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# IMPACT OF GOVERNMENT DEBT ON THE ECONOMIC SECURITY OF STATE

Abstract of the research to obtain

academic degree of Master in Finance
field of knowledge 07 «Management and administration»
specialty 072 «Finance, banking and insurance»
according to the educational and professional program
«Finance and credit with advanced foreign language»

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Mykolaiv 2020

# GENERAL DESCRIPTION OF THESIS

Government debt has taken an important place in the financial system of each country, so it does not seem possible to completely abandon its use in terms of financing the needs of state. This especially concerns those countries with significant budget deficits. For instance, the total global debt (of all countries combined) makes over 98% of the world GDP. For some countries, the issue of government debt is particularly acute. Thus, the US government debt reached 104.30% of the country's gross domestic product in 2018, in Italy – 132.20%, in Japan – 237.10% (according to the World Bank). The question is how debt affects the economic security of state.

Economic security plays important role in the system of national security, it is the basis for all other components since, without the effective functioning of economy, it is impossible to ensure sufficient defence capability of the country, optimal environmental and social policies, protection in the field of information technologies, as well as protection of state interests and national values.

Problems of economic security have been explored by such modern Ukrainian economists as Z. Varnalii, Z. Gbur, S. Davydenko, O. Egorova, J. Zhalilo, O. Levchuk, V. Muntian, V. Prykhodko and others. We can also distinguish the following foreign researchers in the field of economic security: L. Abalkin, D. Bigo, A. Gorodetsky, M. Zhuk, V. Kolupaev, V. Oleynikov, J. Solana and others.

The purpose of this study is to improve the theoretical and methodological basis for assessing the level of economic security of state considering the impact of government debt on economic security of state.

To achieve the goals above, the following tasks were set:

– to identify the essence of a concept "economic security of state" in order to determine the main functional components and its meaning for the national security of state;

– determine the role of debt security for the economic security of state;

– to generalise theoretical concepts exploring the problem of government debt and budget deficit;

– to analyse the trends and changes in government debt at the international level;

– to generalize theoretical approaches to the assessment of economic security of state;

– to develop the integral indicator of the level of economic security of state suitable for interstate comparisons;

– to assess the level of economic security in Ukraine and OECD countries;

– to investigate the interconnection between government debt and economic security of the analysed countries in dynamics;

– to systematize the recommendations for economic security management considering the debt policy of state.

The object of this study is the interconnection between government debt and economic security of state.

The subject of the research is theoretical and methodological foundations as well as practical aspects of the impact of government debt on economic security of state.

The hypothesis assumes that such elements of debt security as size of government debt, its dynamics, and provision by international reserves significantly affect the level of economic security of state.

The following research methods have been used to accomplish stipulated tasks: statistical (analysis of statistical information to explore the dynamics of government debt and economic growth in recent years), comparative analysis (for making interstate comparisons of economic security level), scientific abstraction (since it is impossible to examine all existing factors, we abstract from insignificant differences among similar indicators and concepts), analytic hierarchy process (pairwise comparison of factors to determine their weights in the integral index of economic security of state), grouping (for studying the structure and patterns of distribution the countries by indicators), and regression analysis (to determine the impact of government debt on economic security based on historical data).

The novelty of the research results is the development of a comprehensive universal integral indicator for measuring the level of economic security of different countries, taking into account their peculiarities.

*were improved:*

− theoretical and methodological foundations of the country's economic security research by developing an integral indicator based on the impact of such factors as human capital, international competitiveness, macroeconomic environment, debt security and investment climate, allowing to take into account the state of different sectors of economy and to provide more consistent assessment.

*were further developed:*

− interpretation of the concept of "economic security of state", which takes into account the difference in understanding of the concept in Ukraine and abroad and distinguishes the concepts of "economic security of state" from "economic security";

− description of the features of national debt, which focuses on the threats to the national economy related to its service and pay back;

− determining the relationship between government debt and economic security by analysing and matching the levels of debt and economic security in dynamics.

The survey was based on statistical data for Ukraine and 36 members of the Organisation for Economic Co-operation and Development. The sources of statistics are various international organizations including the World Bank, the International Monetary Fund, and the Organization for Economic Co-operation and Development.

The interim results of the master's thesis were published in two articles: "Theoretical Approaches to Defining the Concept of Economic Security of State" (December 2019) and "Quantitative Assessment of Economic Security in countries of the Organization for Economic Cooperation and Development" (January 2020).

The research consists of an introduction, four sections, conclusions and the list of references used. The total volume is 60 pages of text. References accounts 48 sources. The work contains 20 tables, 13 figures, and 2 formulas.

The first section discusses the theoretical aspects of government debt and economic security of state. The essence of the economic security of state is further revealed, the definition of debt security is given and the features of government debt as a macroeconomic category are characterised. The current international trends of government debt are reviewed.

The second section describes the methodological bases for assessing the impact of government debt on the economic security. The first part of the second section discusses theoretical approaches to assessing the level of economic security of state. The second part presents and substantiates the methodology of calculating the integral indicator of the level of economic security.

Due to the established methodology, the third section provides an empirical analysis of the results by calculating the level of economic security for the selected countries. This section concludes with an analysis of interconnection between government debt and the economic security of state.

The fourth section presents an interpretation for the results of empirical analysis conducted in the third section. A comparative analysis of countries by the value of the economic security index is made, the main factors that influence economic security are highlighted, and current trends of debt security in the OECD countries are analysed. At the end of this section, the practical recommendations are given regarding the possible application of the results of the research, the directions for further research are outlined.

## MAIN CONTENTS OF THE MASTER'S THESIS

**The introduction** justifies the relevance of the research topic, defines the aim, tasks, subject, and object of the study, defines the hypothesis of the study, methods of research, explains the scientific and personal motives for conducting the research, reveals the scientific novelty of the obtained results.

**The first section "Theoretical basis for the research of government debt and economic security of state"** defines the essence and notion of economic security of state, as well as considers main theoretical causes of debt emergence.

It should be noted that there is no the only true definition of economic security of state but there are many theoretical approaches that focus on one or other of its components. The most versatile definition is given by the Ministry of Economic Development, Trade and Agriculture of Ukraine, according to which economic security is a state of the national economy that allows to maintain resistance to internal and external threats, to ensure high competitiveness in the world economic environment and characterise the ability of national economy to sustainable and balanced growth. The components of economic security are industrial, demographic, energy, foreign economic, investment and innovation, macroeconomic, food, social and financial security.

In many scientific works, including the foreign ones, economic security of state is often associated with national competitiveness, that is reflected in country's ability to create internal and external conditions that enable the domestic enterprises to produce goods and services that stand the test of international markets, and the population began to increase incomes and quality of life. The result of the increase of competitiveness is the dynamic growth of labour productivity, innovation and environmental friendliness of production (business) processes, the growing added value in the knowledge-intensive sectors of economy, as well as efficient use of the available factors of production – natural and human resources, capital and technologies.

Despite numerous differences in theoretical approaches to defining the nature and components of economic security, the overwhelming majority of scientists studing this topic agree that debt security is one of the most important factors of economic security of state, that is a factor of ensuring stability, solvency, and financial independence of the country from creditors. Therefore, the state of debt, peculiarities of government debt management, the cost of attracted resources, etc. directly affect the economic security of state.

Debt security as one of the key components of economic security assumes the effectively management and holding government debt at an optimal level which does not pose a threat to public finances and economy as a whole. The most important reason

for government debt growth is budget deficit. Thus, the government, in order to fulfill its functions in full, uses debt resources. At the same time, there are many factors that, in fact, lead to a deficit. American economist Pierre Yared argues that main prerequisites for increasing the debt burden in most countries of the world are the increasing proportion of older people (so-called “population ageing”), political polarisation, and voter uncertainty. Threats to the national economy caused by problems with debt service and repayment, especially what concerns external debt, critically reduce the overall stability and prospects of the country’s economic development. Negative trends such as the rapid growth of government debt and, as a consequence, the increase of debt load on the economy and budget, the uneven timing of debt service obligations, self-replicating nature of debt accumulation (when new loans are attracted to cover the previous ones, not to development) largely block the opportunities for economic growth, and thus critically limit the ability to maintain an adequate level of economic security.

The long-term trend of sovereign debt growth in many countries of the world – including developed ones – is already a clear and indisputable fact. For example, only US government debt grew from 5.7 trillion dollars in 2000 to 21.5 trillion dollars in 2018 (about 279%). During the same period, the country’s gross domestic product (hereinafter referred to as GDP) has only doubled, so not only the nominal amount of debt but also its ratio to the gross product is increasing.

The United States is not an exception. Most economies in the world show steady and sustained growth in government debt as a percentage of GDP. It is shown the dynamics of this indicator in the world’s largest economies on fig. 1. The growth rate of tax revenues is lagging behind the growth rate of public expenditures, so additional financial resources are used to finance the budget deficit.

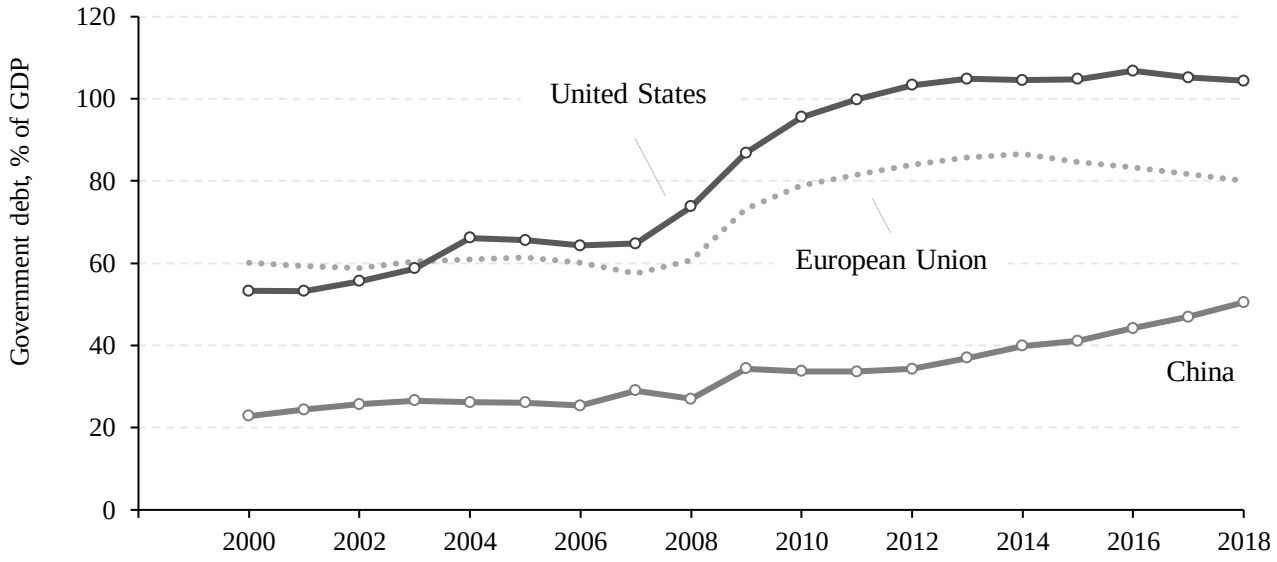


Fig. 1. Dynamics of government debt in advanced economies

As we can see, countries are actively accumulating debt. Thus, during 2000-2018, the US government debt increased from 53.2% to 104.4% of GDP. The growth rate of this indicator in China is even higher – from 22.8% to 50.5%. In turn, there has been a slight decrease in government debt in the EU countries over the last years though the long-term trend also indicates a constant increase. According to the International Monetary Fund (hereinafter referred to as the IMF), as of 2018, the aforementioned economies had generated approximately 62% of the gross world product, so it can be argued that the problem of long-term growth of government debt is actual and, most importantly, is not a local but a global issue.

**The second section "Methodological bases for assessing the impact of government debt on the level of economic security of state"** presents and substantiates the methodology of calculating the integral indicator of the level of economic security.

For the purpose of cross-national comparison, it is necessary to develop a comprehensive indicator of the level of economic security of the state which should include key economic indicators, combine different approaches to calculating the level of economic security. The step-by-step methodology is presented below.

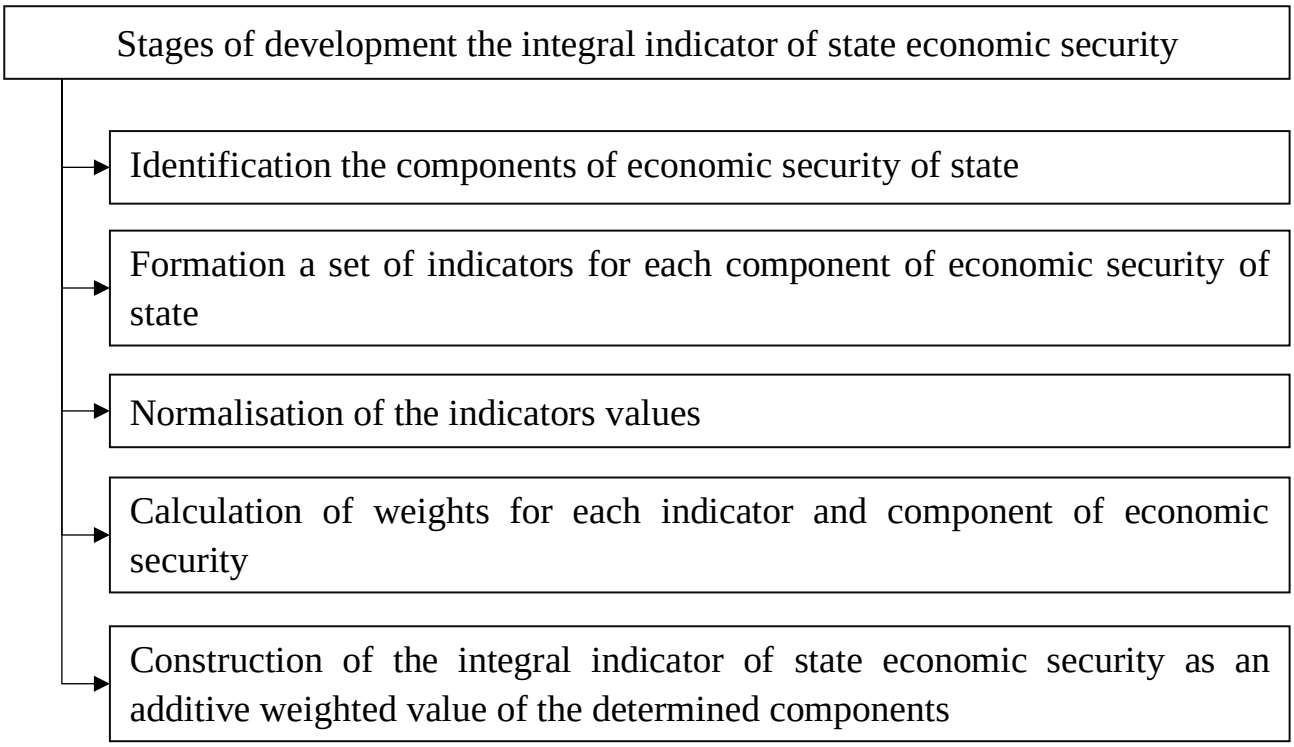


Fig. 2. Stages of development the integral indicator of state economic security

In order to choose the components of the integral indicator, the existing methods of calculating the level of economic security of the state were analysed, among which the approach of the Ministry of Economic Development of Ukraine and the Global Competitiveness Index. Some of the components and indicators that, in the author's opinion, have the greatest impact on the economic security of the state, were borrowed from these methods. The rest of the factors are selected based on different approaches to the interpretation of the concept of "economic security of state".

Therefore, the basic principles for selecting indicators for the formation of an integral indicator were:

– provision of systematically updated, unified statistical information from reliable sources: country statistical committees, the World Bank, the IMF, the OECD and other leading international organizations;

– materiality of influence on the economic security of the state and compliance with existing methods of its calculating;

– possibility of unambiguous interpretation regarding the impact on the economic security of the state.

To ensure unidirectionality, the indicators were divided into stimulators and destimulators. The relationship between $G_j$ and stimulant indicator is straight, and inverse – between $G_j$ and destimulant indicator. Thus, the higher value of stimulator, the higher value of index, for destimulators – the opposite.

Based on the principles outlined above, five major components of a country's economic security have been identified: human capital, international competitiveness, macroeconomic situation, debt security and investment climate. Since the values of all components are equally important for the economic security of the state, their weight coefficients were set at 0.20. The list of components, indicators and their types are given in table. 1.

Table 1

Components of the integral indicator of state economic security level

| # | Components of economic security | Type | Data source |
|---|---|---|---|
| 1 | Human capital | | |
| 1.1 | Life expectancy at birth, years | Stimulator | World Bank |
| 1.2 | Population ages 15-64, % | Stimulator | World Bank |
| 1.3 | Population growth, % | Stimulator | World Bank |
| 1.4 | Tertiary education level, % of 25-64 years-olds | Stimulator | OECD |
| 2 | International competitiveness | | |
| 2.1 | Terms of trade | Stimulator | OECD |
| 2.2 | Annual value added growth, % | Stimulator | OECD |
| 2.3 | Fossil fuel energy consumption, % of total | Destimulator | World Bank |
| 2.4 | Net export, % of GDP | Stimulator | World Bank |
| 3 | Macroeconomic situation | | |
| 3.1 | Unemployment rate, % | Destimulator | OECD |
| 3.2 | Inflation (consumer prices), annual % | Destimulator | World Bank |
| 3.3 | GDP per capita growth, annual % | Stimulator | World Bank |
| 3.4 | Level of shadow economy, % of GDP | Destimulator | IMF |
| 4 | Debt security | | |
| 4.1 | Government debt, % of GDP | Destimulator | IMF |
| 4.2 | Debt dynamics, % to previous year | Destimulator | IMF |
| 4.3 | Total reserves to government debt, % | Stimulator | World Bank |
| 5 | Investment climate | | |
| 5.1 | Net investment in nonfinancial assets, % of GDP | Stimulator | World Bank |
| 5.2 | Ease of doing business score | Stimulator | World Bank |
| 5.3 | Gross fixed capital formation, % of GDP | Stimulator | World Bank |

In determining the specific gravity of the impact of each indicator, it should be noted that, in contrast to quantitative, methods of expert evaluation, which belong to formalized qualitative assessment methods, were used. Most of these methods require a team of experts who meet certain requirements in terms of qualifications, experience, authority, etc. Analytic hierarchy process method, developed by Thomas Saaty, combines the principles of expert assessments and mathematical calculations. On the basis of substantiated interdependencies of factor indicators, a matrix of weights on the MAI scale is developed for indicators that affect each component of the economic security of the state.

The next step in the construction of an integral indicator of the level of economic security of the state is the calculation of weighting coefficients. According to valid pairwise comparisons of indicators, their weight values were determined using 4 methods of processing information of the hierarchy analysis method. The results of the comparisons are shown in table 2.

Table 2

Normalisation of weighting coefficients

| Name of the component | Weight coefficient |
|---|---|
| Human capital | |
| Life expectancy at birth, years | 0.14 |
| Population ages 15-64, % | 0.45 |
| Population growth, % | 0.27 |
| Tertiary education level, % of 25-64 years-olds | 0.14 |
| International competitiveness | |
| Terms of trade | 0.47 |
| Annual value added growth, % | 0.15 |
| Fossil fuel energy consumption, % of total | 0.15 |
| Net export, % of GDP | 0.23 |
| Macroeconomic situation | |
| Unemployment rate, % | 0.24 |
| Inflation (consumer prices), annual % | 0.12 |
| GDP per capita growth, annual % | 0.16 |
| Level of shadow economy, % of GDP | 0.48 |

Table 2 continued

| Debt security | |
|---|---|
| Government debt, % of GDP | 0.55 |
| Debt dynamics, % to previous year | 0.18 |
| Total reserves to government debt, % | 0.27 |
| Investment climate | |
| Net investment in nonfinancial assets, % of GDP | 0.25 |
| Ease of doing business score | 0.50 |
| Gross fixed capital formation, % of GDP | 0.25 |

As it can be seen from the table, the weight values of the components of economic security of the state are normalized using four methods of processing information of the method of analysis of hierarchies. The values obtained for each indicator do not deviate according to the method of estimation, so there is no need to average them. Thus, the values obtained are the weighting coefficients of the indicators.

$$i = 0.2\left(\begin{array}{c}0.14a_1\\+\\0.45a_2\\+\\0.27a_3\\+\\0.14a_4\end{array}\right) + 0.2\left(\begin{array}{c}0.47b_1\\+\\0.15b_2\\+\\0.15b_3\\+\\0.23b_4\end{array}\right) + 0.2\left(\begin{array}{c}0.24c_1\\+\\0.12c_2\\+\\0.16c_3\\+\\0.48c_4\end{array}\right) + 0.2\left(\begin{array}{c}0.55d_1\\+\\0.18d_2\\+\\0.27d_3\end{array}\right) + 0.2\left(\begin{array}{c}0.25e_1\\+\\0.50e_2\\+\\0.25e_3\end{array}\right)$$

Fig. 3. Integral indicator of economic security level

where $i$ – level of economic security; $a$, $b$, $c$, $d$, $e$ – its components

In order to analyse, compare and determine the limit values of indicators characterising the level of economic security, the sample includes all OECD member states (table 3). The choice can be explained due to such facts:

– different developed and developing countries are the members of Organisation for Economic Cooperation and Development (OECD members generate about 60% of the world GDP). Thus, it is possible to analyse the data of states with the most advanced economies;

– the number of OECD members is 36, which includes the vast majority of the European Union countries (23 out of 28). All continents except Africa are represented. This is an opportunity to make cross-national comparisons taking into account the specifics of national economies in different parts of the world;

– accessibility and comprehensiveness of the OECD statistical base;

– the specificity of constructing an integral indicator requires uniform information, so the principle that the countries are selected for should be key. In this case, it is an organisation of developed countries that recognizes the principles of democracy and a market economy.

Additionally, Ukraine is included into the sample. Currently, the country's foreign and domestic policy vector is aimed at European integration and effective participation in the world economy. Thus, it is relevant to compare the level of economic security of Ukraine with the corresponding indicator in other (mainly developed) countries.

Table 3

List of countries to compare the level of economic security

| Country | Code | EU member |
|---|---|---|
| Australia | AUS | No |
| Austria | AUT | Yes |
| Belgium | BEL | Yes |
| Canada | CAN | No |
| Switzerland | CHE | No |
| Chile | CHL | No |
| Czech Republic | CZE | Yes |
| Germany | DEU | Yes |
| Denmark | DNK | Yes |
| Spain | ESP | Yes |
| Estonia | EST | Yes |
| Finland | FIN | Yes |
| France | FRA | Yes |
| United Kingdom | GBR | Yes* |
| Greece | GRC | Yes |
| Hungary | HUN | Yes |
| Ireland | IRL | Yes |
| Iceland | ISL | No |
| Israel | ISR | No |

| Country | Code | EU member |
|---|---|---|
| Italy | ITA | Yes |
| Japan | JPN | No |
| Republic of Korea | KOR | No |
| Lithuania | LTU | Yes |
| Luxembourg | LUX | Yes |
| Latvia | LVA | Yes |
| Mexico | MEX | No |
| Netherlands | NLD | Yes |
| Norway | NOR | No |
| New Zealand | NZL | No |
| Poland | POL | Yes |
| Portugal | PRT | Yes |
| Slovakia | SVK | Yes |
| Slovenia | SVN | Yes |
| Sweden | SWE | Yes |
| Turkey | TUR | No |
| Ukraine | UKR | No |
| United States | USA | No |

* The United Kingdom withdrew from the UE on 31 January 2020

In order to analyse obtained results, it is necessary to divide the values of each component into groups (intervals). There are stages of construction of interval variation series of distribution:

– determining the minimum $x_{min}$ and maximum $x_{max}$ values of the feature among the available observations;

– determining the magnitude of variation of the sign: $R = x_{max} - x_{min}$

– determining the width of the interval;

– calculating limit values of intervals.

We use the Sturges formula developed by the American statistician Herbert Sturges to determine the width of the interval. This is an empirical rule for determining the optimal number of intervals at which the range of change of a random variable is broken when constructing a density histogram of its distribution. It is calculated by the formula (1):

$$n = 1 + \lfloor \log_2 N \rfloor \quad (1)$$

where $N$ is the total number of observations of the value; $\log_2$ – logarithm with base 2; $\lfloor X \rfloor$ is an integer of $x$.

The calculations are made for all OECD countries and Ukraine (n = 37), the scale corresponds to the range of the integral index and equals 1. For these parameters, the number of intervals is 6.

**The third section "Empirical analysis"** provides an empirical analysis of the results by calculating the level of economic security for the selected countries.

The last stage of the development of the integral indicator of level of economic security of state involves calculation and construction of a general index as an additive normalized weighted determined component. Official statistical data (table 4) for 2018 is used for calculation, which is the latest up-to-date information at the time of the analysis. Thus, the findings reflect the level of economic security of the states as of 2018.

Table 4

Generalised rating of countries by the level of economic security

| Code | Human capital | | International competitive-ness | | Macro-economic situation | | Debt security | | Investment climate | | Economic security | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Index | Place | Index | Place | Index | Place | Index | Place | Index | Place | Index | Place |
| ISL | 0.6746 | 4 | 0.7081 | 1 | 0.7361 | 12 | 0.6592 | 3 | 0.5104 | 16 | 0.6577 | 1 |
| NZL | 0.5637 | 8 | 0.6333 | 2 | 0.7430 | 10 | 0.6035 | 9 | 0.7416 | 2 | 0.6570 | 2 |
| KOR | 0.7887 | 1 | 0.5625 | 6 | 0.5683 | 31 | 0.5988 | 11 | 0.7503 | 1 | 0.6537 | 3 |
| CHE | 0.5941 | 7 | 0.4540 | 17 | 0.8331 | 2 | 0.8241 | 1 | 0.4353 | 22 | 0.6281 | 4 |
| IRL | 0.5377 | 10 | 0.5570 | 7 | 0.8475 | 1 | 0.5199 | 23 | 0.6391 | 9 | 0.6202 | 5 |
| LUX | 0.7678 | 2 | 0.6147 | 3 | 0.7373 | 11 | 0.5992 | 10 | 0.2758 | 33 | 0.5989 | 6 |
| EST | 0.3992 | 28 | 0.5929 | 5 | 0.5914 | 28 | 0.6465 | 4 | 0.6842 | 4 | 0.5828 | 7 |
| DNK | 0.4444 | 24 | 0.4659 | 13 | 0.6868 | 18 | 0.6157 | 8 | 0.6815 | 5 | 0.5789 | 8 |
| SWE | 0.4623 | 21 | 0.4914 | 9 | 0.6928 | 16 | 0.5831 | 13 | 0.6481 | 7 | 0.5755 | 9 |
| CZE | 0.3999 | 27 | 0.4506 | 18 | 0.7622 | 7 | 0.7491 | 2 | 0.4835 | 17 | 0.5691 | 10 |
| AUT | 0.5310 | 11 | 0.4249 | 24 | 0.8063 | 4 | 0.5065 | 26 | 0.5244 | 15 | 0.5587 | 11 |
| USA | 0.5067 | 13 | 0.4556 | 16 | 0.8271 | 3 | 0.3968 | 33 | 0.5798 | 10 | 0.5532 | 12 |
| NOR | 0.5431 | 9 | 0.2476 | 35 | 0.7015 | 15 | 0.5342 | 18 | 0.7226 | 3 | 0.5498 | 13 |
| NLD | 0.4783 | 17 | 0.4230 | 25 | 0.7907 | 6 | 0.5570 | 16 | 0.3943 | 26 | 0.5287 | 14 |
| LVA | 0.2754 | 37 | 0.4612 | 15 | 0.6425 | 22 | 0.6189 | 7 | 0.6403 | 8 | 0.5277 | 15 |
| GBR | 0.4817 | 16 | 0.4264 | 23 | 0.7489 | 9 | 0.4288 | 28 | 0.5514 | 11 | 0.5274 | 16 |
| DEU | 0.4331 | 25 | 0.4649 | 14 | 0.7564 | 8 | 0.5240 | 22 | 0.4296 | 23 | 0.5216 | 17 |
| SVK | 0.4985 | 15 | 0.3710 | 28 | 0.7225 | 14 | 0.5409 | 17 | 0.4718 | 19 | 0.5209 | 18 |
| FIN | 0.3875 | 29 | 0.4678 | 12 | 0.6909 | 17 | 0.5122 | 25 | 0.5278 | 13 | 0.5173 | 19 |
| CHL | 0.6081 | 5 | 0.3674 | 30 | 0.6630 | 20 | 0.5950 | 12 | 0.3463 | 29 | 0.5160 | 20 |
| LTU | 0.3129 | 36 | 0.4758 | 10 | 0.5973 | 27 | 0.6314 | 5 | 0.5344 | 12 | 0.5104 | 21 |
| POL | 0.4701 | 19 | 0.4494 | 20 | 0.6421 | 23 | 0.5680 | 15 | 0.4150 | 24 | 0.5089 | 22 |
| CAN | 0.6847 | 3 | 0.3021 | 33 | 0.6722 | 19 | 0.4188 | 29 | 0.4618 | 20 | 0.5079 | 23 |
| ISR | 0.4637 | 20 | 0.6108 | 4 | 0.6043 | 26 | 0.5275 | 21 | 0.3093 | 31 | 0.5031 | 24 |
| AUS | 0.5965 | 6 | 0.1112 | 37 | 0.7299 | 13 | 0.5337 | 19 | 0.5246 | 14 | 0.4992 | 25 |
| SVN | 0.4539 | 23 | 0.5063 | 8 | 0.6237 | 25 | 0.4998 | 27 | 0.4006 | 25 | 0.4969 | 26 |
| HUN | 0.3810 | 31 | 0.4423 | 22 | 0.6343 | 24 | 0.5128 | 24 | 0.3805 | 28 | 0.4702 | 27 |
| FRA | 0.3635 | 33 | 0.4505 | 19 | 0.6535 | 21 | 0.3969 | 32 | 0.4469 | 21 | 0.4622 | 28 |
| TUR | 0.5002 | 14 | 0.2719 | 34 | 0.2376 | 37 | 0.5732 | 14 | 0.6813 | 6 | 0.4528 | 29 |
| BEL | 0.4585 | 22 | 0.3881 | 26 | 0.5825 | 30 | 0.4019 | 31 | 0.3305 | 30 | 0.4323 | 30 |
| PRT | 0.3751 | 32 | 0.4699 | 11 | 0.5868 | 29 | 0.3875 | 34 | 0.3056 | 32 | 0.4250 | 31 |
| ESP | 0.5206 | 12 | 0.3698 | 29 | 0.4235 | 33 | 0.4096 | 30 | 0.3882 | 27 | 0.4223 | 32 |
| JPN | 0.3353 | 35 | 0.3178 | 31 | 0.7972 | 5 | 0.0458 | 37 | 0.4728 | 18 | 0.3938 | 33 |
| MEX | 0.4203 | 26 | 0.3034 | 32 | 0.4207 | 34 | 0.5303 | 20 | 0.2659 | 34 | 0.3881 | 34 |
| ITA | 0.3571 | 34 | 0.4460 | 21 | 0.4561 | 32 | 0.3066 | 35 | 0.2514 | 35 | 0.3635 | 35 |
| UKR | 0.4711 | 18 | 0.1165 | 36 | 0.2700 | 36 | 0.6307 | 6 | 0.1044 | 37 | 0.3186 | 36 |
| GRC | 0.3875 | 30 | 0.3794 | 27 | 0.3327 | 35 | 0.1255 | 36 | 0.1606 | 36 | 0.2771 | 37 |

As can be seen from the table, the values of the indicator of economic security of the state are in the range from 0.2771 to 0.6577 with an average of 0.5101. According to the integral indicator developed, the most economically secured countries are: Iceland (ISL), New Zealand (NZL), Republic of Korea (KOR), Switzerland (CHE), Ireland (IRL), Luxembourg (LUX) and others. The rating is closed by Greece (GRC), Ukraine (UKR), Italy (ITA) and Mexico (MEX) with a significant margin from the upper sample values.

The data range is divided into the following intervals: E (0.2771; 0.3406], D (0.3406; 0.4040], C (0.4040; 0.4674], B (0.4674; 0.5309] , A (0,5309; 0,5943] and A + (0,5943; 0,6577]. The width *h* is 0.0634. The interval distribution of countries is presented in the form of a horizontal histogram in fig. 4.

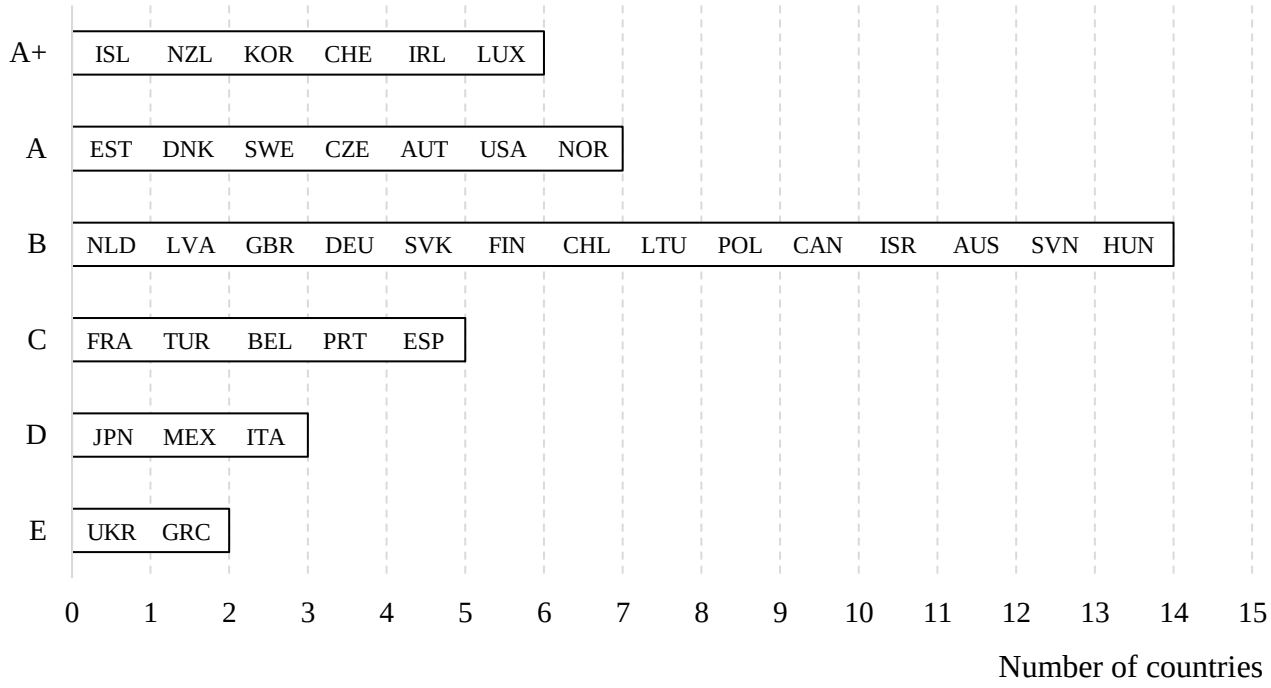


Fig. 4. Interval distribution of countries by level of economic security

As we can see, the constructed histogram forms an approximation to normal distribution with a distinct vertex in the interval B (14 countries, satisfactory level) and a slight superiority of the upper branch. There is a significant fact that countries with high levels of government debt relatively to GDP (Japan, Greece, Italy, Portugal, etc.) are located in the lower distribution intervals.

To determine the impact of government debt on the economic security of the state it is needed to calculate, analyse and compare levels of debt and economic security in dynamics. It is decided to investigate such influence on the example of Ukraine. In order to increase objectivity and to eliminate the influence of external factors, the pre- and post-crisis years (2008-2009) were excluded from the sample. Thus, the observed period is 2010-2018.

The calculation of the level of economic security of the state was carried out according to the developed methodology. The minimum and maximum values of the OECD sample were used to maintain the scale as limiting values. In this regard, indices are distinguished by their individual components. Table 5 presents the results of calculating the level of economic security of Ukraine in 2010-2018.

Table 5

The value of the integral indicator of economic security by years

| Year | Human capital | International competitive-ness | Macro-economic situation | Debt security | Investment climate | Economic security |
|---|---|---|---|---|---|---|
| 2010 | 0.5114 | 0.4054 | 0.2388 | 0.5364 | –0.4672 | 0.2450 |
| 2011 | 0.5220 | 0.4666 | 0.3372 | 0.6299 | –0.4935 | 0.2924 |
| 2012 | 0.5301 | 0.2086 | 0.2623 | 0.5676 | –0.3647 | 0.2408 |
| 2013 | 0.5266 | 0.1979 | 0.2614 | 0.5254 | –0.0860 | 0.2850 |
| 2014 | 0.5075 | 0.0106 | 0.1070 | 0.1508 | –0.0602 | 0.1431 |
| 2015 | 0.5116 | –0.0992 | –0.4129 | 0.3570 | –0.0628 | 0.0587 |
| 2016 | 0.4961 | 0.0028 | 0.1897 | 0.4344 | –0.0423 | 0.2161 |
| 2017 | 0.4834 | 0.0946 | 0.1981 | 0.5800 | 0.0458 | 0.2804 |
| 2018 | 0.4711 | 0.1165 | 0.2700 | 0.6307 | 0.1044 | 0.3186 |

The table shows that the overall values of the index vary from 0.0587 to 0.3186, which indicates a significant fluctuation of the level of economic security of Ukraine during the specified period. It is noteworthy that the value of the human capital component, unlike the other components, has a stable downward trend, which indicates a gradual decrease in the human potential of Ukraine.

For clarity, the comparison of economic and debt security levels in the dynamics is shown in fig. 5.

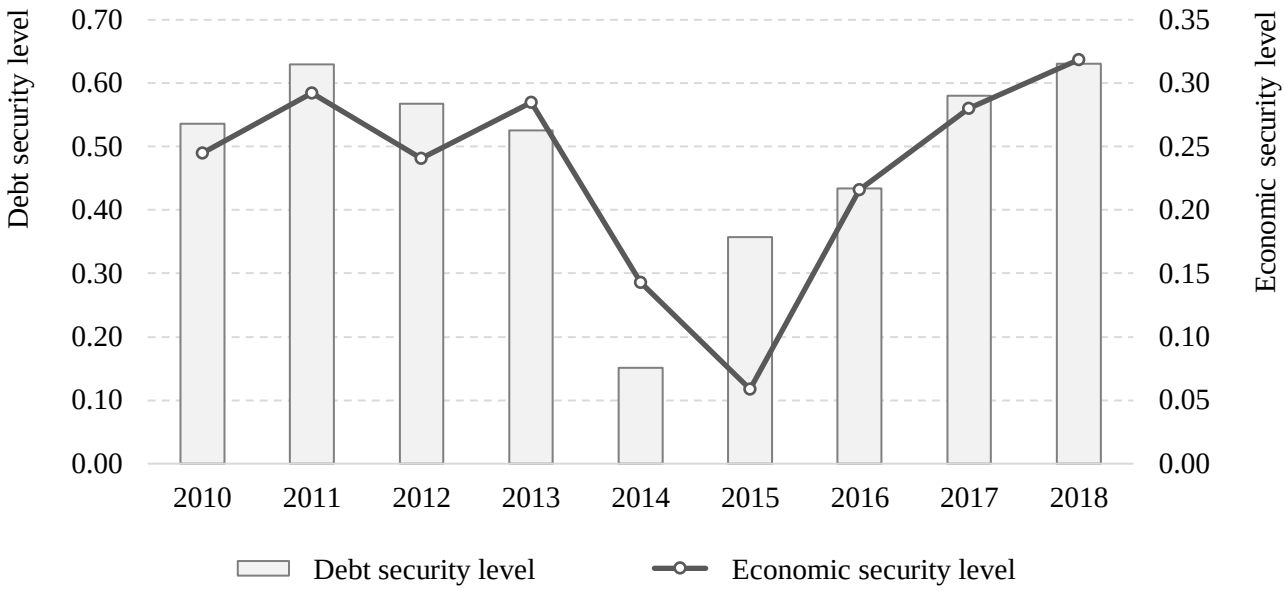


Fig. 5. Dynamics of economic and debt security levels in Ukraine

Visual analysis explores that the relationship between debt and economic security is direct and significant, since the dynamics of both indicators are visually identical. Excel regression analysis was performed to determine the strength of the relationship between these indicators. The following results were obtained:

– the correlation coefficient R is 0,8007, which indicates a strong correlation between the indicators on the Cheddock scale;

– the coefficient of determination of $R^2$ is 0.6411, i.e. the variation of the level of economic security by 64.11% is explained by the variation of the level of debt security, the influence of other factors is 35.89%;

– the coefficient of elasticity E equals 0.9620, i.e. with the increase of the level of debt security by 1%, the level of economic security of the state increases by 0.962%.

The regression analysis showed that there is a strong correlation between the indicators. It can be concluded that effective government debt management is one of the key factors for ensuring a high level of economic security of a state.

**The fourth section "Discussion and Recommendations"** presents an interpretation of the results of empirical analysis conducted in the third section. There is a comparative analysis of countries by the value of the economic security index, explanation of the main factors which influence economic security and analysis of modern trends of debt security in the OECD countries.

The integrated index has made it possible to calculate the level of economic security for the OECD countries, to carry out an interstate comparative analysis and to determine the most important factors for the economic security of a country. In addition, based on the results obtained, a rating of countries was constructed. Figure 6 presents states included in the A + interval (very high level, fig. 4) – and their brief characteristics.

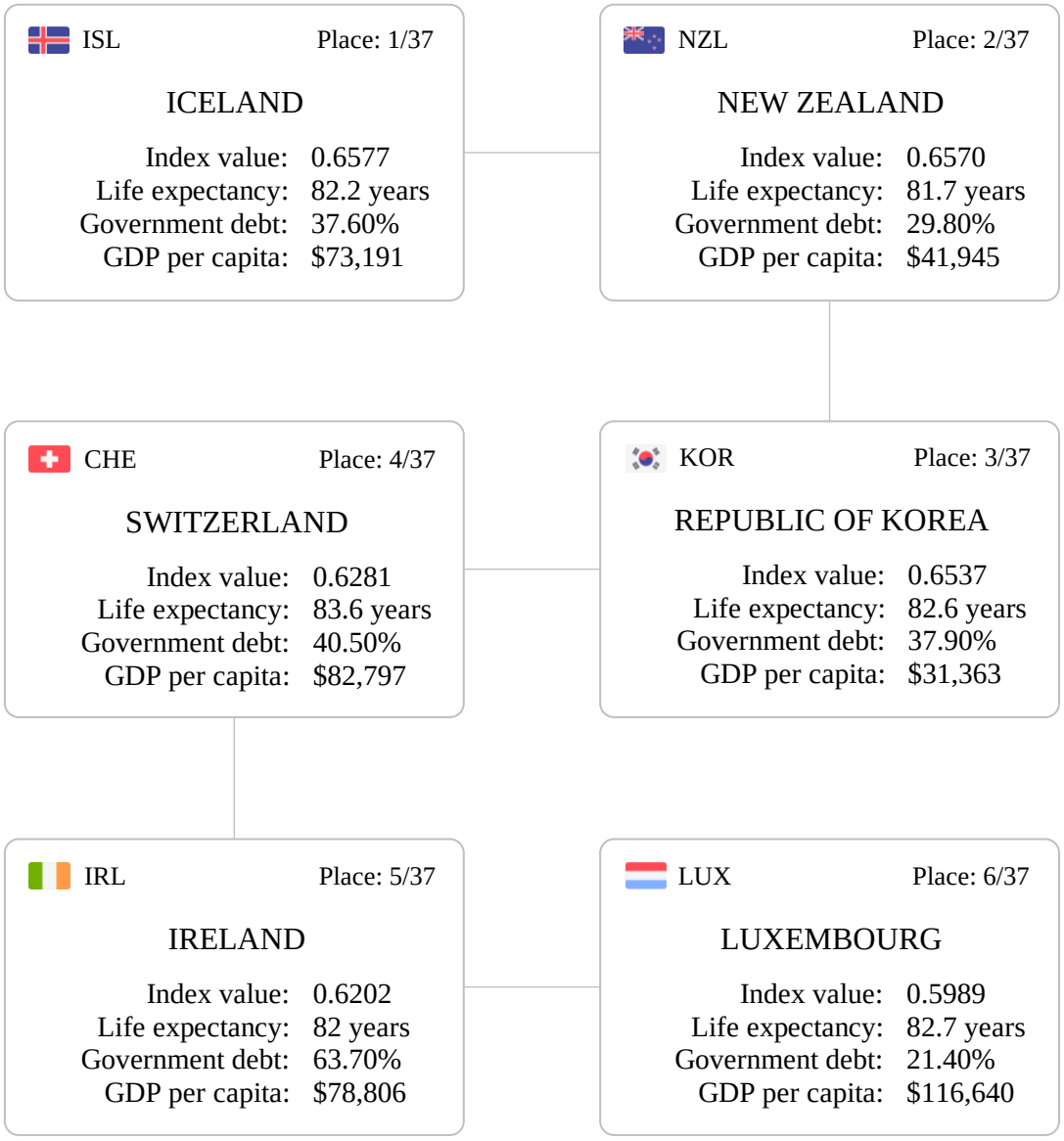


Fig. 6. Countries with the highest level of economic security

As we can see, countries with high levels of economic security are united by a common feature – low or moderate government debt. There are no countries in the ranking with debt level above 65% of GDP, which is an acceptable level according to

international practice. Similarly, countries with significant amounts of debt are located in the end of the rating (Japan, Greece, Italy, Portugal, etc.). It can be argued that the impact of government debt on economic security is significant.

Another confirmation of the hypothesis that government debt is a determinant of level of economic security is the results of the regression analysis based on data on changes in levels of debt and economic security in 2010-2018 in Ukraine, which proved that there is a strong relationship between these indicators (fig. 5).

An increase in government debt has a negative impact on the well-being of the population and business activity in country. Deficit financing, which is the main reason for the growth of the national debt, involves government borrowing on the financial market. As a result, the interest rate (i.e. the price of money) rises, which in turn leads to a reduction in investment in the production process.

It is worth noting that, from the standpoint of international creditworthiness, not only the total amount of government debt but also the share of external debt in it is dangerous. If share of external debt is significant, it indicates a high dependence of the state on foreign creditors, which can dictate their own conditions when attracting loans and, as a consequence, affect internal and external policies of the government. In this case, the national interests of the state may be jeopardized.

If we consider all OECD countries as a whole, it is possible to calculate and track the level of debt security in dynamics. Results of calculations are shown below.


Fig. 7. Dynamics of debt security in OECD countries in 2005-2018

It can be seen from the figure that the level of debt security of the OECD countries was the highest in 2006-2007 during analysed period, and further there is a significant fall. It is noteworthy that even in 2018 debt security of these countries did not reach its pre-crisis level.

Based on the research findings that show a very high level of correlation between debt and economic security, we can conclude that the overall trend in economic security of the OECD countries looks similar over the period.

Given the significant impact of debt security on the economic security, which was proven during the study, it is important to increase the effectiveness of government debt management policies and their transparency. Thus, at government level, it is necessary to:

– to develop public debt management strategy taking into account macroeconomic forecasts and budgetary policy objectives;

– to improve legal security of government debt (by establishing its safe levels, at which state can fulfill its obligations in a timely and full manner);

– to prefer long-term borrowing in order to minimize peak loads during debt repayment and reduce government debt service costs;

– to optimise structure of national debt, in particular by gradually decreasing share of foreign debt, which will reduce the dependence of the state on foreign creditors;

– to control over the targeted use of funds received under state guarantees by economic entities.

Despite the completeness and significance of the results obtained, the direction for further research is to expand and to change the sample of countries. The impact of national debt on economic security was determined based on data from OECD countries, the vast majority of which are developed countries. An appropriate relationship with the sample of developing countries should also be explored. In addition, it is important to improve and refine the integral indicator of the level of economic security of the state, which is a universal tool for international comparison, in particular by expanding the list of indicators for more detailed disclosure of one or

another component of economic security. Equally important is the involvement of more experts in the application of the hierarchy analysis method, that will allow us to obtain more accurate and equitable weighting values.

## CONCLUSIONS

As a result of the research, the following conclusions can be drawn:

1. The concept of “economic security of state” is identified as a state of national economy which allows to remain resilient to internal and external threats, to provide high competitiveness in the world economic environment and characterise the ability of national economy to sustainable and balanced growth. The functional components of economic security of state include industrial, demographic, energy, foreign economic, investment and innovation, macroeconomic, food, social and financial security. It was found that economic security is of paramount importance in the national security of state.

2. It is determined that debt security consists in effective management of government debt and keeping it at an optimal level, that does not pose a threat to public finances and the economy as a whole. Debt security as a factor in ensuring stability, solvency, state sovereignty and financial independence of country, has been identified as one of the fundamental factors for economic security.

3. There are the following theories and scientific concepts underlying the issue of government debt and state budget deficit:

– social choice theory, which defines the “fiscal illusion” and Keynesian economic policy as the main reasons for the budget deficit;

– overlapping generations model (the Samuelson-Diamond model) stating that government should maintain a negative level of public debt in the long run period to guarantee the economic security of state;

– the Ricardo-Barro equivalence hypothesis, according to which the increase in government spendings leads to debt accumulation and has negative effect on current consumption and investments, that counteracts a positive effect on economic growth;

– safe asset provision theory implies that government debt should be increased only in response to rising the income risk;

– dynamic efficiency theory argues that increase in government debt may be the optimal solution in the case of capital overaccumulation to stabilise the macroeconomic situation.

4. As a result of the analysis of trends in the volume of government debt at the international level, it is found that the growth of government debt in many countries is rather a rule than an exception. It is proved that the problem of government debt growth is relevant not only for developing countries and countries with economies in transition, but also for the United States and other highly developed countries, thus, it is an economic problem on a global scale.

5. Two main approaches to determining the level of economic security of state have been considered: calculation of the integral indicator, the methodology of which is designed by the Ministry of Economic Development of Ukraine, and calculation of the Global Competitiveness Index developed by the World Economic Forum (WEF). The first approach is to calculate the 9 aforementioned components of economic security and their weighting factors. The most significant is the financial security which determines 12.94% of the overall value of economic security of state, then – macroeconomic security (12.24%), industrial security (12.18%) and others. Financial security includes banking security, non-banking financial sector security, debt security, budgetary security, currency security, and monetary security. The Global Competitiveness Index is based on 12 parameters, divided into 4 groups, which characterise the country's competitiveness including enabling environment, human capital, markets and innovation ecosystem.

6. For the construction of the integral indicator, 5 main components of the country's economic security were identified: human capital, international competitiveness, macroeconomic situation, debt security and investment climate. The weights for each component are set at 0.20. A pairwise comparison of factor indicators was performed using the analytic hierarchy process method. Based on the reasonable interdependencies of indicators, the matrices of weights for components that affect the

economic security were developed. According to pairwise comparisons of indicators, their weight values were determined using 4 methods of information processing.

7. The integral indicator of the economic security level for OECD countries has been calculated. To analyse the results obtained, the countries were divided into 6 groups using Sturges rule. According to the integral indicator developed, the most economically secured countries are the following: Iceland (ISL), New Zealand (NZL), Republic of Korea (KOR), Switzerland (CHE), Ireland (IRL), Luxembourg (LUX) and others. The rating is closed by Greece (GRC), Ukraine (UKR), Italy (ITA) and Mexico (MEX) with a significant deviation from the upper sample values.

8. The study of the interconnection between government debt and economic security has found that effective management of government debt is one of the key factors for ensuring a high level of economic security of state. The dynamics of the economic security level was investigated for the mentioned countries. The level of debt security of the OECD countries peaked in 2006-2007 with a further significant drop. It is worth emphasizing that even in 2018, the index has not reached its pre-crisis level. Considering the strong correlation between debt and economic security, we can conclude that level of economic security is gradually declining over the past years in OECD countries.

9. Based on the results of the research on the existence of a close relationship between the government debt and level of economic security of state, recommendations were made to improve the effectiveness of government debt management and to increase its transparency: improving the legislative provision for establishing a secure debt level, giving preference to long-term borrowing, optimisation the structure of government debt, etc.

## АНОТАЦІЯ

Колбудський І.О. Вплив державного боргу на економічну безпеку держави. – Рукопис.

Магістерська робота на здобуття освітнього ступеня магістра за спеціальністю 072 «Фінанси, банківська справа та страхування» – Чорноморський національний університет імені Петра Могили, Миколаїв, 2020.

У роботі здійснено аналіз теоретичних підходів до визначення поняття «економічна безпека держави». Розглянуто основні методики розрахунку її рівня. Розроблено універсальний інтегральний показник рівня економічної безпеки держави, здійснено розрахунок відповідного показника для України та держав-учасниць ОЕСР. На основі отриманих даних зроблено міждержавний порівняльний аналіз рівнів економічної безпеки. Досліджено характер впливу державного боргу на економічну безпеку держави.

Ключові слова: економічна безпека держави, національна безпека, державний борг, людський капітал, міжнародна конкурентоспроможність, макроекономічна ситуація, боргова безпека, інвестиційний клімат.

## ANOTATION

Kolbudskyi I.O. Impact of Government Debt on the Economic Security of State. – Manuscript.

Master’s thesis for a Master’s Degree in Specialty 072 “Finance, Banking and Insurance” – Petro Mohyla Black Sea National University, Mykolaiv, 2020.

The research analyses theoretical approaches to defining the concept of “economic security of state”. The main methods of calculating its level are considered. A universal integral indicator of the level of economic security of state was developed and calculated for Ukraine and OECD countries. Based on the data obtained, the interstate comparative analysis of economic security was made. The nature of influence of government debt on the economic security of state was investigated.

Keywords: economic security of state, national security, government debt, human capital, international competitiveness, macroeconomic situation, debt security, investment climate.