







“The public debt of Ukraine in the economic development policy in the war and post-war periods: Bibliometric analysis”

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THE PUBLIC DEBT OF UKRAINE IN THE ECONOMIC DEVELOPMENT POLICY IN THE WAR AND POST-WAR PERIODS: BIBLIOMETRIC ANALYSIS

Abstract

Public debt can attract funds to finance public needs and stabilize the country's economic development. This study aims to analyze the relationship between public debt and economic development considering the war actions in Ukraine. This paper uses bibliometric analysis, comprising in-built Scopus and WoS instruments, VosViewer, and Google Trends tools. The overall results show the close relationship between public debt, economic development, and war (armed conflict) concepts. The publications were examined according to key features: containing the keywords from the green and red clusters; covering the period 2015–2018 and 2022; and discussing public debt in Central and South-Eastern Europe. This improved the theoretical and methodological approach to the bibliometric analysis of public debt. Moreover, the study identified risks (based on selected scientific publications) to which the primary attention should be paid during the war and post-war periods in Ukraine: currency and demographic risks. Key recommendations were provided to ensure debt security during the war and post-war periods. However, the given recommendations should be implemented within the framework of the Recovery Plan of Ukraine, which would improve the credit rating and reliability of the state.

Keywords

public debt, debt security, economic development,
economic development policy, Ukraine, war

JEL Classification

H60, H63, O43, G28

INTRODUCTION

The war in Ukraine led to destabilizing processes worldwide: humanitarian crisis, financial fluctuations, acceleration of inflation, and rising prices. It has also harmed the sustainable development of Ukraine as it became apparent that the reconstruction of Ukraine required enormous resources and the development of the new Marshall Plan. Moreover, financial support for this recovery in the form of loans implies significant obligations, as debts will have to be returned with interest. This will be difficult because the public debt was significant compared to GDP even before the war. As of December 31, 2021, the total state debt of Ukraine amounted to UAH 2,671.82 billion, and the ratio of state debt to GDP was 48.9%. However, as of the end of October 2022, the state debt crossed the mark of 3,770.95 billion hryvnias. At the same time, according to National Bank of Ukraine calculations, the ratio of public debt to GDP increased to 73.91% from 67.7% at the end of the II quarter.

The more Ukraine borrows, the more it will have to return. In the 2023 budget, the government has allocated UAH 326 billion to pay interest on the national debt – almost twice as much as was planned for 2022

(166.4 billion hryvnias). In the future, expenses for debt service and repayment will only increase because Ukraine is also planning large-scale borrowing for 2023 (Moskalenko et al., 2022).

Public debt is not harmful to the economy. On the contrary, government loans are instruments through which countries borrow, actively trade in financial markets, and allow investors to preserve and multiply their capital. Problems appear when the national debt grows too large amounts. Significant resources are spent on its maintenance, which could be used for other purposes.

Ukrainian post-war recovery is only possible with proper public debt management. After all, public debt, along with tax, monetary, and currency policies, is a critical component of economic development policy and an essential condition for its recovery. The primary tasks of the country's debt and economic policy are to ensure economic stability, combat negative debt-forming factors, keep the debt burden within safe limits, or at least ensure its stability (Pulay, 2018).

Public debt in the context of developing an effective economic policy in the war and post-war periods largely depends on the availability of academic support. Therefore, this study aims to investigate this issue.

1. LITERATURE REVIEW

The significant growth of public debt worldwide has actualized demands for optimization of the assessment of the impact of the public debt on the economic development of the country and the observance of a safe level of public debt based on the calculations. Figure 1 shows the dynamics of publications on public debt in Scopus for 2000–October, 2022.

As seen in Figure 1, since 2008 (the global economic crisis), the number of publications examining public debt has increased significantly. In

2022, the growth of scientific interest was caused by the war in Ukraine and its consequences for the world's economies.

Melnyk et al. (2018) emphasized that the key scientific questions regarding public debt are not whether it is worth raising debt but answering the main questions: goals, required volumes of debt, and, most importantly, what cause-and-effect relationships will arise for the economy countries. Brychko et al. (2021) considered the total public debt. Thus, low and moderate debt levels are insignificant for countries with proper macroeconomic and political systems.

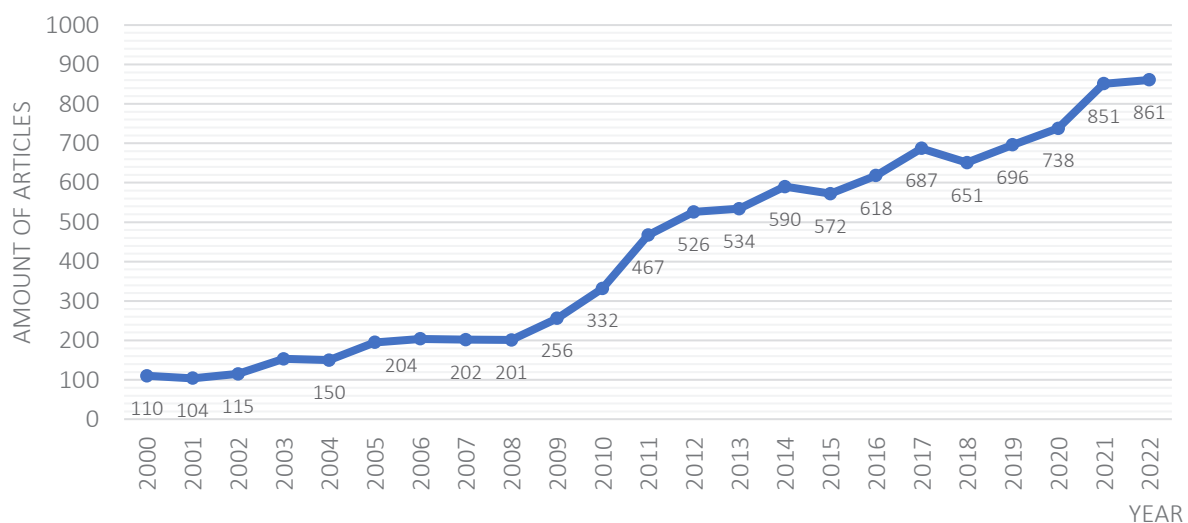


Figure 1. Dynamics of published articles for 2000–2022 concerning public debt

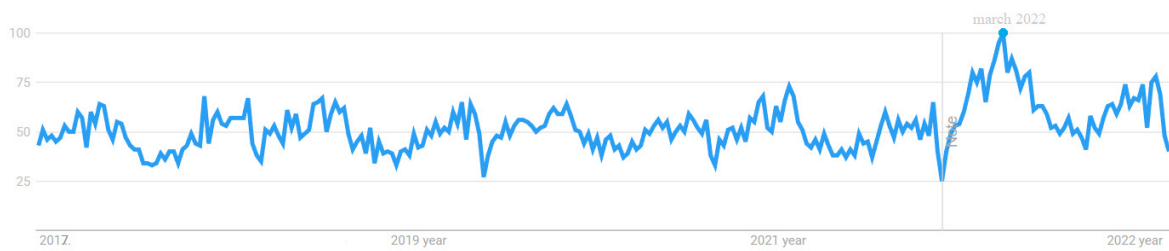


Figure 2. Google Trends on public debt worldwide in 2017–October, 2022

Furthermore, there is a hypothesis that the relationship between debt and economic growth is actually the opposite. Clements (2003) and Fast (2021) argue that when a country has a high level of debt, the government has no incentive to carry out macroeconomic reforms since the profits from this macroeconomic policy will be used only for the repayment of debts.

To confirm that the war in Ukraine causes the growing interest in public debt, Google Trends instruments were used to analyze the frequency of Internet users' requests on this topic (Figure 2).

Figure 2 shows that the most considerable amount of search queries regarding public debt was in March 2022, which coincides with the beginning of the war in Ukraine. The importance of Google Trends analysis is noted by Lisovenko (2014). The number 100 does not mean the number of Internet requests; it is the scale of requests (their maximum value for the period) with which requests for other periods are compared.

The consequences of the Russian invasion are broad and touch numerous countries. Therefore, scholars are particularly interested in researching the war and its destructive results. For example, according to Scopus data, as of the end of October 2022, there are 1 377 articles that, in one way or another, relate to the war in Ukraine, according to WOS – 982 articles. The number of publications for the search query “public debt AND war” – 390 (Scopus) and 208 (WoS), and for the search query “public debt AND Ukraine AND war” – 68 (Scopus) and 77 (WoS). Most of the publications, in one way or another, on the topic of “public debt AND Ukraine” try to determine the impact of the current public debt on the country's economy.

The ratio of public debt to GDP as a critical indicator for assessing the debt burden (debt security) for Ukraine is evaluated and analyzed by Petrushenko et al. (2022). The indicators of external debt security were assessed, and the predicted values of individual indices were calculated, taking into account the current state of the economy of Ukraine.

Zhuravka et al. (2021) and Kuznyetsova et al. (2022), considering the “Stockholm Principles,” indicated the importance of researching the impact of individual macroeconomic and financial risks in the economy of Ukraine on the level of debt security. In addition, the procedure for forecasting the public debt of Ukraine using the ARIMA model was illustrated. Plastun et al. (2019) emphasized that under conditions of armed conflicts and economic recession, a more complex ARMAX model must be used, with the obligatory calculation of the Hurst exponent.

For public debt not to burden the country's economy, it is essential to increase the rate of economic growth, stimulate business, and create acceptable conditions for business operations. Therefore, Lyulyov et al. (2021) and Tiutiunyk et al. (2022) focused on reducing the economy's shadowing level. This help to establish an effective policy of economic development and reduce the public debt due to the receipt of all (shadow) funds to the budget.

Vasilyeva et al. (2020) researched the relationship between public debt, budget policy, and financial and economic policy in general. In particular, internal and external imbalances in the financial sector of the Ukrainian economy were analyzed. This study is quite significant in terms of the mutual influence of imbalances in the financial sector on the debt burden of Ukraine since the recom-

recommendations for eliminating these imbalances can be used even in war conditions.

Furthermore, the indicators of the public debt ratio to the country's macroeconomic indicators are widely used as initial data (Aiyedogbon et al., 2022). However, Eddassi (2020) noted the ambiguity in determining the threshold values of the ratio of public debt to GDP for Ukraine.

Despite significant scientific achievements, theoretical and applied problems related to the search for new ways of turning public borrowing into an instrument of economic growth still need to be solved. The existing approaches require a critical evaluation, taking into account the features of the modern development of the national economy.

This study applies bibliometric analysis to investigate the relationship between public debt and the country's economic development and their synergistic effects, considering military operations on the territory of Ukraine. In addition, the paper aims to study the current academic landscape on the role and impact of public debt on the country's economic growth as a basis for the war and post-war recovery of Ukraine's economy.

2. METHODOLOGY

Several bibliometric tools were employed, including inbuilt Scopus and Web of Science instruments, VosViewer, and Google Trends (Table 1).

Table 1. Employed bibliometric instruments

Instrument	Current study features
In-built Scopus instruments by Elsevier (SciVal) and in-built Web of Science instruments by Clarivate Analytics	The publications were analyzed according to their content, location, and temporal components. An analysis was also carried out regarding authors and their interaction with other academics. With the subsequent import of data in VosViewer for constructing bibliographic maps.
VosViewer	Clustering based on bibliometric maps.
Google Trends	Analysis of search queries regarding the national debt to identify specific trends, including the relationship between the search query regarding the public debt and the beginning of the war in Ukraine.

Additional scientific methods were used: analysis, synthesis, and logical generalization. They assessed the theoretical aspects of the role of public

debt in ensuring the country's economic development in war conditions, which forms the basis for further empirical research in this direction. Statistical analysis was used to determine the dynamics of the state debt, and comparative analysis was employed during contextual, evolutionary, and spatial clustering.

Furthermore, this paper reviewed the two largest scientometric databases: Scopus and Web of Science. Each search and request was formed using the logic operator AND for 2000–October, 2022. Search queries for public debt for Scopus and WoS databases were pre-filtered exclusively by the paper parameter, period (2000–October, 2022), and the broadest categories and subject areas in Scopus. For example, the studies of Molotok (2020) and Dudchenko (2020) were used while conducting a bibliometric analysis.

3. RESULTS AND DISCUSSION

The public debt, through the prism of the latest global economic challenges, is increasingly viewed as an important tool of domestic and foreign economic policy. The next step of the bibliometric analysis is the construction and visualization of maps based on the information obtained from the Scopus database using the VOSviewer software. It helps to formalize the content-contextual dimension of research on public debt in the context of ensuring an effective economic development policy. Relevant articles were selected using keywords search, and the concept of “public debt” was chosen as the main one (Figure 3).

In the context of a more in-depth study of public debt, the analysis of “keyword co-occurrence” or the analysis of repeated use of keywords was chosen. It makes it possible to build a visualization map using content analysis. The cognitive structure of the studied problem and its key topics are determined. Thus, analyzing scientific publications indexed by the Scopus scientometric database using the VOSviewer toolkit, a map of the relationships between the concept of “public debt” and other categories was formed. 6 clusters were identified, which are marked green, red, yellow, blue, turquoise, and purple. In addition, a larger circle diameter indicates higher frequency of mentions of the corresponding concept as a keyword along

Source: Authors' elaboration using the VOSviewer.

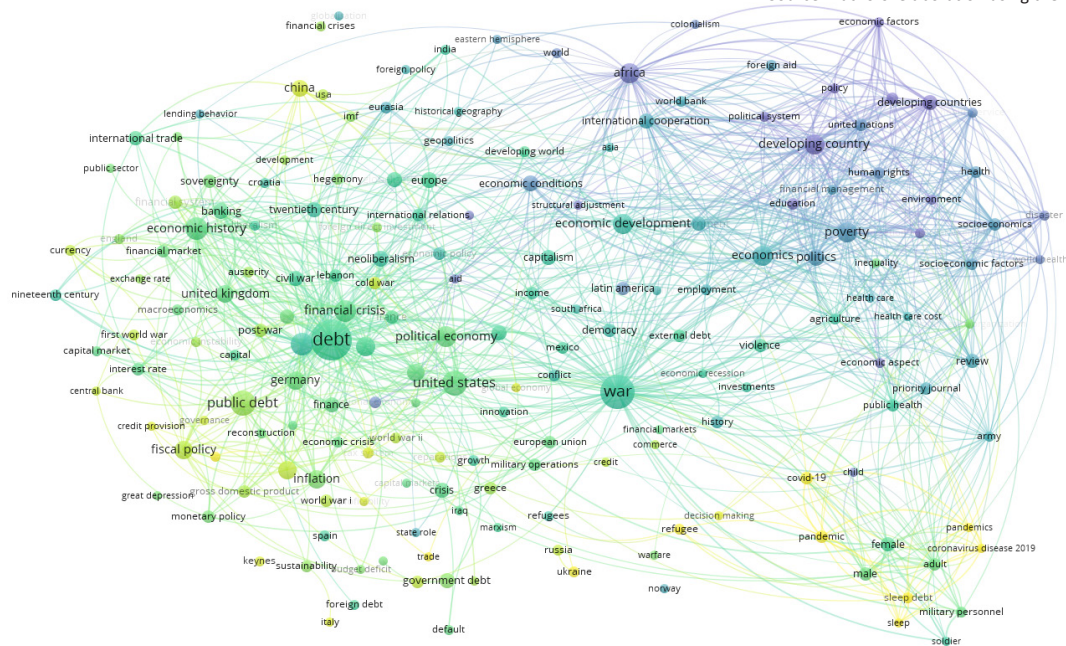


Figure 6. Visualization map of the contextual-temporal dimension of research on public debt in 2000–2022 in Scopus

most often found in research relevant to the chosen issue and have the highest degree of connection with other concepts. In the context of expanding the evolutionary-temporal perspective of this study, it is appropriate to analyze the results of the contextual-temporal block of bibliometric analysis, in which the main substantive determinants of research on the issues of public debt are ranked by time for the period from 2000 to 2022. The gradient in the figure changes from blue – the earliest studies, to yellow – modern publications.

According to the results of the analysis of the contextual-temporal block of research on public debt, it was possible to identify four stages during which the main emphasis in this area changed. In 2000–2005, scientists considered the role of public debt in the development of countries; in 2005–2010, the interest of researchers was directed to the role of public debt as a part of the financial system and a factor of sustainable economic development of countries. In 2010–2015, research on the attraction and exploitation of public debt in specific countries, as well as the role of armed conflicts in the formation of the debt burden, came to the fore. Finally, during 2015–2021, the attention of scientists was directed to substantiating the

connection with the processes of securing sustainable development, environmental sustainability and overcoming the consequences of the Covid-19 pandemic (this stage includes 2022 – publications related to the war in Ukraine and its consequences for the world economies).

In the context of the continuation of the temporal perspective of the bibliometric analysis of research on public debt, it is also advisable to analyze its spatial component (Figure 7).

Thus, according to the results of the spatiotemporal dimension of the bibliometric analysis, it was established that the intensification of research on the issues of public debt is taking place in the countries of the world during 2000–2022 within the framework of consecutive time ranges, each of which has its own geographical centers. A general pattern can be noted: earlier studies from 2010–2012 – Canada, USA, Japan, Australia, and Austria; 2012–2014 – Great Britain, Brazil, and Israel. 2014–2016 – Germany, Switzerland, Czech Republic, and Belgium. 2016–2018 – China, Norway, Greece, and Africa. 2018 – to date – Italy, Turkey, Portugal, and Russia. Although Ukraine is not shown in Figure 7, the analysis of the time dimension of the bibliometric analysis in Ukraine showed that the publication activity of research on the issue of public debt began in 2007. At

Source: Authors' elaboration using the VOSviewer.

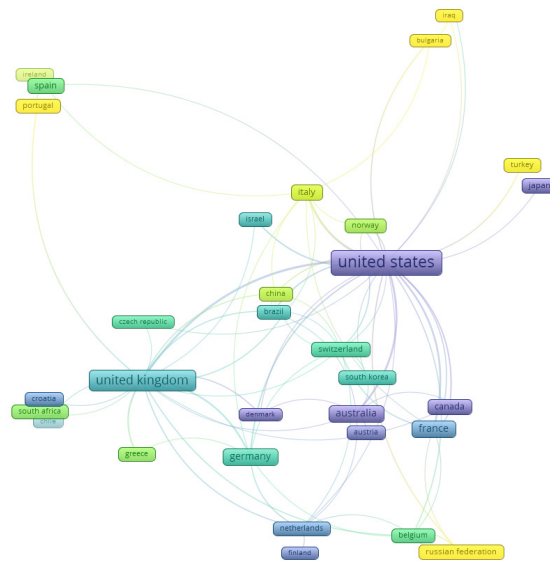


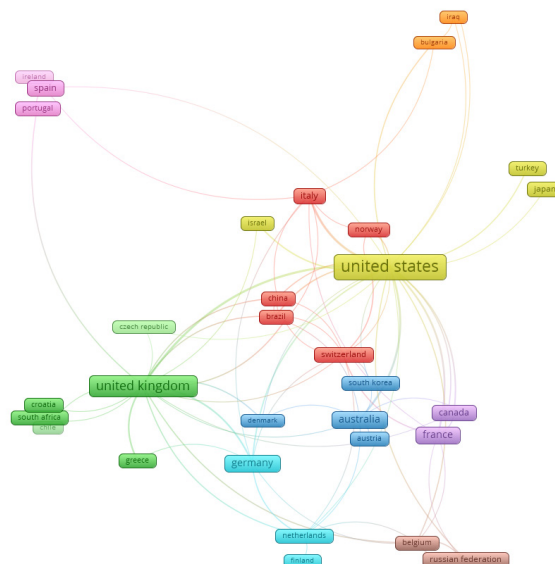
Figure 7. Spatial component of the bibliometric analysis of the concept of public debt

the same time, a particular scientific interest is not only the spatiotemporal analysis of publication activity on public debt issues but also the study of direct geographical relationships in this area.

According to the results of spatial clustering (Figure 8), six groups of countries were identified, researchers from which have joint publications on issues of public debt, namely:

- 1) countries of Central and South-Eastern Europe (Austria, Croatia, the Czech Republic, Ukraine);
- 2) Western and Southern Europe (Belgium, Germany, Greece, Italy, Spain, Great Britain);
- 3) Southeast Asia and Oceania (Australia, Central and Southeast European coun-

Source: Authors' elaboration using the VOSviewer.



Note: Criterion – the country is indicated in the affiliation; scientist's joint publications on public debt issues are indexed by the Scopus scientometric database.

Figure 8. Visualization map of the co-authorship

tries (Austria, Croatia, Poland, Romania, Ukraine)), Western and Southern European countries (Belgium, Germany, Greece, Italy, Spain, Great Britain), Eastern Asian countries (China, South Korea), Countries of Southeast Asia and Oceania (Australia, Japan), Countries of America and Africa, Intercontinental cluster (Canada, France, Netherlands, Norway);

- 4) East Asia (China, South Korea);
- 5) America and Africa (USA, Mexico);
- 6) intercontinental cluster (Canada, France, Norway).

Thus, the conducted analysis proved the existence of connections between researchers on public debt mainly by geographical proximity, while one cluster unites representatives of the scientific community from different continents. It should also be noted that from the total volume of scientific publications indexed by Scopus, the largest number of works for the analyzed period was recorded with affiliation to the USA (2739 scientific articles), Great Britain (1022), Germany (727), Italy (589), France (461), Canada (336), Australia (329), China (306), and Brazil (246). In comparison, in other countries, the number of publications for the analyzed period is at most 100.

According to the analysis, the most significant number of works on the specified issue was published by scientists affiliated with the International

Monetary Fund, the London School of Economics and Political Science, The World Bank (USA), CNRS Center National de la Recherche Scientifique (France), and National Bureau of Economic Research (USA).

The final stage of the bibliometric research analysis on the issue of public debt and its role is the formalization of the structure of the research network presented in Figure 9. The analysis of the selected works shows the high relevance of public debt in the context of economic, political, and investment aspects, as well as the connection with the policy of economic development.

Figure 9 shows the predominance of management (Business, Management, and Accounting) and economics (Economics, Econometrics, and Finance) and confirms public debt research's interdisciplinary nature. At the same time, the sectoral affiliation of the analyzed publications is also quite broad and diversified. However, it is quite natural that most empirical studies on public debt issues have an economic and financial nature.

Thus, according to the results, it was found that research on the issues of public debt and its role in ensuring an effective policy of economic development (including in conditions of war and armed conflicts) occupies a key place in financial and economic research. Its scientific and user interest has significantly intensified in recent years. At the same time, in current conditions in Ukraine, post-

Source: Authors' elaboration using Elsevier's SciVal tools.

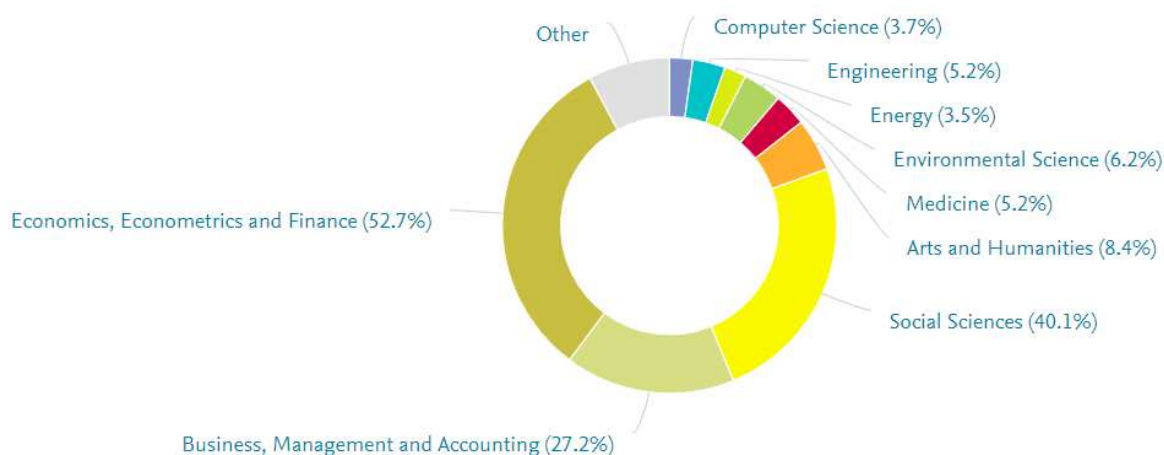


Figure 9. Structural analysis of public debt by subject area

war recovery is only possible with proper public debt management. Summarizing, research on public debt issues is not static; that is, subject to transformation over time. Also, the analysis made it possible to generalize the theoretical aspects of the role of public debt in ensuring the country's economic development more comprehensively and thoroughly according to some important parameters (contextual, evolutionary, spatial), which forms the basis for further empirical research in this direction.

Thus, based on the bibliometric analysis, the publications were examined according to key features:

- publications containing the keywords “public debt,” “economic development,” and “war” (which were included in the green and red clusters);
- publications related to armed conflicts and public debt – for the period 2015-2018 and 2022;
- publications of researchers, which have joint publications on issues of public debt, from countries of Central and South-Eastern Europe.
- publications of subject areas: Business, Management, and Accounting and Economics, Econometrics, and Finance.

The analysis of selected publications based on their prior clustering made it possible to single out risks to which the main attention should be paid during the period of war and post-war reconstruction of Ukraine:

- currency risk. Even now, most of the loans are external. In 2023, their volume may increase even more because the government plans to cover 95% of the budget deficit with external financing. In addition, foreign currency debt service puts pressure on gold and foreign exchange reserves. Therefore, the larger the payments on the external debt, the fewer opportunities the National Bank has to keep the hryvnia from devaluation and the higher the chance of increasing the burden on the budget to make such

payments. Currently, Ukraine receives extremely favorable loans, the interest rates are either zero or close to zero, and the terms of the debts often provide for a grace period during which no payments need to be made. Borrowing terms are also usually long. The only alternative to external creditors is Domestic Bonds for up to 30 years. However, such borrowing has its price in the form of rapid inflation and devaluation of hryvnia due to money emission (Kaya, 2020; Bouchetara et al., 2020);

- demographic risk. The burden of repaying and servicing public loans will fall on the shoulders of future generations. Since millions of citizens left the country, there is a risk that no one will repay the war debts.

Based on the analysis, key recommendations for ensuring debt security during the war and post-war period in Ukraine were singled out. Of course, it is difficult to predict the amount the state will increase its debt because part of the financing comes to Ukraine on irreversible terms. The ratio of national debt to GDP in 2023 may be much higher than 100% in the case of a smaller-than-expected nominal GDP and much lower if Ukraine receives most of the money in the form of grants.

The only way to ensure debt security during the war and post-war period in Ukraine is to increase the rate of economic growth and carry out reforms within the framework of the implementation of the Recovery Plan of Ukraine, which would improve the credit rating and reliability of the state. The European integration vector of development should help in this. The prospect of membership in the EU will encourage international investment in Ukraine's economy after the war, and the need to meet the requirements for joining the EU will help improve the credit rating and reduce the cost of foreign loans. The development of an effective debt policy should consider the complex relationship between public debt, the degree of financial stability, and the country's socioeconomic, investment, and innovative development. Ensuring Ukraine's recovery is impossible without an adequate public debt management system (Lyulyov et al., 2021).

At the same time, in the middle of the war, the goals of the debt policy (and economic development policy) should be subject to even greater attention, and the threshold values of the debt security indices should be reviewed and recalculated based on the current state of the country. The recommended frequency of calculating debt sustainability indices is once a quarter. Based on the

calculated index values and their comparison with critical values, it is worth making forecasts considering threats to the country's debt sustainability. However, since Ukraine exists in conditions of significant uncertainty, such forecasts should be short-term. The next step is an assessment of the effectiveness of the measures taken to ensure debt security in wartime conditions.

CONCLUSION

This study aims to develop a current academic landscape on the role and impact of public debt on the country's economic development policy as a basis for the war and post-war recovery of Ukraine's economy using bibliometric analysis.

The dynamics of published articles for 2000–2022 concerning public debt show the significant growth of scientific interest since 2008 (which is connected with the global economic crisis) and in 2022, caused by the war in Ukraine and its consequences for the economies of the world. Furthermore, results of Google Trends of Internet users' requests about "public debt" worldwide in 2017–2022 confirmed the connection of interest in the challenges of the war in Ukraine, which once again proves the importance of researching public debt during the war.

Identifying the relationship of public debt with other concepts allowed identifying 6 clusters. Thus, the largest diameter (which means a higher frequency of mentioning the concept of public debt as a keyword in scientific articles) has a circle related to the relationship between public debt and the country's economic (financial) development.

Summarizing the results of the content-contextual block of bibliometric analysis made it possible to note that the central part of scientific research is focused on identifying the relationships between public debt and economic development (red and green clusters) in an inextricable relationship with the concept of war (green and purple clusters). A map of the density of connections between concepts in the context of public debt research demonstrated a close connection between the concepts of public debt, war, and economic development, confirming the results of the previous analysis.

According to the results of the analysis of the contextual-temporal block of research on public debt, it was possible to identify four stages during which the main emphasis in this area changed. First, special attention is paid to scientific publications for 2015–2018 and 2022. During these time frames, the most significant number of publications was observed regarding the formation of debt policy in armed conflicts (to ensure an effective economic development policy). Due to the results of spatial clustering, six groups of countries were identified, researchers from which have joint publications on issues of public debt. Ukraine is included in the first and third clusters. The analysis of selected publications based on their prior clustering made it possible to single out risks to which the primary attention should be paid during the war and post-war period in Ukraine: currency risk and demographic risk. This study made it possible to single out key recommendations to ensure debt security during the war and post-war period in Ukraine: to increase the rate of economic growth and carry out reforms within the framework of the implementation of the Recovery Plan of Ukraine.

AUTHOR CONTRIBUTIONS

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Supervision: Sergiy Voytov.

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Writing – original draft: Hanna Filatova, Yevheniia Polishchuk.

Writing – review & editing: Hanna Filatova.

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