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THE WAR IN UKRAINE, CLIMATE CHANGE AND VIRAL INFECTIONS: IMPACT ON GEO-ECONOMIC SHIFTS IN THE GLOBAL ECONOMY

The article reveals how the war in Ukraine, global warming, which has been talked about for the past five years, and the COVID-19 pandemic affect many processes in the world economy. Growth forecasts for the largest economies have been revised downwards, given that the turmoil in financial and commodity markets caused by the war in Ukraine could persist for years.

Keywords: war in Ukraine; COVID-19 pandemic; climate change; globalization; man-made disasters; world trade.

Changes are constantly taking place on earth, local wars are being waged, diseases are being modified and climate changes are taking place. The earth does not stop revolving around the sun.

Russia's military invasion of Ukraine on February 24, 2022 has complicated an already unstable geopolitical situation, and its consequences in terms of human losses and impact on the world economy, which has also been affected by the sanctions imposed against Russia and the worsening of the energy crisis, cannot yet be assessed in full. Growth forecasts for major econo-

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mies have been revised downwards, given that the turmoil in financial and commodity markets stemming from the war in Ukraine could persist for years. It is difficult to predict the impact of the consequences of the war and the sharp increase in the level of prices on the world market [1].

Therefore, the **purpose of the article** is to determine and analyze the impact of three main factors on geoeconomic shifts in the world economy: the war in Ukraine, climate change and aggressive viral infections.

By the beginning of this crisis, the global economy had not yet fully recovered from the pandemic. Even before the war, inflation in many countries was rising under the influence of imbalances between supply and demand and support measures taken during the pandemic, causing a tightening of monetary policy. Recent lockdowns in China could create new bottlenecks in global supply chains.

Under these conditions, in addition to immediate and tragic humanitarian consequences, the war will lead to a slowdown in economic growth and an increase in inflation. In general, the risks to the economy have increased sharply, and it has become even more difficult to find compromise solutions in the field of economic policy.

The war was the latest in a series of supply shocks that have befallen the global economy over the past few years. Like seismic waves, its effects will spread far and wide through commodity markets, trade and financial ties. Ukraine is a major supplier of wheat and corn. The reduction in the supply of these goods caused a sharp rise in prices for them. Importing countries in the Middle East, North Africa and Sub-Saharan Africa are the hardest hit by this. However, rising food and fuel prices will worsen the situation of low-income households around the world, including in the Americas and Asia.

In advanced economies, it will take longer for aggregate output to recover to pre-pandemic levels. In addition, the divergence that emerged in 2021 between advanced economies and emerging market and developing economies is expected to continue, signaling the long-term negative effects of the pandemic.

Inflation has become a clear and real threat to many countries. Even before the war, it was rising rapidly under the influence of a surge in commodity prices and imbalances between supply and demand. Many central banks, such as the US Federal Reserve, have already moved to tighten monetary policy. There is a growing risk that inflation expectations will start to deviate from central bank targets, prompting policymakers to tighten policy more aggressively. In addition, in poorer countries, higher food and fuel prices can greatly increase the risk of social unrest.

Immediately after the invasion, there was a tightening of financial conditions for emerging market and developing countries. So far, this reassessment of risk has been largely orderly. However, a number of risks related to financial vulnerabilities remain, raising the likelihood of a sharp tightening in global financial conditions, as well as capital outflows.

In the fiscal realm, policy space has already shrunk in many countries as a result of the pandemic. It was predicted that the curtailment of emergency measures of budget support would continue. Soaring commodity prices and rising global interest rates will further shrink fiscal space, especially in oil and food-importing emerging market and developing countries.

The war also raises the risk of a longer-term division of the world economy into geopolitical blocs with different technological standards, cross-border payment systems, and reserve currencies. Such a “tectonic shift” would entail long-term inefficiencies and increased volatility and would be a serious impediment to the operation of the rules-based system that has governed international and economic relations for the past 75 years.

Global issues of world development have two main areas. The first is conceptually significant problems that require the study of social certainty and solution (conceptual uncertainty of the role and value of resources, lack of a global model of relations between countries, destruction in international relations, imbalance of the volume of resources in countries), and the second is practically threatening problems, which require the maximum limitation and the fastest future solution (asymmetries in the quality of life in countries, the destruction of human resources and man-made human influence).

With the emergence of the COVID-19 pandemic around the world, countries were left with no choice but to temporarily stop their trading activities with each other, which negatively affected the supply of goods and caused disruptions in the supply chain. Moreover, countries around the world have imposed nationwide shutdowns of nearly all retail outlets for non-perishable consumer goods, including clothing, electronics and fashion accessories¹.

Despite the fact that the recognition of the uniqueness of the “pandemic crisis” has become almost universal, it is difficult to talk about any well-established definitions of this global phenomenon, the effect of which is not only prolonged for an indefinite time, but, apparently, is becoming fundamental.

The results of the fight against the pandemic allow us to talk about several models of behavior of countries and governments — from “Chinese” to “Swedish”. At the same time, measures that worked successfully in one country turned out to be ineffective in another. What was common was the determining role of the state and its expenditures. The scale of state support — significant in most economies — in developed countries was provided mainly by the implementation of ultra-loose monetary and active fiscal policy, including the widespread use of unconventional monetary measures. It can be said that one of the immediate consequences of the pandemic was the prospect of global use of such measures, at least in the near future, as well as the increased risk of a global financial crisis and inflation threats, which is largely related to this.

¹ Trade set to plunge as COVID-19 pandemic upends global economy. *WTO*. 2020. Apr 08. https://www.wto.org/english/news_e/pres20_e/pr855_e.htm (accessed on: 20.01.2023).

Problems in the field of medicine and the healthcare system, which practically nowhere had a sufficient “margin of safety” to face such a disease, acquired a truly existential character. The new virus has proven to be both more contagious and deadlier than the most dangerous infections that developed countries have dealt with in modern history. Moreover, the rapid expansion of health care capacities, the largest mobilization in the fight against the pandemic since the Second World War, negatively affected the availability of medical care in other areas. At the same time, the very nature of the pandemic not only objectively limited the work of enterprises and entire industries, radically influenced logistics and the use of established trade and economic ties, but also stimulated the choice of restrictive, protectionist and isolationist policies. Already weakened by geopolitical and trade conflicts, the system of multilateral cooperation has been further tested. In fact, the world is facing a crisis of global cooperation at the very moment when it needs this cooperation the most in decades.

The common phrase “The world will never be the same as before” is very effective, but the question is: what will this world be like? Today’s predictions about the situation in the economy the day after tomorrow are often refuted tomorrow afternoon — never before have the forecasts of not only economists, but also representatives of other social and even natural sciences, been so reminiscent of fortune-telling on the stars. The nature of the infection, the specifics of its spread, the very nature of the pandemic and its biological, psychological and political effects have not been fully explored. The pandemic crisis forces us to think about the effectiveness of industries that develop and protect human capital. And also about the accuracy of choosing priorities in budget policy, including taking into account world economic, demographic, and humanitarian trends. COVID-19, for all its extremely negative effects, has returned the individual to the center of attention of states and societies. What will such a long coronacrisis change in demographic trends, in fertility and mortality, in terms of life expectancy, finally? What will happen to the nature of the relationships of people who maintain social distance, see each other almost exclusively in masks and on the screens of gadgets that are now replacing face-to-face communication? How will the quality of contacts “teacher-student”, “teacher-student” change? And these are just some of the new troubling questions that have no clear answer. At first, it seemed that the coronacrisis would unite nations regardless of the peculiarities of national economic and political systems. The merger did not work — at least not yet. Moreover, pandemic frustration often provoked distrust of “foreigners” carrying viruses. The focus of discussions was deglobalization. It manifested itself in the most bizarre ways, including in the form of a kind of “grafting nationalism” or in the growth of the attractiveness of populist and conservative discourses. And this despite the fact that isolation during the period of lockdowns unexpectedly entered different countries into a single world context: threats and challenges turned out to be, in fact, common for all. Is it possible

to learn to answer them together? This is perhaps the main question that the unprecedented pandemic crisis has posed to humanity.

This eliminated the need to transport these goods, thus causing a huge blow to the logistics industry worldwide. The food and beverage industry has also faced the effects of the global pandemic, as restaurants and cafes have been closed and even online food orders have seen declining volumes. The following are the most significant global trends in the transformation of the logistics services market: an increase in quality indicators of the logistics market, the use of logistics outsourcing, the strengthening of takeover and merger processes, as well as restructuring in world logistics, further globalization of logistics.

Long-term development trends can be conditionally divided into three large groups: technological, economic and political. The following global trends can be distinguished:

- **changing the era of high-tech by the era of high-Hume.** The development of high technologies will gradually, but naturally, be replaced by the development of high humanitarian technologies aimed at revealing individual talents and collective capabilities of people. Man is moving to the center of the economic process, it is he who increases the price and value of intellectual capital, it is talent that will be the subject of competition in the near future. However, this trend provokes a risk — loss of individual consciousness, oppression of the individual by mass consciousness;

- **integration of integrations.** This trend, of course, remains very controversial in connection with the growth of protectionism in the short and medium term. However, the forms of interaction of global unions are already being implemented quite actively today and will gain momentum;

- **digitization of the economy.** This trend is currently perceived by most research centers as the main source of economic growth. According to some data, the potential economic effect of digitalization of the economy is from 19 to 34 % of the total expected GDP growth. The risks provoked by this trend are related to the transformation of the labor market, the growth of the income gap and social stratification, the growth of the influence of individual personalities (not even structures) on the processes of digital transformation of the economy in the world, the increase in cyber dependence, the increase in the number and complexity of cyber-attacks, the use of technology blockchain for the “cryptocurrency race” and illegal operations, insufficient protection of personal (“transparency” of private life) and corporate data, increased demand for renewable energy sources, increased fluctuations in the global commodity and financial markets, etc. However, it is digital transformation that will change most industries: industry, trade, digital capital, transport and logistics, agriculture, digital media, energy, new market models (economy of shared consumption, crowdsourcing, etc.) [2].

The digitalization of the economy is the current stage in the development of scientific and technological progress, which consists in the introduction of

a certain type of innovation into real economic practice. An idea of the impact of the widespread introduction of innovations in various sectors of the economy on economic growth rates can be obtained by analyzing their specifics and features in different periods. Note that the innovations of the second half of the XX century were predominantly food items. At that time, it was possible to observe the appearance and introduction into production of space rockets and nuclear power plants, computers of various generations and mobile phones, the improvement of production technology (from the production of chemical fibers and fabrics to the production of aircraft, cars), etc. The expansion of knowledge in various fields made it possible to develop current production and constantly produce new products that acted as competitive goods and stimulated production, growth in output, providing both an increase in income and business profits, and the economic growth of the economies of individual countries and the entire globe as a whole.

In the first decade of the XXI century product innovations have spread throughout the world. These are smartphones, tablets, gadgets, digital platforms and other innovations that, thanks to the Internet, have provided technical opportunities for the development of the digital economy and digitalization processes in the social sphere. However, already in the late 2000s — early 2010s much more attention has been paid to innovations in the field of storage, transmission and processing of information. There are constantly emerging varieties of businesses that specialize in such activities and the income from which is not associated with the release or production of any additional products. Such innovations are process-based — it is no coincidence that even businesses have begun to analyze the point of view of business processes.

The main feature of modern process innovations is that their use in business provides, first of all, the reduction or saving of costs for a particular type of activity, allows processing large amounts of information, transmitting them over considerable distances in real time. But process innovations do not necessarily lead to growth and expansion of output in each such business, and therefore are not a direct and immediate factor in GDP growth. Process innovations provide network businesses with the opportunity to distribute and redistribute information, provide non-material services that do not create value. In this sense, they can lead to a reduction or slowdown in economic growth, expressed in terms of GDP growth. The relationship between product and process innovations and the development of the economy is shown in the figure.

At present, the expansion and dissemination of knowledge as a non-competitive good, on the one hand, may not have an impact on the development of production and economic growth, and on the other hand, it can provide on its basis increasing returns from increasing the scale of production precisely through the widespread use of already proven results, research and development.

The influence of knowledge dissemination in the Internet era, the development of network technologies and the use of digital platforms significant-

ly expand the possibilities of both modern network business and business in the real sector of the economy in solving problems related to the implementation of research and development. This uses the knowledge and skills of not only the employees of the relevant business organization, but also a wide range of people involved to perform certain tasks on an open competition basis or on the basis of crowdsourcing [3].

It should be borne in mind that the development of product innovations, such as robotics in various industries and areas, is currently continuing.

3D printers, new materials, digital platforms. Such developments require significant capital expenditures, the use of highly qualified specialists, significant investments associated with the production of products and their promotion to the market. The creation of competitive goods can still serve as a certain factor in economic growth. E-commerce, cloud technologies, Internet services are developing at an increasing pace, since they often do not imply large capital investments.

In general, the widespread development and application of process innovations, the creation and spread of businesses operating on their basis, can be one of the factors hindering economic growth, along with the consequences of the global economic crisis of 2008, the debt crises of a number of countries, financial market problems, etc.

Increasing anthropogenic load on the environment. The trend refers to the increase in the effects of human activities on the environment, for example, the reduction of access to natural resources, the development of industries based on renewable energy sources and nanotechnology and, accordingly, the increase in inequality in the distribution of income from the ownership of new energy production technologies, the economic consequences of pollution of the world's oceans, unforeseen adverse consequences of technological advances, etc.²

Forecasting climate change is a much more difficult task than forecasting the weather for the coming days. Here, as in the weather forecast, there is something that is calculated quite reliably and something that is approximately predicted by popular signs or the experience of past years. Forecasting for millennia (in particular, the onset of a new ice age) is a reliable astronomical forecast. As for the next decades, here the models have already learned how to calculate the average air temperature in the surface layer of the atmosphere depending on the concentration of greenhouse gases in the atmosphere — in fact, on how much CO₂ is emitted by humanity. With the help of models, it is possible to describe the course of the Earth's temperature during the period from the pre-industrial era to the present day. This means that we have a very reliable tool for predicting the future.

² Risk, resilience, and rebalancing in global value chains. *McKinsey & Company*. 2020. Aug 06. URL: <https://www.mckinsey.com/capabilities/operations/our-insights/risk-resilience-and-rebalancing-in-global-value-chains> (accessed on: 20.01.2023).

Calculations for the future (in particular, until 2100) show that the radiative heating of the atmosphere (in W/m^2) will be mainly determined by the anthropogenic enhancement of the greenhouse effect. The role of natural factors on the scale of one century will be relatively small. Therefore, in a simplified way, model calculations can be represented as three steps. First, projections of CO₂ emissions (as well as other gases and aerosols) are made. Then the concentrations of CO₂ and other gases and aerosols in the atmosphere are calculated. At the third, most difficult, stage, using models of the general circulation of the atmosphere and the ocean, year after year, the future is reproduced: temperature, precipitation, snow cover, etc. The models are somewhat worse able to describe regional and seasonal temperature trends, even worse — regime changes precipitation. Models are not yet able to predict the increase in the frequency and strength of abnormal weather events, such as droughts, floods, typhoons, etc. Here, environmentalists and economists are still relying more on analog logical considerations. For example, with a relatively small increase in the average temperature, the number of anomalous phenomena will grow proportionally — according to a dependence close to linear. Then if in the 20th century the temperature change was 0.7 °C, and in the 21st century — 5 times more, then anomalous phenomena can be expected 5 times more. Note that an increase in average temperature, for example, by 2 °C means its increase in a number of regions by 5 °C or more. Moreover, especially strong changes are expected in the Polar Regions. When considering forecasts for the future, it is fundamentally important which scenario of greenhouse gas emissions into the atmosphere is chosen. For the next two decades, all scenarios give almost the same increase in the average global temperature by 0.2 °C over 10 years. Even if we assume that emissions are immediately stopped so that the concentration of greenhouse gases in the atmosphere no longer increases, warming will continue and will amount to 0.6 °C over the 21st century.

The outlined trends are certainly not exhaustive. But they raise a huge number of questions: both from the point of view of changing the economic structure of the world, and from the point of view of the risks that these changes provoke. In addition, social and ethical tasks and challenges are becoming increasingly acute. Countries live in a very dynamic time with very complex challenges, which is demonstrated by the increased attention to the problem of global development. At the level of an individual, global trends are reflected, perhaps, even faster than at the level of a country. As a result, a person, being in the center of development as an object that is influenced by political decisions and for which world businesses compete³.

³ The Green Economy: Trade and Sustainable Development Implication. United Nations Conference on Trade and Development (Geneva, Switzerland, 2010, Oct 7-8). New York and Geneva, United Nations, 2010. 51 p. URL: http://unctad.org/en/docs/ditcted20102_en.pdf

CONCLUSIONS

Global problems of world development can be divided into two main groups. The first are conceptually significant problems that require the study of social certainty and their solution (conceptual uncertainty of the role and value of resources, the absence of a global model of relations between countries, destructiveness in international relations, the imbalance of resources in countries), and the second are practical problems that need maximum limitation and as soon as possible solution in the future (asymmetry of quality of life in countries, destruction of human resources and man-made human influence). Digitization is put at the core because it affects security. We are now in a world of global cyberattacks, we see that modern warfare uses computational methods. And, accordingly, digitalization is a key condition for the national security of any bloc, any country.

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**ВІЙНА В УКРАЇНІ, ЗМІНИ КЛІМАТУ І ВІРУСНІ ІНФЕКЦІЇ:
ВПЛИВ НА ГЕОЕКОНОМІЧНІ ЗРУШЕННЯ У СВІТОВІЙ ЕКОНОМІЦІ**

Війна в Україні, глобальне потепління, про яке говорять останні п'ять років, пандемія COVID-19 мають особливий ефект і зрушують процеси у світовій економіці.

Воєнне вторгнення РФ в Україну 24 лютого 2022 р. ускладнило й без того нестабільну геополітичну ситуацію та її наслідки в плані людських втрат і впливу на світову економіку, на яку також тиснуть запроваджені проти РФ санкції і погіршення енергетичної ситуації. Кризу ще не можна оцінити повною мірою. Прогнози зростання для найбільших економік були переглянуті в бік зниження з урахуванням того, що спричинені війною в Україні потрясіння на фінансових і товарних ринках можуть зберігатися протягом багатьох років. Важко передбачити вплив і наслідків війни, і різкого підвищення рівня цін на світовому ринку.

Глобальні проблеми світового розвитку можна поділити на дві основні групи. Перша — це концептуально значущі проблеми, які потребують вивчення соціальної визначеності й вирішення (концептуальна невизначеність ролі й цінності ресурсів, відсутність глобальної моделі відносин між країнами, деструктивність у міжнародних відносинах, незбалансованість обсягів ресурсів у країнах), і друга — практичні проблеми, які потребують максимального обмеження і якнайшвидшого вирішення в майбутньому (асиметрія якості життя в країнах, руйнування людських ресурсів і техногенний вплив людини). Цифровізація стає основоположною, тому що вона впливає на безпеку. Нині ми живемо у світі глобальної кібератаки, бачимо, що під час сучасних бойових дій використовуються обчислювальні методи. Отже, цифровізація є ключовою умовою національної безпеки будь-якого блоку, будь-якої країни.

Ключові слова: *війна в Україні; пандемія COVID-19; кліматичні зміни; глобалізація; техногенні катастрофи; світова торгівля.*