“Assessment of government debt security of emerging markets: theory and practice”

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ASSESSMENT OF GOVERNMENT DEBT SECURITY OF EMERGING MARKETS: THEORY AND PRACTICE

Abstract

This study came to inspect a new approach to the government debt security assessment based on the systematization of indicators in terms of four directions: solvency, liquidity, domestic indebtedness, and external indebtedness. The proposed methodology considers the weaknesses, which negatively affect the level of government debt security.

It was established that in 2014–2016 the level of security at emerging markets was the worst. The main reason was insufficient solvency. Also, the obtained results showed that the general assessment of domestic indebtedness in recent years had a more dangerous level than the external one. In addition, it was revealed that similar problems with the level of debt burden are also presented in the EU countries since the value of the analyzed indicator – general government debt to GDP – exceeds 60%.

It is recommended to consider the experience of debt management reform of new members of the EU and, at the same time, post-socialist countries by other emerging economies.

Keywords government debt security, solvency, liquidity, domestic indebtedness, external indebtedness, emerging markets

JEL Classification F15, F34, F52

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INTRODUCTION

In contemporary conditions of uncertainty, public debt is constantly burdened with risk, which indicates the existence of a real threat to government debt security. It should be noted that despite the many negative aspects and the consequences of using the state borrowings, they remain the most effective and popular way of financing the budget deficit.

This statement provides real grounds for considering such a problem as "government debt security" and, as a result, economic security and macroeconomic situation of the country in general.

It should be noted that the main factors influencing debt security are the volume of public debt, its structure and dynamics, political and economic stability of the country, normative legal support of the state debt, exchange rate and its stability, level of economic development of the country, economic reforms, and process of global integration.

So, there is no single approach to the analysis and assessment of debt security globally, each country uses a certain set of indicators, but their limits are not clearly defined by law, and they vary due to the different economic situation. Moreover, some methodologies are outdated and require a differentiated approach to the assessment.

Hence, the above-presented emphasizes the necessity of providing the new methodological bases of estimating the government debt security of the emerging markets within the integrated environment.

1. LITERATURE REVIEW

Before proceeding to the analysis of the essence of the debt security, it is necessary, firstly, to investigate the content of the term "safety," which is definitely related to the term "security".

According to Kunev (2007), the term "safety" usually means the absence of danger (unacceptable risk) associated with the possibility of causing any damage to the system. The term "safety" has a Greek origin and means "owning the situation." According to the theory of motivation given in the writings of researcher A. Maslow (1954), safety is one of the main conditions in the hierarchy of human needs and exists along with physiological needs such as food, clothing, etc.

"Security" means feeling safe, protected, free from danger, or risk. Also, security refers to all the measures that are taken to protect a place (Collins Dictionary, n.d.). With the emergence of national states and the increasing role of international relations, security is considered as national security. English philosopher and political thinker Hobbes ((1909 ed.) [1651]) states that national security is not just a center of state activity; it is the main meaning of the state's existence. Thus, it is believed, in general, that it is impossible to imagine the existence of any state without it. In the modern world, national security is also the greatest value for ensuring an independent statehood.

The concept of "national security" was firstly introduced by President T. Roosevelt in 1904. Since then, mainly from a military and political point of view, in the United States and other Western countries, one understands national security as state resulting from the implementation of defensive measures that increase the state's security against hostile acts or other types of external interference. Security is also considered as a set of measures taken to protect against any external influence aimed at disrupting the functioning of the object.

As an integral part of the national security of the state there should be considered economic security, which is defined as the protection of the vital interests of each citizen, society, and state. The Constitution of Ukraine (1996) states that along with the protection of the sovereignty and territorial integrity of Ukraine, the most important function of the state is to ensure its economic security. It should be added that nowadays, in the time of the permanent process of globalization and integration, the importance of maintaining economic security becomes extremely important.

It should be added that in the works of Western economists, financial security is effectively identified with financial stability at the macroeconomic level. In the narrow sense, financial security is defined as the reliable security of the financial system from internal and external threats. Thus, the stability of the financial system is considered as the basis of financial security.

The primary task of the country's economic policy, from the standpoint of the stability of its financial security, is to manage and service the country's public debt. The close relationship between the economy of each country and the world requires constant monitoring of destabilizing factors, which today, in the conditions of export orientation of the country, negative balance of payments, inefficiency of budgetary relations, cooperation with the IFIs permanently threaten the strength of the financial system. Thus, the issue of providing and creating sufficient and also reliable level of debt security becomes more and more relevant.

Hence, according to the abovementioned analysis, it is required to establish the relationship and to determine the place of debt security in the overall structure of security (Figure 1).

It is believed that in the conditions of unstable economic situation, it is necessary to consider the approach that allows estimating current financial condition, existing and potential threats to security, to identify the influence of indicators stimu-

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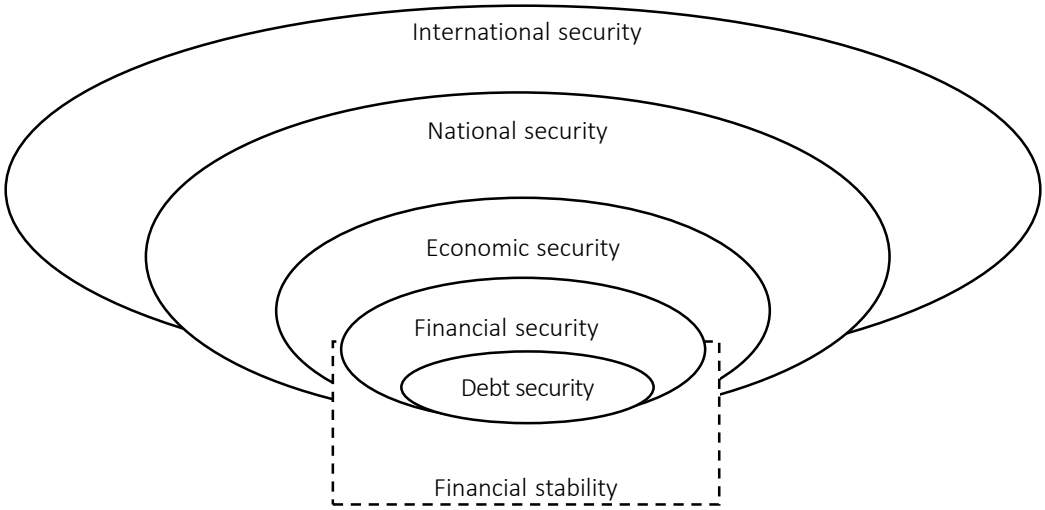

Figure 1. Establishing the government debt security place in the overall structure

lants and disincentives on the level of the security (Ryabushka & Pavelka, 2015).

However, there is still no single approach to the mechanism of the essence of debt security among scientists. Discussions are ongoing on the methodology and list of indicators for assessing debt security and their thresholds.

The most well-known approaches of calculating the debt security indicators are developed by the International Monetary Fund (2006) and the World Bank (2017). It should be noted that they vary both in terms of the number of indicators and their thresholds. In Ukraine, the calculation of the government debt security indicators is based on the use of Methodological Recommendations for Calculating the Level of Economic Security of Ukraine (Ministry of Economic Development and Trade of Ukraine, 2013), but this standard is not perfect; therefore, correction is necessary.

According to the methodology of the IMF, twelve indicators are included. At the same time, the management of the World Bank proposes a system of indicators, which consists of nine indicators. Most of them are used as a basis for the calculation of the government debt security index in Ukraine (Table 1).

In Ukraine, the Ministry of Economic Development and Trade developed an approach for calculating the level of financial and economic security of the country, and it includes the components of banking, non-bank, debt, budget, currency, and monetary security. An important component of financial security is a debt security. From 2007 till 2013, there were considered nine official indicators of the level of Ukraine's debt security, which were approved in Methodology for Calculating the Level of Economic Security of Ukraine (Ministry of Economy of Ukraine, 2007). This approach has logical-mathematical and methodological support.

Today, new indicators have been developed that reflect the debt situation, which are calculated in accordance with an approach proposed by the Ministry of Economic Development and Trade of Ukraine (2013), and it contains five indicators.

To assess the level of debt security, economists often use such a criterion as the ratio of total public debt to GDP. It should be noted that there are different approaches to defining the boundary value of the ratio of public debt to GDP. According to the Recommendations for Calculating the Level of Economic Security of Ukraine, the critical value is considered to be set at the level of 60%. The analysis showed that, in the requirements of the IFIs, in particular, in the Memorandum on Cooperation with the IMF, the state debt of Ukraine should not be greater than 35-40% of GDP. It should be noted that the critical value of this coefficient in the Budget Code of Ukraine (2010) is also set at 60%.

Table 1. Comparison of the approaches to the government debt security indicators' assessment

Source: International Monetary Fund (2006), Ministry of Economic Development and Trade (2007, 2013), World Bank (2017).

No.	Debt security indicators by the Ministry of Economy of Ukraine (2007)	Debt security indicators by the Ministry of Economic Development and Trade of Ukraine (2013)	Debt safety indicators developed by the World Bank	Financial soundness Indicators developed by the International Monetary Fund	
1	The ratio of the total public debt to GDP, %	The ratio of the state and state-guaranteed debt to GDP, %	The ratio of total external debt to exports of goods and services	Interest service ratio	Solvency indicators
2	The ratio of total external debt to GDP, %	The ratio of gross external debt to GDP, %	The ratio of total external debt gross national product	External debt to exports	
3	The level of external debt per capita, US dollars	The average weighted yield of T-bills (government bonds) in the primary market, %	The ratio of total debt service to exports of goods and services	External debt over GDP	
4	The ratio of external debt to exports of goods and services, %	Index EMBI (Emerging Markets Bond Index) +	The ratio of total interest payments to gross national product	Present value of debt over exports	
5	Interest payments on external debt (% of exports of goods and services)	The ratio of official international reserves to the volume of gross external debt, %	The ratio of total interest payments to exports of goods and services	Present value of debt over fiscal revenue	
6	The ratio of external debt service payments (principal + interest) to the state budget revenue, %	–	The ratio of international reserves total external debt	Debt service over exports	
7	The ratio of domestic debt to GDP, %	–	The ratio of international reserves to imports of goods and services	International reserves to short-term debt	Liquidity indicators
8	The ratio of domestic debt service payments (principal + interest) to the state budget revenues, %	–	The ratio of short-term debt to total external debt	Ratio of short-term debt to total outstanding debt	
9	Outstanding domestic public debt securities to GDP, %	–	The ratio of multilateral debt to total external debt	Public sector debt service over exports	Public sector indicators
10	–	–	–	Public debt over GDP or tax revenues	
11	–	–	–	Average maturity of non-concessional debt	
12	–	–	–	Foreign currency debt over total debt	

This threshold is borrowed from the practice of the European Union and is set out in the Maastricht Treaty (1992), the basic economic agreement of the EU countries. However, for the developing countries, the highest safe level has set at 50% of GDP, as the range of commitments attributed to public debt in the European Union is broader than in other emerging markets.

2. METHODOLOGY

It is proposed to consider a new approach to assessment of the debt security index, taking into account international experience (Figure 2).

At the first stage, a system of groups of indicators is arranged in four directions of the government

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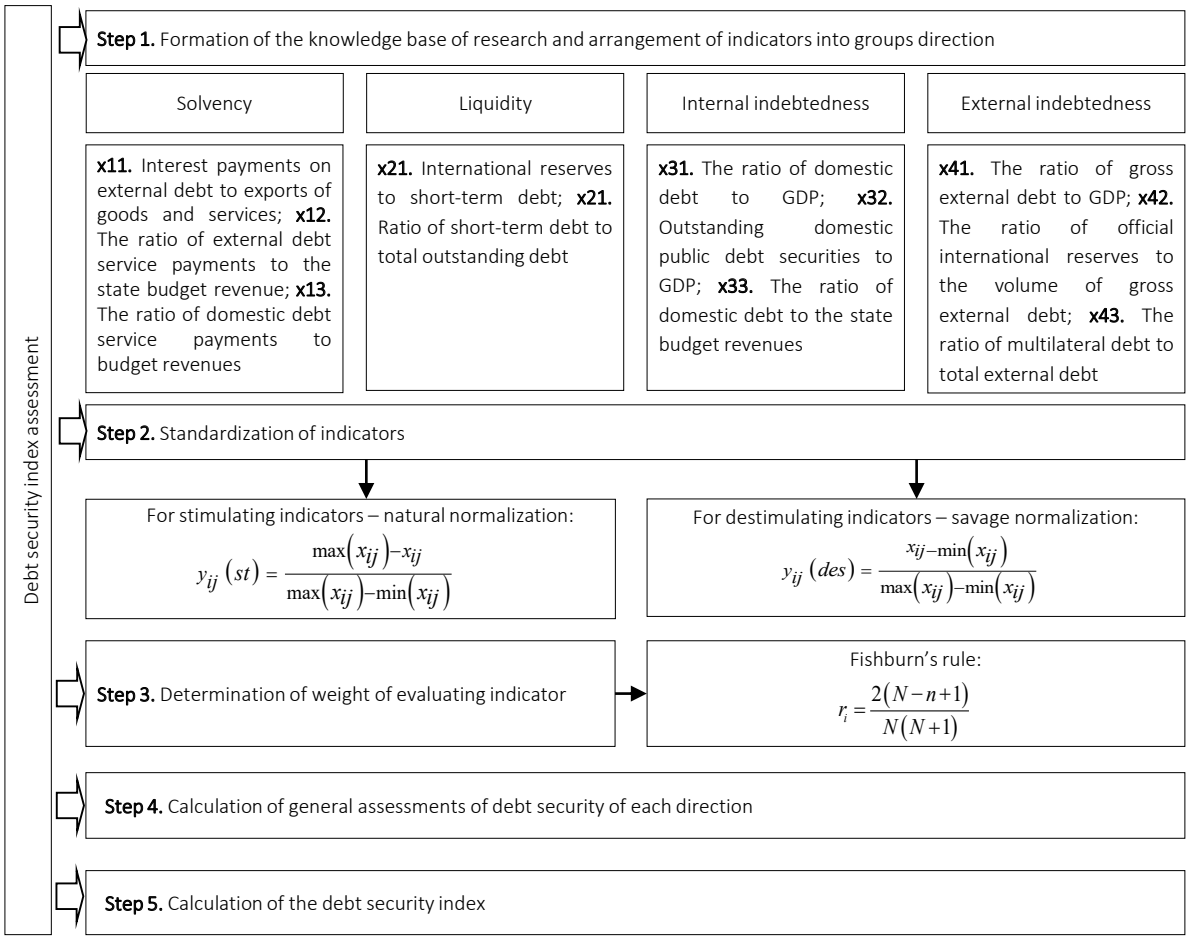

Figure 2. Conceptual framework for the assessment of the government debt security index

debt security: solvency, liquidity, internal indebtedness, and external indebtedness.

The second step is devoted to the normalization (standardization) of indicators. It should be noted that there are different effects of the indicators on the resultant index and have different measurement units. Hence, it was proposed to normalize the input database using two different approaches for standardization of data:

- for stimulating indicators – natural standardization:

$$y_{ij}(st) = \frac{\max(x_{ij}) - x_{ij}}{\max(x_{ij}) - \min(x_{ij})}, \quad (1)$$

- for destimulating indicators – savage standardization:

$$y_{ij}(des) = \frac{x_{ij} - \min(x_{ij})}{\max(x_{ij}) - \min(x_{ij})}, \quad (2)$$

where $y_{ij}(st)$ – standardized value of the stimulating indicator, $y_{ij}(des)$ – standardized value of the destimulating indicator.

Destimulating indicators include almost all coefficients except Greenspan indicator (the ratio of international reserves to short-term debt) and the ratio of the amount of official international reserves to the amount of gross external debt.

At the third stage, there should be made the determination of the importance of the characteristics of debt security, which is based on the Fishburn's rule:

$$r_i = \frac{2(N-n+1)}{N(N+1)}, \quad (3)$$

where r_i – weight of the indicator, n – rank of the indicator, N – total number of ranks (ranked criteria).

The fourth stage is called the calculation of general assessments of debt security in the following directions: internal indebtedness, external indebtedness, solvency and liquidity. At this stage, the calculations will be conducted using the following formula:

$$R_{kj} = \sum_{i=1}^{n} y_{ij*} r_i, \quad (4)$$

where R_{kj} – debt security index, k – total number of groups (directions) of general assessments of debt (in this case – 4).

Final stage is devoted to the calculation of the government debt security index. It is assumed that the weight of the general assessments of internal debt, external indebtedness, solvency and liquidity will be the same. Thus, the following formula will be used:

$$I_x = \sqrt[4]{R_1 \cdot R_2 \cdot R_3 \cdot R_4}, \quad (5)$$

where I_x – the government debt security index.

3. RESULTS AND DISCUSSION

In order to conduct the present study, one needs to draw on information from different methodologies, hence, to compare them and indicate the main problem of the study.

The calculation of these indicators was carried out according to the approaches for calculating the level of economic security, approved by the Ministry of Economy (2007) and the Ministry of Economic Development and Trade of Ukraine (2013).

3.1. Analyses of debt security indicators of Ukraine (approach of the Ministry of Economy)

The calculated values of the country's debt security indicators during the analyzed period of 2006–2016 are given in Table A1. It is worth paying attention to the fact that this approach determines the optimal level of the ratio of the total public debt to GDP at 55%. There was indicated a dangerous increase in the level of debt load (81%) in the last year compared to 2006, and it exceeds the normative value.

A similar situation is observed with external debt – there was a sharp increase in the level of external debt in relation to GDP, and the value of this indicator exceeded the critical level of 25%, and in 2010, the maximum value was fixed in 2015 – 52.7%.

It was also investigated that in 2016, there was an increase in the volume of domestic debt to GDP. However, this value did not exceed the permissible norm of 30%. In 2010–2013, the ratio varied between 13 and 17%, not exceeding the norms. The change took place in 2014 when the indicator was almost 30%. In 2015, there was a decrease (by 5%).

The value of the indicator of the level of external debt per person had a steady tendency to increase, ranging from USD 270 to USD 1,068. It is worth noting the fact that the indicator exceeded the threshold even in the pre-crisis period of 2007.

The general trend in the dynamics of changes in the ratio of external debt to exports and imports of goods and services shows that, in general, during 2006–2014, the value of the indicator was not stable. In 2015, the situation changed somewhat when the value reached almost 72%.

As for the ratio of the amount of interest payments on external debt servicing to the annual exports of goods and services, a similar tendency is observed there. However, it should be noted that the value of the indicator increased from 0.9% to 2.83% over the period, i.e., it increased almost three times.

It should be noted that the level of government debt on government securities to GDP almost reached its critical value in 2014 and reached a mark of 29.42%. This indicator reflects the level of development of the debt securities market in the country and their percentage in the total amount of public debt to GDP. This situation indicates an ineffective state policy on the government securities market.

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3.2. Analyses of debt security indicators of Ukraine (approach of the Ministry of Economic Development and Trade)

The analysis showed that the ratio of public and guaranteed debt to GDP was quite critical, since 2009, the indicator exceeds the permissible level of 70%, and in 2015, it was 144% (Table A2).

As for the estimation of the average weighted yield of T-bills (government bonds) in the primary market, during the investigated period, the value of this parameter almost constantly exceeded the permissible level set. The situation improved in 2016 when the value reached 9%.

The research showed that the EMBI index for 2006–2016 was consistently within the permissible limits and did not exceed 1,000, although in 2012, its value almost reached the critical point.

It should be noted that the proper level of the official international reserves is a positive sign of the country's solvency. As can be seen from Table A2, the dynamics of the ratio of the amount of official international reserves to the amount of gross external debt deteriorated since 2012, when the value of the indicator was 17%; however, in 2014, the critical level of this indicator was fixed, which was almost on 14% lower than the normal level 5.96%.

Thus, one can conclude that the main reasons for such a critical situation with indicators is the instability, both political and economical in the country, which adversely affects almost all the components of the country's debt security.

3.3. Integrated index of Ukraine's debt security

Based on these methods, indexes of Ukraine's debt security during 2006–2016 were calculated. The evaluation results are shown in Figure 3.

It should be noted that the calculated values of the indices were quite different. Furthermore, the approaches do not allow determining the key factors of the low level of government debt security.

One should conclude that during the analyzed period, the integral indexes in both methods have a negative tendency. Consequently, during the last years there is a threatening situation.

It is worth noting that to date, the methodology for calculating the level of the government debt security is imperfect.

3.4. Assessment of the debt security index, taking into account international experience

Hence, the obtained results prove the imperfection of both systems, and there is a need to consider a new proposed approach to the assessment of debt security index, taking into account international experience. The calculated values of the country's debt security indicators during the ana-

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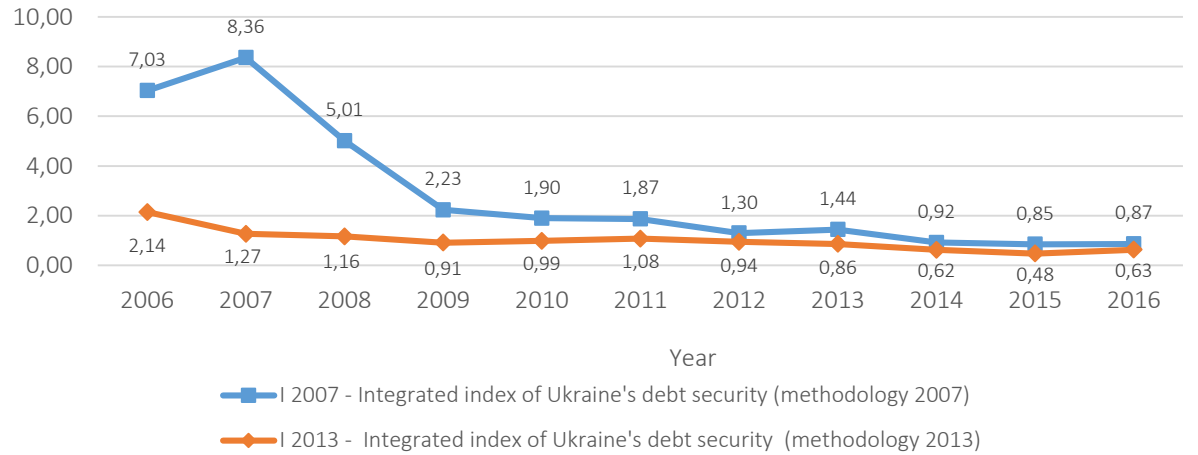

Figure 3. Integral index of Ukraine's debt security

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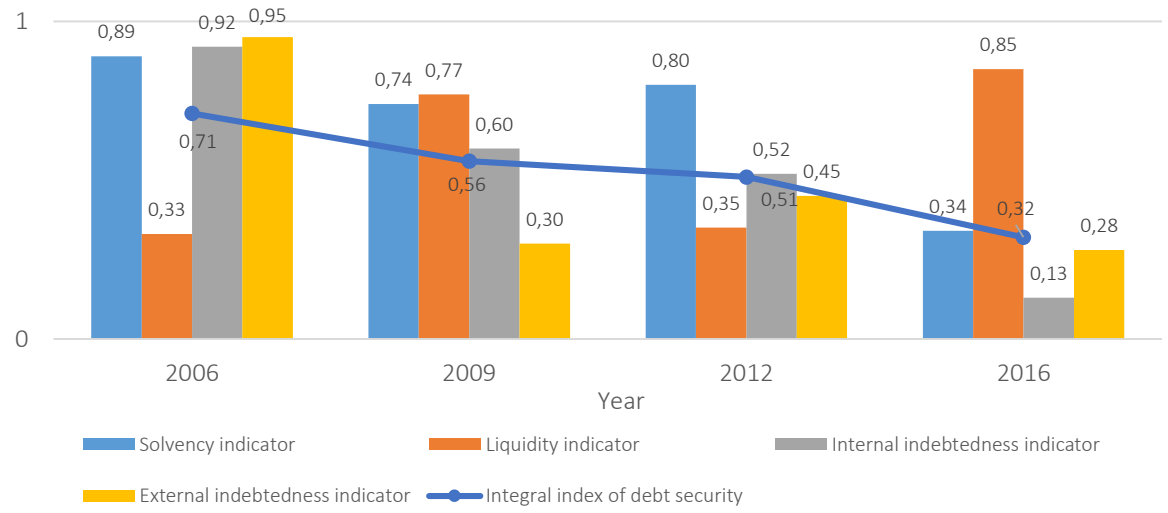

Figure 4. Dynamics of the general assessments and the integral index of the government debt security during 2006–2016

lyzed period of 2006–2016 are given in Table B1. According to the proposed approach, the general assessments in terms of studied directions and the integral index of debt security in Ukraine are depicted in Figure 4.

The diagram reveals that the lowest level of safety was in the last 3 years during the analyzed period, and, compared to the pre-crisis 2008 year, this integral index decreased by 0.5 percentage points. The main reason is insufficient solvency. It should be noted that general assessment of domestic indebtedness in recent years (2014–2016) has a negative tendency, and it has a more dangerous level than the external one.

Thus, we can say that the proposed approach takes into account the weaknesses, which negatively affect the level of government debt security.

The problem of government debt growth is a widespread phenomenon in the world. This situation is typical for both advanced and as emerging economies (Table 2).

The data show that among emerging markets, Ukraine has the highest debt burden level, especially during the last three years. The reasons for such a situation are deep economic and political crisis, which was caused by the long-standing military conflict and the annexation of the

Table 2. General government gross debt in emerging economies, % of GDP, 2006–2016

Source: World Bank, Eurostat (2018).

Country	Year										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Belarus	7.9	8.9	10.7	19.2	18.9	39.4	24.4	23.8	24.6	37.6	40.2
Georgia	27.9	22.7	27.0	34.6	36.8	32.5	32.5	33.9	35.4	41.3	44.4
Hungary	64.6	65.6	71.6	77.8	80.5	80.7	78.2	76.6	75.7	74.7	74.1
Latvia	9.9	8.4	18.7	36.6	47.4	42.7	41.2	39.0	40.9	36.5	40.1
Poland	46.9	44.2	46.3	49.4	53.1	54.1	53.7	55.7	50.2	51.1	54.4
Russia	9.9	7.2	6.5	8.7	9.1	8.6	8.5	9.1	11.2	13.5	14.2
Ukraine	14.8	12.3	20.0	34.8	39.9	35.9	36.6	40.2	70.3	79.4	81.0
Estonia	4.4	3.7	4.5	7.0	6.6	6.1	9.7	10.2	10.7	10.1	9.5
Bulgaria	21.0	16.3	13.0	13.7	15.3	15.2	16.7	17.0	27.0	26.0	29.5
Moldova	29.2	23.2	18.4	27.6	26.3	23.8	24.3	23.7	24.8	25.3	38.3
Czech Republic	27.9	27.8	28.7	34.1	38.2	39.8	44.5	44.9	42.2	40.3	37.2
Lithuania	17.2	15.9	14.6	28.0	36.2	37.2	39.8	38.7	40.5	42.7	40.2
Croatia	38.6	37.2	39	48.3	57.3	63.8	69.4	80.4	84	83.7	80.2

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Autonomous Republic of Crimea; corruption schemes with borrowed public funds; non-investment direction use of credit sources and, as a result, accumulation of new debt obligations.

It should be noted that the increase in debt burden in emerging markets can be explained by various reasons, among which particular attention should be paid to macroeconomic instability, long-term restructuring of the national economy of these countries, and imbalance in the financial sector. All this led to the objective need to attract additional funds in foreign markets.

Similar problems with the level of debt burden are also presented in the EU countries since the value of the analyzed indicator – gross government debt to GDP – exceeds 60%. In general, in the EU, there is a different tendency: in Estonia, it is 9.5%, and in Greece, there is a trend towards increasing a debt burden (179%). As the value of the presented indicator varies, there should be determined the groups of countries by their debt burden in 2016.

The Sturges' rule helps to find out the optimal number of groups and help to make an accurate representation of the distribution of the data:

$$m = 1 + 3,322 \log n, \quad (6)$$

where m – number of classes, n – size of the data.

It was found there are five defined groups: countries with low level of debt burden, permissible level, average level, high level, and crisis level. The results are presented in Table 3.

Table 3. General government gross debt to GDP ratio in European countries in 2016

Source: Eurostat (2018).

No.	Group	Country
1	Low level (up to 10%)	Estonia
2	Permissible level (from 11 to 52%)	Bulgaria, Czech Republic, Denmark, Latvia, Lithuania, Luxembourg, Romania, Sweden, Slovakia
3	Average level (from 53 to 94%)	Austria, Croatia, Finland, Germany, Hungary, Ireland, Kingdom, Malta, Netherlands, Poland, Slovenia, United
4	High level (from 95 to 137%)	Belgium, Cyprus, France, Italy Portugal, Spain
5	Crisis level (more than 138%)	Greece

It should be stated that a significant number of countries belong to the category of the group with the average level of public debt to GDP: Croatia, Poland, Slovenia, Hungary, Germany, etc. Ukraine can also be attributed to this group with a level of 81% in 2016. It should be mentioned that the Czech Republic as a member of the EU, and, the same time, the post-socialist country, is classified as the country with a permissible level of debt burden.

Taking into account the EU integration processes in Ukraine, there is a need to conduct a comparative analysis of debt burden situation with East European countries.

Admittedly, the experience of debt management reform of the Czech Republic can be considered by other emerging markets in transition (e.g., Ukraine).

Figure 5 shows the dynamics of the debt burden index in Ukraine and the Czech Republic in the period of 2006–2016.

The data analysis of the public debt to the GDP, shown in Figure 5, gives an opportunity to conclude the following: in Ukraine during the given period, the level of debt load rapidly increased from 14.8 percent of GDP in 2006 to 81.0 percent of GDP in 2016. A quite sharp change was observed in 2014. The situation was caused by the unofficial war in eastern Ukraine since 2014 with Russia. Also, severe tensions might be raised because of persistent debt controlling by foreign creditors, such as IMF.

In contrast, at the beginning of the analyzed period, the Czech government debt was established at the level of 27.9, reached its maximum in 2013 – 44.9, and dropped annually to 37.2 percent of GDP in 2016.

It is worth to pay attention to the fact that, along with the public debt to GDP in international practice, the indicator of the ratio of external public debt to GDP is often used. Data presented in Figure 6 show that within the overall period 2006–2016 in Ukraine was observed the same tendency – the value of this parameter was higher than in the Czech Republic. It tells about active foreign borrowing policy in Ukraine and cooperation with IFIs.

Source: CEIC (2018).

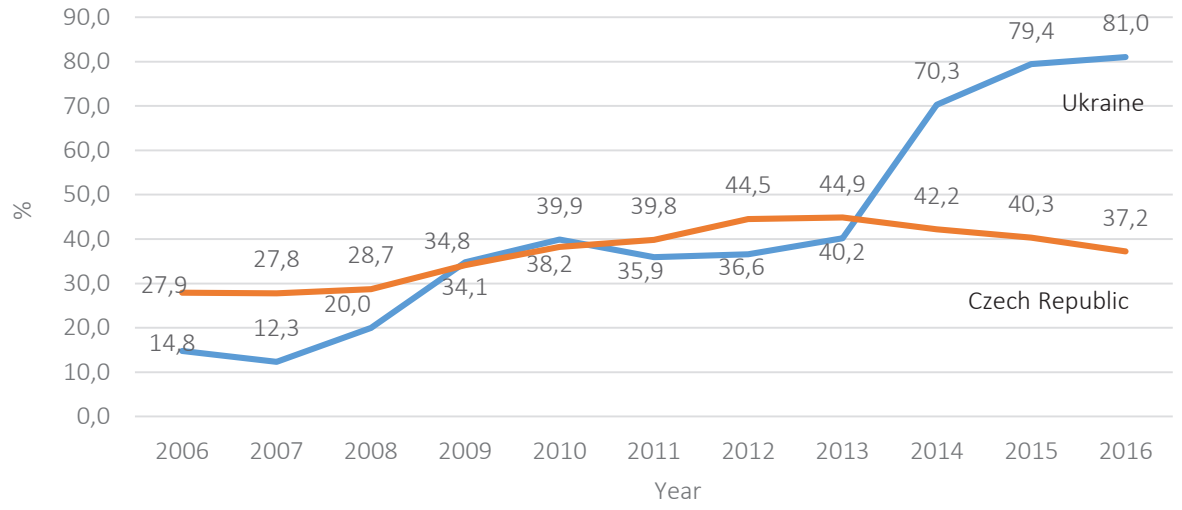

Figure 5. The ratio of government debt in Ukraine and the Czech Republic, % of GDP, 2006–2016

Meanwhile, the Czech Republic conducted a cautious policy relating to structural adjustment programs, foreign debt relief and had no problems with external debt. Positive results in debt management in this country have been achieved through the active and consistent implementation of programs of the international financial institutions and timely financial assistance.

The primary task of the debt policy in the Czech Republic was to develop appropriate national fiscal stabilization programs, and the introduction of such tool as a medium-term public debt management strategy enabled, especially after joining the EU, to reduce debt risks, improve debt structure and keep a safe level of the debt burden.

In order to strengthen government debt security after joining to the EU, some post-socialist new EU member countries had to apply for the following tools:

1) increase of domestic borrowings in the national currency: in some countries, this share was up to 70% in the debt structure;

2) reduction of the proportion of short-term debt instruments: since the cost of servicing the short-term securities portfolio is more sensitive to changes in interest rates during the period of market destabilization, the issue of long-term bonds allowed distributing future debt obligations on the longer interval;

Source: CEIC (2018).

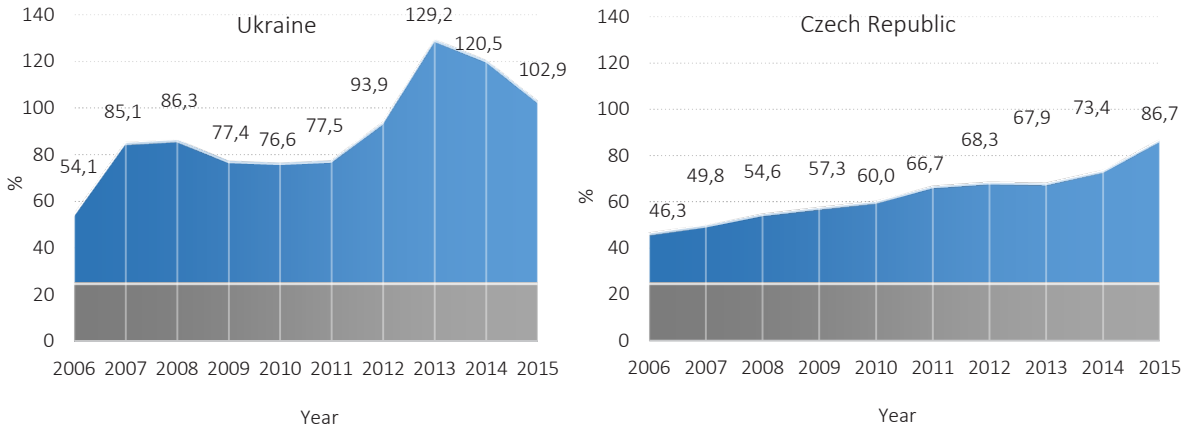

Figure 6. The ratio of external debt in Ukraine and the Czech Republic, % of GDP, 2006–2016

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3) strengthened control over the debt policy at the local level, and implemented systematic measures in the framework of medium-term public debt management strategies: during the accession to the EU, the volume of local debt of new member did not exceed 2% of GDP, but in subsequent years their debt policy at the local level significantly increased the burden on the local budget. The EU has initiated the discussions on the possibility of developing the regulations that will impose appropriate restrictions and allow them to keep debt burden at an acceptable level;

4) centralization of monitoring: post-socialist new EU member countries created and improved their debt risk control systems in accordance with the IMF developed methodological principles, including the widespread use of the stress test of the debt portfolio based on the economic and financial shocks, to which the country potentially exposed;

5) regulation of quasi-fiscal operations and state-guaranteed debt: activation of the use of the instrument of a state guarantee in the early 2000s was aimed at the economic and social alignment between the old and new members of the EU. In particular, financing of the infrastructure's modernization in the field of telecommunications and road infrastructure through the public-private partnership instrument (PPP) allowed the Czech Republic, Estonia, Poland to reach the level of other EU countries in the short term.

Hence, recommendations can be useful for future consideration and practical implementation by East European countries, which have the EU integration orientation and still have debt burden problems.

CONCLUSION

According to the abovementioned analysis, the relationship and place of debt security in the overall structure was established. The primary task of the country's economic policy, from the standpoint of the stability of its financial system, is to manage the government debt. However, there is still no single approach to the mechanism of the assessment of debt security among scientists; discussions are ongoing on the methodology and list of indicators for debt security's calculation and their thresholds.

In this paper, new approach to the assessment of debt security was introduced, taking into account international experience. The following case study is based on the analysis of data of emerging markets and European countries in a period of 2006–2016. The results indicate that during the investigated period in 2014–2015, the level of security was the worst. The main reason is insufficient solvency. It should be noted that the overall assessment of domestic indebtedness in general over the past years has had more dangerous level than the external one. Thus, the proposed approach takes into account all weaknesses and indicates the factors of negative impact on the level of government debt security.

The analyzed data indicate that the debt situation in 2016 in most EU countries is threatening since the ratio of government debt to GDP exceeds 60%. Taking into account the EU integration processes in Ukraine, it is proposed to conduct a comparative analysis of debt burden situation with East European countries, which are the members of the EU (e.g., the Czech Republic).

The analysis shows that the ratio of the public debt to the GDP gives an opportunity to conclude the following: in Ukraine during the given period, the level of debt load rapidly increased from 14.8 percent of GDP in 2006 to 81.0 percent of GDP in 2016. A quite sharp change was observed in 2014. The situation was caused by the unofficial war in eastern Ukraine since 2014 with Russia. Also, severe tensions might be raised because of persistent debt controlling by foreign creditors, such as IMF.

In contrast, at the beginning of the analyzed period, the Czech government debt was established at the level of 27.9, reached its maximum in 2013 – 44.9, and dropped annually to 37.2 percent of GDP in 2016.

Obviously, the Czech Republic conducted a cautious policy relating to structural adjustment programs, foreign debt relief and had no problems with external debt. Positive results in debt management in this country have been achieved through the active and consistent implementation of programs of the international financial institutions and timely financial assistance.

Hence, it is recommended to consider the experience of debt management reform of new members of the EU and, at the same time, post-socialist countries by other emerging transition economies.

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APPENDIX A

Table A1. Results of calculation of the debt security indicators (methodology from 2007)

Source: Compiled by the authors.

Debt security indicators	Threshold	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
The ratio of the total public debt to GDP, %	< 55	14.80	12.31	19.98	34.81	39.93	35.94	36.59	40.19	70.26	79.40	80.97
The ratio of total external debt to GDP, %	< 25	11.75	9.70	12.35	23.18	25.56	22.74	21.92	20.67	39.06	52.66	52.03
The level of external debt per capita, US dollars	< 200	270.61	297.77	385.82	575.83	757.77	820.13	847.93	827.13	887.64	1013.83	1068.81
The ratio of external debt to exports of goods and services, %	< 70	20.27	17.25	13.54	32.69	34.80	29.30	30.21	34.18	47.10	71.89	78.44
Interest payments on external debt (% of exports of goods and services)	< 12	0.90	0.84	0.67	1.08	0.90	1.14	0.00	1.61	2.10	2.55	2.83
The ratio of external debt service payments (principal + interest) to the state budget revenue, %	< 20	5.92	4.04	2.29	8.49	4.86	6.71	8.70	14.30	19.35	65.85	6.85
The ratio of domestic debt to GDP, %	< 30	3.05	2.47	4.71	9.97	13.09	12.26	13.51	17.66	29.42	25.66	28.14
The ratio of domestic debt service payments (principal + interest) to the state budget revenues, %	< 25	3.74	1.87	1.94	10.78	12.72	15.13	10.98	19.37	28.76	28.30	27.03
Outstanding domestic public debt securities to GDP, %	< 30	1.42	1.26	3.08	7.63	12.78	12.02	13.29	17.46	29.42	25.53	28.04

Table A2. Results of calculation of the debt security indicators (methodology from 2013)

Source: Compiled by the authors.

Debt security indicators	Threshold	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
The ratio of the public and guaranteed debt to GDP, %	< 60	14.80	12.31	19.98	34.81	39.93	35.94	36.59	40.19	70.26	79.40	80.97
The ratio of gross external debt to GDP, %	< 70	50.59	56.02	61.77	90.39	86.30	76.61	76.38	78.05	127.12	143.96	129.66
The average weighted yield of T-bills (government bonds) in the primary market, %	< 11	9.26	6.71	11.86	12.21	10.39	9.17	12.94	13.13	13.44	13.07	9.16
Index EMBI (Emerging Markets Bond Index) +	< 1000	536.80	607.96	634.10	695.65	798.09	866.87	992.03	967.30	954.36	–	–
The ratio of official international reserves to the volume of gross external debt, %	> 20	40.07	39.75	30.29	24.66	28.39	24.08	16.82	13.20	5.24	10.41	10.47

APPENDIX B

Table B1. Results of calculation of the debt security indicators (authors' approach)

Source: Compiled by the authors.

Debt security indicators	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Solvency											
Interest payments on external debt to exports of goods and services	0.90	0.84	0.67	1.08	0.90	1.14	0.00	1.61	2.10	2.55	2.83
The ratio of external debt service payments to the state budget revenue	5.92	4.04	2.29	8.49	4.86	6.71	8.70	14.30	19.35	65.85	6.85
The ratio of domestic debt service payments to the state budget revenues	3.74	1.87	1.94	10.78	12.72	15.13	10.98	19.37	28.76	28.30	27.03
Liquidity											
International reserves to short-term debt	146.98	157.08	155.38	139.05	135.10	100.89	78.57	58.71	37.15	78.27	97.01
The ratio of short-term debt to total outstanding debt	27.91	25.86	19.97	18.43	21.81	24.96	23.21	24.48	16.05	14.31	14.10
Internal indebtedness											
The ratio of domestic debt to GDP	3.05	2.47	4.71	9.97	13.09	12.26	13.51	17.66	29.42	25.66	28.14
Outstanding domestic public debt securities to GDP	9.26	6.71	11.86	12.21	10.39	9.17	12.94	13.13	13.44	13.07	9.16
The ratio of domestic debt to the state budget revenues	60.33	53.48	81.74	151.60	179.67	150.40	148.97	172.39	308.28	293.96	313.13
External indebtedness											
The ratio of gross external debt to GDP	11.75	9.70	12.35	23.18	25.56	22.74	21.92	20.67	39.06	52.66	52.03
The ratio of official international reserves to the volume of gross external debt	40.07	39.75	30.29	24.66	28.39	24.08	16.82	13.20	5.24	10.41	10.47
The ratio of multilateral debt to total external debt	25.89	23.45	23.85	49.85	45.68	43.08	38.29	27.73	34.79	40.81	37.94

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