, the output of market products will decline by 45.4% compared to 2021 and will amount to about 100.7 billion USD. Calculations based on World Bank data [19] indicate that this is nearly the amount of commodity output that Ukraine produced in 2017.

The scale of output decline in Ukraine's commodity sector in 2022 can be described in more detail using domestic sales indicators for the largest groups of commodity products, which usually include consumer and investment goods.

Consumer goods. Retail turnover is the largest representative sample, which gives an idea of the circulation of consumer goods in domestic market. With the beginning of the war, retail turnover sharply decreased. Undoubtedly, the root cause of this was hostilities and physical destruction of retail facilities. Almost a third of them stopped working on the market. Other factors that led to the current market situation, include the following: the lack of product stocks with the producers, difficulties with transportation, and the lack of personnel in stores and

logistic chains. However, the above mentioned circumstances do not explain why among the facilities that ceased operation the smallest shares are accounted for by gas stations (network reduced by 15%), pharmacies (16%), food mini-supermarkets (17%), and the largest shares are accounted for by entertainment-and-shopping centers (87%), jewelry stores (85%), clothing and footwear stores (72%), and household and digital appliances (51%) [24].

The above mentioned facts can be explained most convincingly by a drastic reduction in consumer demand and a change in its structure in favor of goods that satisfy basic needs for food, medicine and safety (moving to safe places). In the structure of retail trade, their share is about 60%. In addition, it is worth considering that about 14.0% of Ukraine's population have gone abroad. Calculations show that in 2022, the physical volume of retail turnover in Ukraine may decrease by 48.6% relative to 2021. For comparison, during the 2014-2015 crisis, the physical volume of turnover only decreased by 28% compared to 2013.

Investment goods. A reduction in consumer demand on Ukraine's domestic market will almost certainly depress private investment activities. The largest representative sample, which makes it possible to create an idea about the circulation of investment goods on domestic market, is the volume of capital investments. Their dynamics in 2022 are affected by the following circumstances. First, with the beginning of the full-scale war, the public capital investments practically stopped, including within such well-known pre-war programs as "Great Construction" and "Great Restoration". Secondly, in the nine above mentioned regions, where hostilities have taken place or are taking place, the greatest risks for new capital investments remain due to the instability of the front line and increased frequency of missile attacks. If these circumstances are included in the calculations, it can be concluded that in 2022, capital investments in Ukraine may decrease by 58.7% compared to 2021. World Bank experts make similar conclusions. According to their assessment, capital investments will "sag" by 57.5% [25].

How the reduction in the output of consumer and investment goods in 2022 affects the business economic activity is demonstrated by the results of surveys on the companies conducted by specialists of the Institute of Economic Research and Political Consultations. According to them, in April 2022, compared to March, the share of those companies whose output decreased by more than a half exceeds the share of those whose output increased or did not change (70.5% and 29.5%, respectively) [26].

3.2. Some assessments of Ukraine's inertial economic recovery

The crises of 2014-2015 and 2022 in Ukraine were triggered by the Russian Federation. However, to achieve its goals, in each case the Russian Federation used radically different means. While in 2014-2015 it was economic war that was chosen as the main instrument to ruin Ukraine's commodity production, then in 2022 it is a war of occupation, and physical destruction of Ukraine's economic potential.



During the six-year period 2016-2021, Ukraine's economy recovered to the pre-crisis level of 2013. In this regard, a natural question arises: *how long will it take to restore the pre-war level of commodity production?* There is no definite answer to it, because it depends on the ways to be chosen for post-war economic development.

Assuming that in 2022 commodity output in Ukraine will decrease by 45.4%, and in the first post-war year its recovery will take place inertially, that is, in the same manner as in the 2018-2021 scenario (without taking into account the crisis year 2020), then one can expect that over the consequent three years, the output of commercial goods and services will not reach 100%, but only 70.5% of the level of 2021. The latter can be explained by the fact that during the pre-war period, the contribution of regions that suffered large-scale economic devastation during hostilities to Ukraine's GDP, as already noted, was 29.5%. Hence in the post-war period these regions will under-contribute a corresponding share to this country's overall commodity output.

If, after the first three years during the post-war recovery, commodity output increases from 54.9 to 70.5% of the 2021 figure and continues to grow at 4.0% per year on average (the rate observed in 2021), then we can expect that during the consequent nine years it will reach the pre-war level. Under these conditions, the total period of recovery of commodity output to the level 2021 may take about *12 years*. At the same time, it should be understood that Ukraine will only "recover" as one of the poorest European countries, because the latter will continue developing during this period.

Given the considerably long period of reaching the pre-war level of commodity output, a natural question arises: *can it be reduced?* In our opinion, the search for the answer should begin with the analysis of certain long-term economic trends observed in the global economy.

In getting acquainted with the experience of other countries that rapidly develop and claim the role of new poles of global economic growth, one can reveal that one part of them maintain high economic dynamics by using advantages of their domestic markets and growing population, while the other - by using the advantages of foreign markets. For example, in 2001-2020, China and Indonesia, with average annual balances of foreign trade in goods and services, respectively, at 3.4 and 2.4% of GDP [27], were more active in using the opportunities of foreign markets to achieve average annual growth rates of 8.7 and 4.9% [28]. At the same time, India and Turkey, with negative average annual foreign trade balances (-3.1 and -2.1% of GDP, respectively), were more active in using the opportunities of domestic markets, which resulted in considerably high average growth rates (5.8 and 4.8% per year).

Economic history testifies that over the recent two decades, Ukraine has had certain experience of using the advantages of both external and internal markets to maintain economic dynamics. In particular, in 2001-2005, with a positive average annual trade balance of goods and services (3.3% of GDP), this country's domestic economy took advantage of foreign markets and managed to speed up growth to an average of 7.7% per year. These growth rates considerably exceeded those that

could be achieved with domestically oriented industries alone. However, since 2006, Ukraine began to use mainly the opportunities of its domestic market: calculations based on World Bank data indicate a negative average annual trade balance in 2006-2020 (-5.4% of GDP), which was accompanied by a decrease in the average rate of economic growth to 0.02% per year.

In explaining why, since 2006, the potential of Ukraine's domestic market to support high rates of economic growth has been considerably offset by a negative foreign trade balance, scientists rightly note the dominance of raw materials and semi-finished products in the structure of merchandise exports, and the dominance of consumer and investment goods (i.e. final products with a relatively higher market value) in the structure of imports.

However, today the above explanation is no longer sufficient to answer a new urgent question that arises in the war realities: *which industries in the post-war period should be prioritized for recovery at the expense of international aid* in order to maximally use their potential to reduce the time to bring Ukraine's economy out of crisis and achieve high growth rates? These new issues require a search for new approaches to their solution. We will try to do this using the estimates of the technological complexity of Ukrainian export and import items.

3.3. Priority guidelines for the post-war recovery of exports

Ukraine's export industries look quite dynamic. In particular, during the period of post-crisis recovery in 2016-2021, exports of domestic goods and services increased from 46.0 to 81.7 billion USD, i.e. to the pre-crisis level of 2013. This brought additional currency income, but did not provide positive growth. It can be explained in the following way.

In 2016-2021 in Ukraine, the average annual unit value of gross merchandise imports UV_{im} was 0.78 USD/kg, and that of gross merchandise exports (UV_{ex}) - 0.31 USD/kg. It therefore follows that the technological complexity of imports was 2.5 times higher than that of Ukrainian merchandise exports. Revenues from the sale of the latter did not cover foreign currency costs on importing technologically more complex products. As a result, there was a negative balance of foreign trade in goods in the range of 6.56-14.26 billion USD, which led to a decrease in the annual growth rate. This decrease was partly compensated by the positive balance of foreign trade in services, which ranged from 0.48 to 4.40 billion USD [29]. However, this did not remove the problem of slowing economic dynamics.

During the post-war period, the solution to the above mentioned problem can be started by channeling part of the international aid and limited state resources to industries that are able to restore and/or raise the sales of their products on foreign markets in a short time, which would increase the overall level of technological complexity of Ukrainian merchandise exports and, respectively, its market value relative to imports. As a result, export revenues will be able to cover hard currency costs for imports to a greater extent, which would reduce the negative balance of foreign trade in goods, raise the growth rates of Ukraine's economy and the incomes of individuals, companies and the state.



The first step towards verifying the above mentioned assumption is a search for scientific approaches to the *identification of products*, which in the pre-war period acted a factor that increased the overall technological complexity of Ukraine's merchandise exports. In our opinion, such products had to meet the following criteria. First, they had to have a high non-price (value, qualitative) competitiveness². The latter means that Ukrainian products were bought on international markets not because of their lower prices, but because of their better quality compared to competitors' analogues. Secondly, they had to have a significant share in the structure of both Ukraine's domestic and global commodity exports. This means that, on the one hand, a country has enough resources to expand the production of such items in the future, and on the other hand, that such products are part of, for example, the top 100 globally largest export commodity groups. And thirdly, these products had to be of increased technological complexity.

The use of the above criteria brought the following results. The research based on the first criterion, in particular, made it possible to reveal that in 2019-2021, 71 export product groups in Ukraine were characterized by high non-price competitiveness, that is, about 6% of their total number in the three-digit code classification.

For the research based on the second criterion, a separate algorithm was developed, which, with the help of certain features, made it possible to describe and compare export product groups with high non-price competitiveness. In particular, it was established that the commodity group "insulated wires, cables and other insulated electrical conductors; fiber-optic cables" (code according to the Ukrainian Classifier of Goods of Foreign Economic Activities (UKTZED code) 8544; the share in merchandise exports is 2.33%) was the largest share in Ukraine's commodity exports. In the pre-crisis year of 2019, cable items ranked 16th in the list of the 100 largest global export groups [30]. Ukraine's exports of equipment for distributing electricity (SITC group 773) amounted to 136.1 billion USD, i.e. 0.7% of this item's global exports [31, p. 234]. In 2019, the share of Ukraine in global exports of cable products was 1.01%. In Ukraine' cable production was diversified and cable items were manufactured at 47 enterprises [32], some of which were located in Zaporizhzhya, Donetsk, Luhansk, Chernihiv and Kharkiv oblasts', where hostilities took place/continue.

The use of the above research algorithm made it possible to reveal that out of 71 export commodity groups with high non-price competitiveness, in addition to

² For practical use of the firsts criterion, it was formalized as follows. A sign that high non-price competitiveness exerts a dominant influence on the export of a certain group of goods is a market situation in which the exports of this group of goods exceeds the imports of analogues and at the same time the unit cost of the export product set is greater than that of the imported product set. Formally, this feature can be presented as follows: $X_{ij} / M_{ij} > 1$; $UV_{ixj} / UV_{itj} > 1$, where X_{ij} , M_{ij} – export, import of goods of group j of country i ; and UV_{ixj} , UV_{itj} – unit value of export and import goods of group j of country i [1, p. 18].

cable products, the following groups had a comparatively high share in the structure of Ukraine's and global commodity exports: electric heating devices and apparatus (UKTZED code 8516; share in Ukraine's merchandise exports was 0.75%; 69th place in the list of the top 100 export groups); turbojet, turboprop and other gas turbine engines (UKTZED code 8411; share - 0.6%; 12th place in the list); vessels intended for the transportation of people or cargo; tugs and pushers (UKTZED code 8901; share - 0.12%), yachts and other vessels for leisure or sports (UKTZED code 8903; share - 0.09%), 42nd place in the list; sound or visual signaling electrical equipment (UKTZED code 8831; share - 0.11%; 64th place in the list); part of aircraft from groups 8801 and 8802 (UKTZED code 8803; share - 0.07%; 29th place in the list); and steam turbines and other steam based turbines (UKTZED code 8406; share - 0.02%). The main production facilities of the above items were located in the cities of Dnipro, Kyiv, Zaporizhzhia, Mariupol, Mykolaiv, Kharkiv, and Kherson.

In addition to the above commodity groups, Ukraine produced other types of export items of high non-price competitiveness including: starting equipment for aircraft; deck braking devices; ground simulators for the flight crew; their parts (UKTZED code 8805; the share in commodity exports was 0.01%); binoculars, monoculars; other astronomical instruments (UKTZED code 9005; share - 0.01%), women's blouses, knitted shirts (UKTZED code 6106; share - 0.01%), men's suits, overalls, shorts (UKTZED code 6203; share - 0.18 %) etc. However, these product groups either have limited volumes of global sales, or in order to increase the scale of production, they need to attract a considerable additional labor force, whose number is gradually decreasing in Ukraine. Hence they only partially meet the requirements of the second criterion.

Research based on the third criterion makes it possible to find out whether the eight above mentioned commodity groups can be classified as having increased technological complexity. In particular, a comparison of unit cost index of each commodity group with the average unit cost index of Ukraine's total commodity imports shows the following. In 2021, the average market value of 1 kg of imported products was 0.98 USD, while for the product group "turbojet engines, turboprops and other gas turbines" it was 1198.6 USD, group "parts of aircraft and spacecraft of heading 8801 or 8802" - \$494.3 USD, group "sound or visual signaling electrical equipment" - 80.2 USD, groups "steam turbines and other steam turbines" - 29.2 USD, groups "insulated wires, cables and other insulated electrical conductors; fiber-optic cables", as already mentioned, - \$20.8. USD, "yachts and other watercraft" group - \$19.00 USD, group "electrical heating devices and devices" - 15.0 USD; and group "vessels intended for the transportation of people or cargo" - 1.2 USD.

It follows from these calculations that all the above mentioned export commodity groups can be classified as having increased technological complexity. The following groups had the highest values of this indicator: turbojet engines, aircraft parts, and sound or visual signaling electrical equipment.



Summarizing, it is worth noting that during the pre-war period, the general level of technological complexity of Ukraine's merchandising was most influenced by the industries that produced and sold the items of the above eight commodity groups on foreign markets. Therefore, in the post-war period, it is advisable to recognize exactly these industries as a priority and to largely channel international aid to their restoration.

4. Interpretation of the results of applied research

The results of empirical research by Western scholars testify that usually only about 8% of international aid is used for post-war production recovery. Hence if Ukraine is given an international aid in the amount of, for example, \$500 billion USD, then probably only about 40 billion USD of that amount will be extended to restore this Ukrainian commodity production, which is a relatively small amount. During 2005-2013, Ukrainian companies borrowed almost 61 billion USD on international markets, which failed to make any noticeable effect on their technological modernization and did not help them avoid the output decline in the pre-crisis years of 2012-2013. *Therefore, the essential issue for the production recovery is the distribution of international aid between particular purposes.*

In our opinion, the resources of international aid should not be spread out among all completely or partially destroyed facilities, but should be directed primarily to the reconstruction of those capable to promptly resume production and sale (in particular, on the international markets) of items with increased technological complexity, which would raise the unit cost of Ukraine's merchandise exports. The rapid expansion of the output of the above mentioned products is the shortest way to reduce the negative balance of this country's foreign trade in goods and speed up the post-war recovery of commodity production to the level of 2021.

Conclusions and recommendations

Directing international aid to the post-war production recovery, which has a significant impact on the general level of technological complexity of Ukraine's merchandise exports, is only *a means to reduce the time frame for the current crisis state of this country's economy and reverse towards economic growth after the war.* It is advisable to choose *grants* as the main form of assistance, because the heavily damaged by the war Ukrainian companies will not be able to service additional credit liabilities. This use of aid would be a welcome but insufficient step by the government to reach high growth rates of Ukraine's economy in the medium and long term. This can be argued by the fact that in the pre-war 2021, the above mentioned product groups accounted for only 4% of total merchandise exports. The priority restoration of their production is an economic policy measure that will only temporarily reduce the negative balance of foreign merchandise trade

and speed up the dynamics of commodity production in Ukraine until exports are fully resumed by the other, mainly raw material based economic sectors³.

In order to preserve and multiply this provisional positive economic effect of the aid, it is advisable for the state authorities in the post-war period to restart the mechanisms for innovative activities in the economy and for attracting foreign investments in order to increase the output and exports of items capable of raising the level of technological complexity of Ukrainian goods on foreign markets. These mechanisms currently remain ineffective because during the pre-war period, despite the "improvement" of the legislation, innovative activities in the economy constantly slowed down against the background of the foreign capital flight.

In the post-war period, various approaches can be used to address the shortcomings of the above mentioned mechanisms. The current set of tools for encouraging the companies' innovative activities should be complemented with tools that reduce the level of the companies' market risks and taxation, namely: reduction of income tax by a percentage of the company's R&D expenses, public reimbursement of part of the costs for acquiring new technologies to produce innovative products, reduction of the tax rate on income from the use of inventions, as well as on that earned by new innovative companies, accelerated depreciation for certain types of equipment, etc. This set of measures can be partially replaced by one measure that would stipulate the introduction of a tax on withdrawn capital, the feasibility of whose introduction has been discussed in Ukraine since 2018. At the same time, the movement towards improved institution of the rule of law can be significantly accelerated by a prompt introduction of a transparent procedure for assigning judges at all levels, their prosecution for misuse of powers, prevention of corruption and other measures, which have also been discussed in Ukrainian society for many years.

However, even if in the post-war period Ukraine quickly copes with the above mentioned tasks and opens a gateway for the revival of innovative activities of domestic companies and investment activities of foreign companies, this does not mean that this country's economy will automatically attain rapid long-term growth. Such a conclusion follows from the fact that Ukraine has significant reserves of natural resources. The destruction of enterprises engaged in their production opens the way for foreign investors to invest in the raw materials industries, which would be equivalent to the restoration of the economic model of 2021, that is, the preservation of its then current development level.

³ We should not expect that the process of recovery of raw materials industries will be short-term. For example, to restore agricultural exports, demining and reclamation of land, reconstruction of roads, unblocking of ports it is necessary to restore exports of metal products, to rebuild metallurgical enterprises, production and transport infrastructure, etc. In addition, these industries are very "tied" to the territory (natural conditions and soils for agro-raw material production, deposits for metallurgy). And the liberation and restoration of territories is a long and expensive business. On the contrary, the expansion and restart of high-tech productions has fewer territorial and resource restrictions.



In order to avoid such a scenario, it is advisory for the state authorities to define the priority guidelines for economic restructuring for a period of, for example, 10 years, and on their basis to formulate a state target program for economic reconstruction of Ukraine, whose executors should be advanced companies - both Ukrainian and foreign. The goal of such a program should be to expand the exports of items with increased technological complexity. It is clear that international aid in the form of grants cannot be used to achieve this goal. This requires other sources and forms of aid that are capable of creating stronger incentives for advanced companies to find and introduce new economic activities for the production and export of the items of increased technological complexity. There are different ways to encourage the companies' investment activities in priority areas. For example, to give them access to international aid, which can be provided by institutions such as the European Bank for Reconstruction and Development, the European Investment Bank, and the World Bank, in the form of subsidized loans issued at a rate lower than the market rate. Ukrainian authorities can also provide such companies with indirect subsidies in the form of medium-term tax benefits, and by providing access to interest-free export-import loans.

Scientifically, the most difficult issue today remains identifying the priority guidelines in economic restructuring. While justifying them, some scientists note that these guidelines should solve the key problems that the war with Russia brings to the fore. It is about Ukraine's energy security, its rejection from Russian energy sources and transition to a carbon-free economy, as well as the development of the military-industrial complex with its reorientation towards high-precision weapons. However, solving these important problems probably cannot be considered as the key to Ukraine's transition to a country of long-term rapid growth. Such a transition requires reconstruction of other economic sectors, which would be able to raise the share of items of increased technological complexity, for example, to half of total exports. In order to define the optimal set of such sectors, it is necessary not only to conduct new comprehensive joint studies with professionals from various fields of economic science, but also to reach a political consensus regarding the vision of Ukraine's post-war economy in the world economy.

If by the end of the war, Ukraine manages to solve the above mentioned tasks, then in the post-war period, this will create a basis for reducing the overall period of recovery in commodity production, which can be proven by the following calculation data. Other conditions remaining unchanged, if in 2021 the unit value of Ukraine's merchandise exports had been 0.48 instead of 0.42 USD/kg, that is, by 6 points higher, this would create a positive trade balance in goods and increase the growth rate of commodity production to 10.8% per year.

The above calculations give reason to predicting such a scenario in the post-war period. Channeling international aid in the form of grants and loans to expand production is a real means to rise the overall level of technological complexity of Ukrainian commodity exports, in terms of unit value by 6 or more points. If this path is chosen, one can expect the growth rate of commodity output in Ukraine to

exceed 10% per year, and the total period of recovery of this country's economy to the level of 2021 will be halved, that is, will reduce *from 12 to 6 years*.

And the last point. Only over time, after the complete recovery of commodity production in Ukraine and the resumption of long-term rapid growth on a qualitatively new technological basis, scientists will have an indisputable ground for the following theoretical conclusion: in the post-war period, international aid performs the role of a driver of rapid economic growth as much as it contributes to economic restructuring, which converts production from military to civilian, and transform it from technologically simple to more technologically complex. As to the subject of further research on the topic, it should address tools and mechanisms for attracting foreign aid to ensure the production and export of items with increased technological complexity.

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ПОВОЄННА ЕКОНОМІКА УКРАЇНИ: МІЖНАРОДНА ДОПОМОГА ТА ПОЛІТИКА ЗРОСТАННЯ

Повномасштабна війна, розв'язана в 2022 р. РФ проти України, супроводжується масовими руйнуваннями інфраструктурних та промислових об'єктів. Швидке їх відновлення неможливе без міжнародної допомоги. Однак із історії відомо, що використання такої допомоги не завжди зумовлювало прискорене повоєнне відновлення країн, ринки та економіки яких розвиваються. Знання про такі факти спонукало західних науковців до пошуку механізму впливу допомоги на економічне зростання. Дослідження, що розпочалися в 1960-х роках, цей механізм не висвітлили. Проте вони показали, що допомога прискорювала економічне зростання та відновлення країн, які проводили порівняно кращу фіскальну, монетарну та торговельну політику, а також досягли успіхів у формуванні інституту верховенства права.

У статті обґрунтовано дещо інший науковий підхід. Ним передбачається, що коли в країні здійснюється не лише порівняно краща фіскальна, монетарна, зовнішньоторговельна, інституційна, а ще й структурна економічна політика, вплив міжнародної допомоги на повоєнне зростання економіки може суттєво збільшуватися. Запропонований підхід став підставою для висунення наукового положення, що в Україні обмежений обсяг допомоги не варто розпорошувати на відбудову всіх зруйнованих та пошкоджених війною промислових об'єктів, а доцільно сконцентрувати її на відновленні підприємств, які в короткий термін спроможні розпочати випуск та продаж на міжнародних ринках продукції підвищеної технологічної

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складності. Переваги такого способу використання допомоги розкрито за допомогою розрахункових даних. Вони свідчать, що спрямування міжнародної допомоги на розширення експорту продукції підвищеної технологічної складності створить в Україні сприятливі умови для прискорення темпів повоєнного зростання товарного виробництва до 10% на рік та скорочення періоду його відновлення до рівня 2021 р. з 12 до 6 років.

Разом із тим наведено аргументи, що зазначене використання допомоги є лише засобом скорочення термінів виходу економіки з кризи та її переходу до стану прискореного зростання. Перерости в довгострокову економічну тенденцію цей стан зможе лише за умови запровадження дієвого механізму стимулювання інноваційної діяльності підприємств та залучення іноземних інвестицій у галузі, що виробляють продукцію підвищеної технологічної складності. Моделювання можливих сценаріїв повоєнного відновлення економіки України децю розширили наукові уявлення про механізм впливу допомоги на економічне зростання країн. Зокрема, вони були доповнені ідеєю, що в повоєнний період міжнародна допомога виконує роль рушія високих темпів економічного зростання країн настільки, наскільки вона сприяє структурним змінам в економіці, що переводять виробництво із воєнних рейок на цивільні та перетворюють його із технологічно простого на більш технологічно складніше.

Ключові слова: повоєнна економіка, міжнародна допомога, товарне виробництво, економічне зростання, економічна політика, експорт, імпорт, одинична вартість, продукція підвищеної технологічної складності