THE STATE'S DEBT ACCEPTANCE CRITERIA IDENTIFICATION AND EVALUATION OF THEIR ACCEPTABILITY IN LITHUANIA

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Abstract. Debating the introduction of euro in Lithuania, the media and scientific literature have been analysing the rates of economic convergence. This article analyses the stability of the state's financial situation, questions the scientists' attitude towards the state's debt and presents the acceptability criteria of the state's debt. The correspondence of financial situation's stability indicators to acceptance criteria does not get enough attention in scientific works. The aim of this article is to explore the limits of Lithuanian borrowing, using the established criteria for the assessment of state's debt. The evaluation has revealed that the stability indicators of Lithuanian financial situation often do not correspond to the approved criteria. With the use of mathematical modelling, this article calculates the amount of acceptable state's debt during the selected period.

Keywords: debt, debt management, budget, deficit, government policy and regulation.
JEL Classification: H63, M68.

Introduction

State's borrowing is a tool of social economic policy. By managing debt, government, first of all, may support certain economic sectors or social groups by entering into indirect obligations, thus achieving its political objectives of the program.

In most of the countries across the world, state's borrowing is considered to be an imminent and irreprehensible phenomenon of economic development. In addition, business development opportunities in many cases depend on greater financial resources that are quite difficult to be formed by using own recourses, especially in developing countries (Kindsfaterienė and Lukaševičius, 2008). When an internal or foreign borrowing is being processed by public sector, capital recourses are being distributed among the countries. Economic theory suggests that government's borrowing may stimulate economic growth. However, there always remains a risk that public debt may become an unbearable burden for country's budget and country's economic development. Thus, country's borrowing is an issue of wide discussions.

Economic downturn has highlighted a rather different kind of problems in public finance sector. A difficult situation has formed in EU, where a number of euro zone countries are suffering from fiscal imbalances determined by the largest public debt in history. The year of 2009 can be defined as the beginning of public sector's financial problems in this region, when extremely high levels of budget deficit were recorded after the crisis had strongly reduced state revenues and increased costs, thus forcing governments to borrow. Growing debt levels have caused panic in financial markets (Vaicenavičius and Račickas, 2013). Therefore, country's borrowing in the present situation is inevitable, and for this reason its influence towards state's economy should be analyzed.

The essential purpose of public authorities is to ensure economic and political stability (Navickas and Malakauskaitė, 2008). Therefore, in case of limited financial recourses within the countries, the major influence on strengthening their financial systems, by providing the necessary funding, is being done by country's borrowing. Debt management policy is an integral part of country's general economic policy.

Theoretical aspects of public debt and various problematic aspects, related to Lithuania's borrowing have been discussed in the works of Levišauskaitė and Rūškys (2003), **Štu**opytė and Guzavičius (2008).

Authors of foreign countries discuss country's borrowing rates, reasons and consequences on the basis of their country's experience. It should be noted that the issue of country's borrowing has been emphasized by Mankiw and Taylor (2006), Blanchard (2007), Barro (2008), Krugman (1994, 1998, 2009), Zamkov (1997). On the other hand, these works lack of systematic and generalizing analysis on country's borrowing.

The *objective* of the article is public debt acceptability criteria.

The *aim* of the article is to analyze Lithuania's borrowing acceptability limits by using the defined public debt assessment criteria.

Research methods include the following: systematic and comparative analysis and summary of scientific literature, method of logical deduction, statistical benchmarking analysis, conclusions generation method, mathematical modelling, visualization techniques.

The scientific novelty of the article is reflected in the performed mathematical calculations. In scientific studies, the main focus is given to the prediction of state's debt. This article is a continuation of the previous author's scientific publications. The author previously predicted the possible amount of debt during the selected year or predicted period that was needed to achieve the relevant indicators. Currently, in the published scientific works, little attention has been paid to the analysis of the stability indicators of financial situation, and actually there are no scientific publications that evaluate the stability of state's debt using mathematical modelling. In addition, the article analyses the future, i.e., it evaluates the indicators predicted by the Ministry of Finance. Using this modelling, the possibility to adjust the predicted indicators is highlighted.

Methodological aspects of public debt assessment criteria

Public debt is one of macroeconomics analysis objects. Public debt is an integral part of state's functions, since the insufficient funding, necessary for state's functions implementation, can be identified as the main cause of public debt. Typically, most countries find their government budget in deficit rather than surplus, so that the amount of worldwide govern-

ment debt has been growing over time (Frederic, 2012). By assessing the effect of public debt
towards the economy, it is necessary to know how public debt is comprehended by different
scientists (see Table 1).

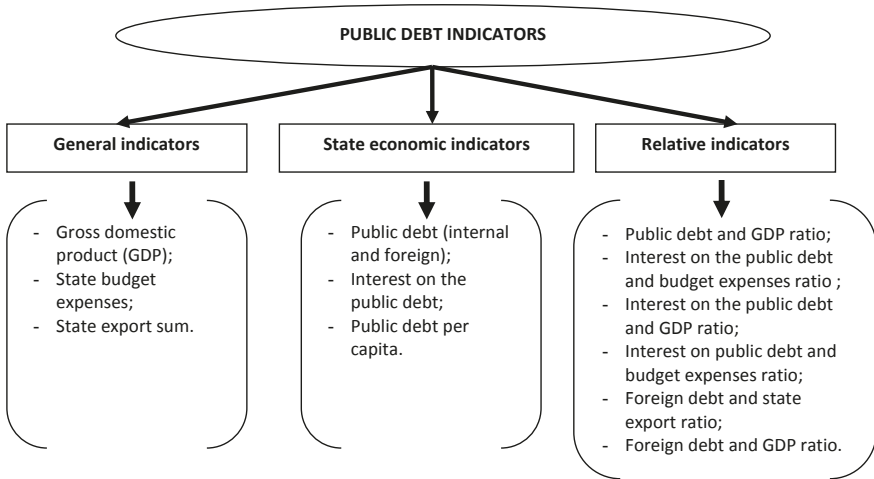**Table 1.** Concept of public debt, presented by different authors

Author	Concept of public debt
Public Debt Act of the Republic of Lithuania	Public debt – assumed, but not yet implemented obligations by, entitled to borrow, general government's entities, to repay creditors their funds, which have been borrowed by distributing Government's securities, by signing loan agreements, financial lease (leasing) contracts and other debt instruments, with a consolidated sum.
Levišauskaitė, K. and Rūškys, G. (2003)	Public debt is a sum of all issued and uncovered state loans along with accrued interests that must be paid on fixed time or before the deadline.
Snieška, V. *et al.* (2005)	Public (government) debt – debt of all government's levels during the financial year.
Mankiw N.G. and Taylor, P. (2006)	Governments finance budget deficits by borrowing in the bond market, and the accumulations of past government borrowing is called the government debt.
Blanchard, O. (2007)	Public debt is the amount of the reserve – current debt, which government has accumulated, because of the former deficit.
Štuopytė, Ž. and Guzavičius, A. (2008)	Public debt is the sum of government's non-refundable loans and unpaid interests for them, and other financial liabilities that the state has undertaken to its creditors.
Barro, J. R. (2008)	Public debt is the sum of state's debt securities, intended to finance a temporary lack of funds in the state budget.
Buškevičiūtė, E. (2008)	Public debt is specific crediting relationships, emerging among the entities, residents and state.
Davulis, G. (2009)	Public debt – the amount of state's total uncovered annual budget deficits.

Source: compiled by the author

The definitions of public debt, presented in Table 1, can be divided into two categories. The division can be processed, according to the emphasized subject, describing public debt. Authors, who define public debt as being related to budget imbalance, can be assigned to the first group; while authors, depicting the concept of public debt as the total amount of state's highest authorities' existing loans and their maintenance costs, can be ascribed to the second group. According to such grouping principal, Blanchard, Mankiw and Taylor, Davulis, Barro, and their definitions fall into the first category; and public debt definitions, provided by Levišauskaitė and Rūškys, Štuopytė and Guzavičiaus, Buškevičiūtė and Snieška, fall into the second one. The national debt is the stock of government bonds outstanding. It is the product of the past and current budget deficits. As the size of the debt increases, the amount of interest that must be paid on the debt tends to rise (Boyes and Melvin, 2008). It is important to accurately determine or predict annual growth rates of country's liabilities, budget deficit and the real GDP growth rates, when assessing debt acceptability. For this reason, the analysis of specific indicators is processed, which helps to assess county's financial stability, cost of funding sources, country's ability to cover liabilities and debt burden scale.

Public debt and its development tendencies are defined by public debt indicators (see Figure 1). Public debt indicators are expressed in absolute units and relative sizes.

Figure 1. Public debt assessment indicators

Source: Levišauskaitė and Rūškys (2003)

By applying these indicators, Lithuania's debt condition and alteration can be assessed. Borrowed capital and due to it processed investments grant companies strategic competitiveness. Usually, the lend capital and investments are elements that complement each other: growth of the borrowed capital is determined by investment growth and vice versa (Norvaišienė *et al.,* 2008).

Most of the scientists agree that when economic growth appears and there is a rather small capital and the investment potentiality and its return are higher than in the developed countries, country's borrowing should have a positive effect on economic development. When the amount of government debt relative to the size of the economy gets very large, investors may begin to fear that the government will default on the debt and, by engaging in debt repudiation, fail to pay it all back (Frederic, 2012). The acceptable value of the budget deficit in the long-run is assessed on terms of the ability to keep the variables of the fiscal policy stable. The state offering high interest rates can sell its securities in the short-run, though in case of failure the cost of servicing the national debt will increase in the future, the budget deficit will consequently increase and the government credibility will decrease (Missale *et al.*, 2002). Interest payment constitutes a part of current expenditure of the government, and higher interest payments are to lead either to increased income taxation, or to greater public sector borrowing requirement, which, in its turn, produces even heavier national debt (Colander, 2008).

Assessing theoretically, economic development and growing budget revenues should cover budget deficit and existing public debt. Attempts to assess whether borrowed funds are used effectively and how public debt affects rates of economic growth, employment, inflation and other macroeconomic parameters, lead to disagreements. One of the most prominent economists of our time, Nobel Prize winner in 2008, Krugman (2009) stated that country, being in economic downturn phase, should not be particularly saving, be-

cause strict saving measures bring country into an even deeper downturn. Such opinion has particularly contradicted other economists' opinion and especially the actions of various countries' governments (including Lithuania's and Latvia's).

In this article, country's borrowing will be assessed, according to public debt indicators provided in Figure 1, for which certain limits, according to Maastricht Treaty or International Monetary Fund requirements (see Table 2), are being determined. On the basis of these criteria, each country's ability to fulfil its debt obligations can be assessed.

Further forming public debt assessment methodology, a possibility to predict country's borrowing limits by using mathematical models is presented. Scientists suggest various mathematical models that may help to assess and predict acceptable size of public debt, referring to present macroeconomic situation in the country. In this article, mathematical models, suggested by Zamkov and Blanchard will be applied.

Table 2. Evaluation criteria of public debt acceptability level

Criteria	Definition of criteria	Distinguished acceptability limits
Public debt and GDP ratio	Provide country's economic stability level.	≤ 60 percent GDP (Maastricht Treaty criteria)
Foreign debt and GDP ratio	Country's potentiality to return debts is assessed.	≤ 30 percent (IMF)
Ratio of paid interest on government debt and government's revenues	The burden of country's debt is assessed.	≤ 10 percent (IMF)
Budget deficit and GDP ratio, %	Country's financial situation is assessed.	≥ 3 percent (Maastricht Treaty criteria)

Source: compiled by the author

Acceptable size of public debt in time t, according to Blanchards (2007) mathematical model, is determined by the formula No. 1.

$$b_t = \frac{1+i}{1+\psi} b_{t-1} + pd_t + sf_t \qquad [1]$$

Here: b_t – public debt and GDP ratio in time t, %;

ψ – nominal GDP growth rate, %;

i – country's borrowing interest norm, %;

pd_t – country's initial budget balance and GDP ratio in time t, %;

sf_t – adjusted ratio of income and cost difference with GDP in time t, %.

Mathematical model for prediction of the relationship between budget deficit, public debt and economic growth rates, suggested by Zamkov (1997), is presented in formula No. 2. The model covers several assumptions:

- the value of the nominal GDP Y_t grows at the constant annual rate p, %;
- the total budget deficit (namely, payment in percentage due to the national debt and the main debt) H_t annually stands at q % off GDP;
- the national debt D_t (at its nominal value);
- the relation between the national debt and GDP in the year t (d_t). Thus, (Zamkov, 1997):
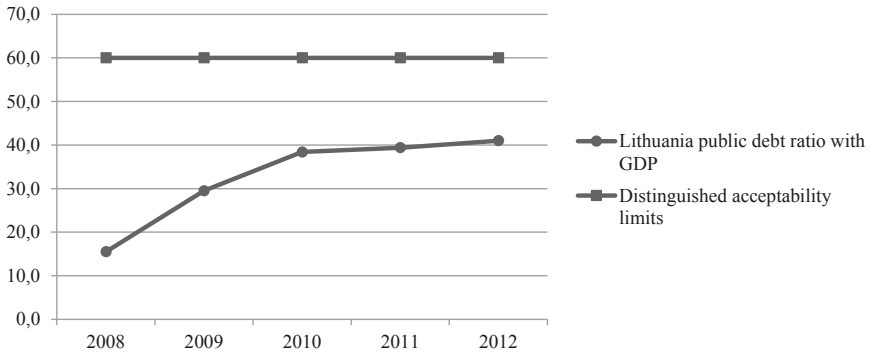
$$\lim_{t\to\infty} d_t = \lim_{t\to\infty} \frac{D_t}{Y_t} = \frac{q\left(1+\dfrac{p}{100}\right)}{p}.$$ [2]

By applying the presented model, the necessary real GDP growth ratio could be calculated in such a manner that the present budget deficit % GDP and public debt GDP in year t would not have a negative effect on state's economy.

Lithuania's debt criteria assessment and discussion of results

Public debt at the end of 2012 was equal to 46577, 2 million litas, which constituted 41 percent of gross domestic product (GDP). Public debt ratio with GDP during 2012 increased by 1,6 percentage point (in 2011, it constituted 39,4 percent of GDP) (see Figure 2).

Figure 2. Changes in public debt ratio with GDP in 2008-2012, %

Source: Data of the Lithuanian Ministry of Finance

Since the public sector consists of the central government, local government and state enterprises, the public borrowing requirement can be broken down in the relevant part (Karazijienė, 2013):
- central government borrowing requirement;
- local government borrowing requirement;
- state-owned enterprises borrowing requirements.

At the end of 2012, the central government debt – 43131 million – constituted public debt, local government debt – 2184,5 million litas (out of which 165,5 million litas were state's relent loans on behalf of the state, and 28,1 million litas were short-term loans from state budget) and debt of social security funds – 9727 million litas, out of which 8272 million litas have been on-lend by the Ministry of Finances. Consolidated liabilities between subsectors was 8465,6 million litas (see Table 3).

Table 3. National debt according to a sector

	31 December 2010		31 December 2011		31 December 2012	
	LTL million	%	LTL million	%	LTL million	%
General government debt	36606,5	100,0	41897,2	100,0	46577,2	100,0
Central government debt	34129,7	93,3	38504,7	91,9	43131,2	92,6
Debt of social security funds*	1108,1	3,0	1590,0	3,8	1455,0	3,1
Local government debt*	1368,7	3,7	1802,5	4,3	1990,9	4,3

* Data on local government debt are indicated herein in the consolidated form, i.e. less loans issued by
the government

Source: Data of the Lithuanian Ministry of Finance

According to the Maastricht Treaty, general budget deficit of the countries, joining the
European Union, should not exceed 3% of GDP (q) and public debt should not exceed 60%
of GDP (d_t). In order to maintain these marginal parameters for a long period, certain real
(wanted) GDP growth rate (p) is necessary, which can be found by modifying and applying
formula 2.

$$Thus : 0,6 = \frac{3\left(\frac{1+p}{100}\right)}{p}; \quad where \quad p = 5,26\%$$

As can be seen, in order to maintain a certain indebtedness level, quite large GDP
growth rates are necessary. Assessing the criteria, this indicator is included into the general
assessment table (see Table 4), which is formed according to the analysis, presented in meth-
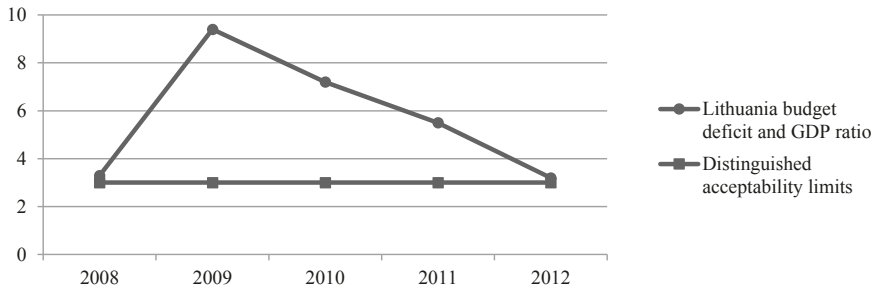odological part, Table 2.

Table 4. Assessment criteria of Lithuania's debt level acceptability

Criteria	Years			Distinguished acceptability limits
	2010	2011	2012	
Public debt and GDP ratio	38,4	39,4	41	≤ 60 % GDP
Foreign debt and GDP ratio	28,3	29,1	31	≤ 30 %
Ratio of paid interest on government debt and government's revenues	5,6	5,7	6	≤ 10 %
Budget deficit and GDP ratio, %	7,2	5,5	3,2	≤ 3 %
Ratio of GDP growth, %	1,6	6	3,7	≥ 5,26 %

Source: Data of the Lithuanian Ministry of Finance, Eurostat

By analysing the assessment criteria of Lithuania's debt level acceptability, it can be
distinguished that two criteria, the ratio of public debt and GDP, and the ratio of paid in-
terest on government debt and government's revenues, during the last year did not exceed
acceptability limits. However, other criteria exceeded acceptability limits in one or the other
year. By analysing ratio of Lithuania's foreign debt and GDP, it can be noted that from 2010
to 2012 the foreign debt was constantly growing, and in 2012 it exceeded the acceptability
level by 30%. Budget deficits are financed by public borrowing, which increases the stock of
public debt already in existence (Burda and Wyplosz, 2013). The most notable excess of the
acceptability level happened during budget deficit and GDP ratio assessment. Although this
criterion during the last year was becoming closer to the level of 3%, it still remains difficult
to achieve it in Lithuania in an economic sense (see Figure 3).

Figure 3. Change of budget deficit and GDP in 2008-2012, %

Source: Data of the Lithuanian Ministry of Finance

After assessing Lithuania's public debt acceptability criteria, the prediction of Lithuania's debt and GDP ratio is being processed. Prediction in being processed according to the presented Blanchard's (1) formula and Zamkov's (2) formula. The results are presented in Table 5.

Table 5. Prediction of public debt and GDP ratio potential levels

	2012	2013	2014	2015
Public debt and GDP ratio, %	40,5	39,7	41,2	39,6
Nominal GDP, %	-	5,1	6,1	7,8
Real GDP, %	-	3,4	3,6	3,9
Initial deficit and GDP ratio, %	-	2,5	1,5	0,5
Long-term interest norm, %	-	5,0	5,3	5,6
Adjusted ratio of income and cost difference with GDP in time t	-	0*	0*	0*
*Prediction of public debt and GDP ratio possible limits, according to **Blanchard's methodology***	-	42,59	40,80	40,46
*Prediction of public debt and GDP ratio possible limits, according to **Zamkov's methodology***	-	30,15	28,2	25,78

* No adjustment has been done in predicting indicators.
Source: compiled by the author

For calculations, macroeconomic indicators, predicted for 2013-2015 by Lithuanian Ministry of Finances – public debt and GDP ratio, %, nominal and real GDP growth rate, %, initial deficit and GDP ratio, %, long-term interest norm, %, have been used. The aim of this analysis was to assess, whether macroeconomic indicators predicted by the Lithuanian Ministry of Finances will not affect the economy negatively. After the calculations, it was noted that the results varied greatly. Calculations of potential public debt and GDP ratio, according to Blanchard's methodology, presented that debt level during 2013-2015 could be slightly higher, accordingly 2,89% and 0.86%, while predicted indebtedness of 41,2% of GDP in 2014 should be lower by 0,4%, whereas calculations, according to Zamkov's methodology, determined that predicted indebtedness during the period of 2013-2015 will be excessive on average by 12% each year.

Conclusion

It should be noted that public debt and its variation tendencies are described by public debt indicators that could be categorized into general, state's economic and relative indicators. These debt indicators can be expressed by absolute units and relative sizes. The state of Lithuania's public debt and its variations can be assessed by applying these indicators.

After Lithuania's debt criteria were assessed, it was determined that the criteria, provided in Maastricht Treaty or approved by International Monetary Fund, were disregarded. Lithuania's foreign debt in 2012 exceeded the acceptability level by 30% and constituted 31% of GDP. Budget deficit and GDP ratio during the investigation period in 2010-2012 was in all times excessive, according to the Maastricht Treaty.

Mathematical modelling, used in researches, enabled to reveal Lithuania's debt reliance on budget deficit and real GDP growth rate. A more detailed analysis on the basis of theoretical and practical suggestions, provided in the article, could help in forming country's borrowing policy.

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VALSTYBĖS SKOLOS PRIIMTINUMO KRITERIJŲ IDENTIFIKAVIMAS IR JŲ PRIIMTINUMO LIETUVOJE VERTINIMAS

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Santrauka: Svarstant įvesti eurą Lietuvoje, žiniasklaidoje ir mokslinėje literatūroje analizuojami ekonomikos konvergencijos rodikliai. Šiame straipsnyje analizuojamas valstybės finansinės padėties tvarumas, tiriamas mokslininkų požiūris į valstybės skolą, pateikiami valstybės skolos priimtinumo vertinimo kriterijai. Finansinės padėties tvarumo rodiklių atitiktis priimtinumo kriterijams nėra pakankamai akcentuojama moksliniuose darbuose. Šio straipsnio tikslas – naudojant nustatytus valstybės skolos vertinimo kriterijus ištirti Lietuvos valstybės skolinimosi priimtinumo ribas. Atliktas vertinimas atskleidė, kad Lietuvos finansinės padėties tvarumo rodikliai dažnai neatitinka patvirtintų kriterijų. Taip pat straipsnyje taikant matematinį modeliavimą apskaičiuotas priimtinas valstybės skolos dydis pasirinktu laikotarpiu.

Reikšminiai žodžiai: valstybės skola, skolos valdymas, biudžeto deficitas, vyriausybės politika ir reguliavimas.