THE IMPACT OF GOVERNMENT DEBT ON PUBLIC FINANCE STABILITY IN LITHUANIA

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Abstract. *Purpose* – though the global financial crisis is well behind us several EU countries continue to experience problems with public finance stability and need to cope with the consequences of high public debt. The purpose of the article is to find the relationship between government debt and of public finance stability in Lithuania.

Research methodology – in order to achieve the aim of the article Financial Stability Index (FSI) for Lithuania has been created. It is based on theory and previous research. To find the determinants of FSI the multiple regression analysis model was specified and tested using Ordinary Least Squares (OLS).

Findings – the results of multiple regression analysis indicate the government debt has a statistically significant impact on FSI, ceteris paribus. Other findings of the research show that profit or loss of the non-financial sector, foreign trade balance as well as a foreign direct investment are significant determinants of public finance stability.

Research limitations – one of the limitations of this research is the small sample size that has an impact on the validity and generalizability of the results. Having a longer time-series data or panel data for more countries would improve the robustness and applicability of research results.

Practical implications – the results of the research provide guidance to policymakers in the public finance area.

Originality/Value − this paper contributes to the scarce literature on government debt and other determinants of financial stability in Lithuania.

Keywords: public finance, financial stability, public debt.

JEL Classification: H60, H63, H68, E62.

Conference topic: Contemporary Financial Management.

Introduction

Government borrowing is an integral part of public finance. Theoretically, domestic public debt can produce many benefits to the countries. It plays a crucial role in economic growth and obtaining financial resources for long-term infrastructure projects and supports financial systems by providing credit during crisis periods. In contrast, excessive public debt can have negative outcomes. In the worst-case scenario, the country fails to service its debt and faces default with long-lasting economic, financial, and social consequences.

As a result of the recent global financial and economic crises, many countries experienced a dramatic decline in GDP growth. Consequently, the tax collections fell as well as the aggregate demand for goods and services. In order to revive economic activities, some countries resorted to the policy of so-called "quantitative easing" (Blommestein & Turner, 2012). But the majority of smaller economies had neither accumulated reserves nor much flexibility in the monetary policy. The only solution to raise funds was borrowing. Since the economies were slow to recover and the recession lingered on some, even large economies continued to borrow and accumulated excessive debt burdens. Notably, the ratio of debt to GDP in Italy, which is a member of G-7, reached 132% in 2014 (CEIC, 2019). This indicator is second only to the worst performing country -Greece- where debt to GDP ratio reached 178% in 2015 (CEIC, 2019). The country was in danger of default and even risked leaving the Eurozone. Clearly, such results indicate a potential threat to financial stability and represent deep problems in the economies of those countries.

Though the ratio of government debt to GDP in Lithuania never crossed the line of 40% Lithuanian economy was gravely affected by the global financial crisis of 2007−2008. In order to alleviate the devastating economic and social

effects of the crisis on businesses and individuals, the Government had to resort to borrowing. The debt to GDP ratio increased from 13.5% in 2008 to 39.2% in 2012 (Lithuanian Statistics Department, 2018).

There is no single universal borrowing strategy or policy. Instead, each country creates its own borrowing strategy and rules in order to improve the economic situation in the country, induce economic growth or at least minimize its decline. One of the goals of responsible government borrowing is to ensure the financial stability of the country.

The purpose of the article is to find what effect, if any, the level of government debt has on the public finance stability in Lithuania. The research was carried out in two stages. First, in order to achieve the aim of the article the Finance Stability Index (FSI) for Lithuania has been created. It is based on theory and the findings of previous research. Second, to find the determinants of FSI the multiple regression analysis model was specified and tested using OLS. The results of multiple regression analysis indicate that the government debt has a statistically significant negative impact on FSI, *ceteris paribus*. Other findings of the research show that profit or loss of the non-financial sector, foreign trade balance as well as a foreign direct investment are significant determinants of public finance stability.

The paper is organized in the following way. In section one the literature review of the impact of public debt on macroeconomic indicators is presented. The second section is devoted to the description of data, variables, and the research methods used in the paper. The results of the multiple regression analysis are presented and discussed in section 3. Finally, the last section concludes.

1. Literature review

The recent financial crisis and the subsequent increase in public debt revived the scholarly literature on the relationship between public debt and macroeconomic indicators as well as financial stability. Preserving financial stability has become the principal objective in economic policymaking (Houben, Jan Kakes, & Schinasi, 2004). This preoccupation reflects such developments as the expansion, liberalization, and globalization of financial systems. These developments significantly increased the possibility of larger adverse effects of financial instability on economic performance. Other trends include the fact that financial systems have expanded at a much faster pace than the real economy. This process of financial expansion was accompanied by a changing structure of the financial system, with an increasing segment of nonmonetary assets. The growing cross-industry and cross-border integration made financial systems more interconnected at both national and international levels (Houben et al., 2004).

Though the prevalent view is that public borrowing has a destabilizing effect on the financial system, the literature of the relationships between public debt and financial stability reveals at least two points of view. The first view is defended by Kumhof and Tanner (2005) who argue that the public debt strengthens the stability of the financial sector through the security, high liquidity and steady flow of returns offered by the government bonds (Kumhof & Tanner, 2005). Similarly, Panizza and Presbitero (2014) also find no evidence that public debt has a causal effect on economic growth (Panizza & Presbitero, 2014). The second point of view is supported by Houben et al. (2014), Ilgün (2016) and Janda and Kravtsov (2017) who show that high public debt is related to financial instability (Houben et al., 2004; İlgün, 2016; Janda & Kravtsov, 2017). However, the effects of the public debt on financial development and economic growth depend upon investigated geographies and have different results in a long and short run. Janda and Kravtsov (2017) explore the time-varying effects of domestic public debts on the financial development, private lending, and banking performance in the countries of the Central Eastern Europe, Balkan and Baltics region. Their findings indicate that the growth of public debt positively impacts the banking sector efficiency only in the short-term. They find only minor time effects of public debt on the financial stability indicators (Janda & Kravtsov, 2017).

That the effects may vary in the short and long-run has been found by Gómez-Puig and Sosvilla-Rivero (2015). The research based on the sample of the 10 EU countries indicates a negative effect of public debt on economic output in the long-run. But there is a probability of a positive effect in the short run. This possibility depends on the characteristics of the country and on the final distribution of public debt. (Gómez-Puig & Sosvilla-Rivero, 2015).

Whether public debt has a negative effect on growth depends upon modelling choices and data coverage (Égert, 2015). Using nonlinear threshold models, Egert (2015) shows that the negative nonlinear relationship between the ratio of public debt to GDP and economic growth can be detected in rare cases but correlations start at very low levels of public debt (between 20% and 60% of GDP) (Égert, 2015).

Government borrowing has an adverse effect on financial development in the long run. In addition, the findings indicate that while trade openness enhances financial development, economic instability exerts a negative impact in countries with emerging economies (İlgün, 2016). There is also evidence of a negative relationship between public debt and financial repression (Hauner, 2009). In countries where the government is the major recipient of bank lending, public debt is likely to be harmful to financial development. Moreover, the lower the financial depth, the greater the negative effects of public borrowing on financial development and macroeconomic indicators (Ismihan & Ozkan, 2012).

2. Empirical research

The research consists of two stages. In stage one, based on the previous research the Index of the Financial Stability of the Lithuanian Government (Financial Stability Index) is created. In stage two, the regression analysis model is specified and tested to determine the relationship between the Financial Stability Index and the level of the government debt controlling for other economic variables. The following hypotheses are tested:

H_0: There is no significant relationship between government borrowing and financial stability.

H_A: There is a significant relationship between government borrowing and financial stability.

2.1. Data

Time-series data from 2007 to 2017 (and data for the first quarter of 2018) are used to create the financial stability index and specify a regression model. The quarterly data are used to have a larger sample and increase the validity of the regression results. The total N = 46. The definition of variables used for the analysis and data sources are indicated in Table 1. Based on the previous research the following variables have been chosen for the empirical analysis.

Table 1. Definition of variables and data sources

Variable	Definition	Data source
Debt	Government debt in EUR	(Lithuanian Statistics Department, 2018)
Unemployment	Level of unemployment (%)	(Lithuanian Statistics Department, 2018)
Inflation	Level of inflation (%)	(Lithuanian Statistics Department, 2018)
Budget	Government deficit/surplus (in EUR)	(Lithuanian Statistics Department, 2018)
Revenue	Tax revenue (in EUR)	(Lithuanian Statistics Department, 2018)
FDI	Foreign direct investment per capita (in EUR)	(Lithuanian Statistics Department, 2018)
Trade	Foreign trade balance	(Lithuanian Statistics Department, 2018)
WorldEcon	World Economic Climate Index	Center for Economic Studies (Center of Economic Studies, 2018)
Rating	The average Credit rating of Lithuania by S&P, Moody's and Fitch[1]	(Ministry of Finance of Lithuania, 2018)
Profit	Corporate finance profit/loss of the non-financial sector	(Lithuanian Statistics Department, 2018)
ROA	Return on assets in the banking sector	Central Bank of Lithuania (Bank of Lithuania, 2018)
Bad loans	The ratio of bad loans to total loans	Central Bank of Lithuania (Bank of Lithuania, 2018)
GDP	Gross Domestic Product in current prices (EUR)	(Lithuanian Statistics Department, 2018)

Financial stability index

Following the methods developed by Gersl and Heřmánek (2007), Albulescu (2009) and Deksnytė (2010), the following variables were chosen to create a Financial Stability Index: World Economic Climate Index (I1), Credit rating (I2), Unemployment rate (I3), Ratio of bad loans to total loans (I4), ROA (I5), Inflation (I6), GDP (I7), Budget deficit/surplus (I8). (Albulescu, 2009; Deksnytė, 2010; Gersl & Heřmánek, 2007). In order to standardize the values of each indicator "I", each of the 8 indicators was allowed to vary between 0 and 1 [0−1]. The following formula was used to standardize the indicators:

$$I_{itn} = \frac{I_{it} - M_{in}(I_i)}{M_{itn}(I_i) - M_{in}(I_i)},\qquad(1)$$

where: I_{it} is the value of indicator in period t; $M_i(I_i)$; $Max(I_i)$ is the minimal and max values of the indicator during the analyzed period (2007−2018); $I_{it}n$ is the standardized value of the indicator.

The next step is to combine the standardized values of the indicators into a single value. Each indicator is given the same weight (Albulescu, 2009). The Financial Stability Index (FSI) is created which is used as a dependent variable in the second stage of analysis.

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[1] Since each credit rating agency uses a unique symbol to indicate the credit rating each rating was converted into a numerical value using the methodology developed by Skaržauskas and Valentaitė (2015) (Valentinaitė & Skaržauskas, 2015).

$$FSI = \frac{I_1 n + I_1 n + I_1 n + I_1 n + I_1 n + I_1 n + I_1 n + I_1 n}{8} . \tag{2}$$

2.2. Regression model specification

In order to find evidence if the level of government borrowing has an impact on the financial stability of the multiple regression model is specified:

$$FSI_t = \beta_0 + \beta_1 \chi_t + \beta_2 \chi_t + \cdots + \beta_n \chi_n + \varepsilon_t . \tag{3}$$

where: *FSI* is the Financial Stability Index, β_0 is the intercept, $\beta_{1,2,\ldots n}$ represents mx1 vector of coefficients. Sub index *t* refers to a time period, $\chi_{1,2\ldots n}$ – represents a vector of independent variables, ε_t is an error term.

Dependent variable

The FSI trend in Figure 1 reflects the variation in all 8 indicators that were used to create the index. The first warning signals can be detected in the 3rd and 4th quarters of 2007. Before that period the FSI was evaluated at 0.8 points which indicates that the country's economy was balanced and its financial system stable. However, the sharp decline in the Index after the 4th quarter of 2007 shows that the financial situation in the country was drastically worsening. It hits the bottom in the 4th quarter of 2009 when financial stability index was equal to 0.26. After that period the FCI was going up with small dips in certain periods. In the 1st quarter of 2018, the value of the index reaches 0.87 which is higher than its values prior to the financial crisis.
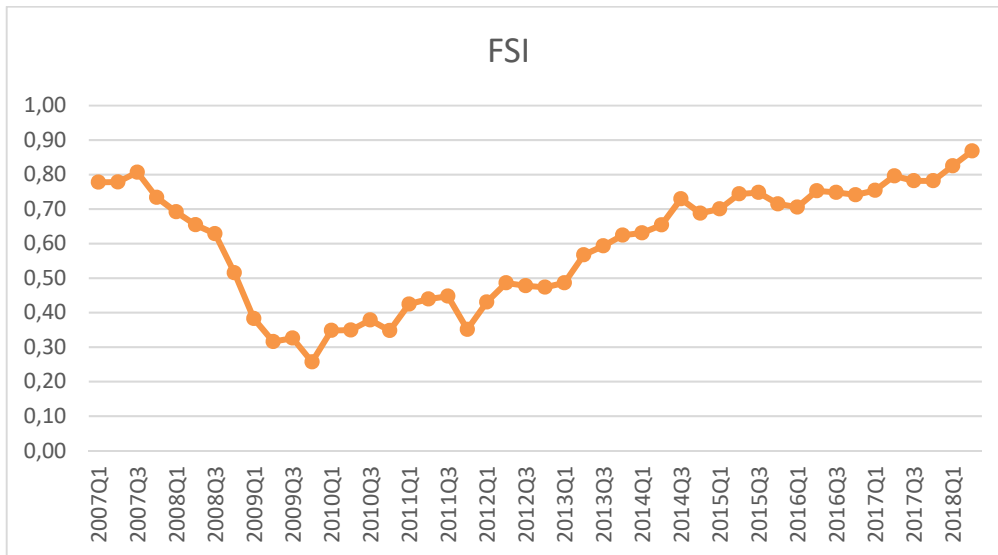

Figure 1. Financial stability index
(source: created by the author)

Explanatory variables

Debt. By looking at Figure 2 it is obvious that the government debt has been growing starting with the 1st quarter of 2009. Before that period the debt was equal to about 4 billion EUR and doesn't show much fluctuation. At the beginning of 2010, the debt level more than doubled compared to the 1st quarter of 2007. It increased from 4.2 billion EUR to 9.1 billion EUR. These numbers provide evidence that Lithuanian government's fiscal policy prior to the crisis was not aimed at predicting the crisis or to dampen its impact on the country's economy. Therefore, the government had to resort to borrowing and accept large financial obligations. In the 3rd quarter of 2015, the debt was equal to 14.1 billion EUR. It represents an increase of 250 per cent. At the same time, it should be noted that the debt levelled out starting with 2012. The government has taken strict austerity measures and the growth of debt was contained. Nevertheless, there was a definite increase in government debt over the period of the research. The expected sign for variable "Debt" is negative.
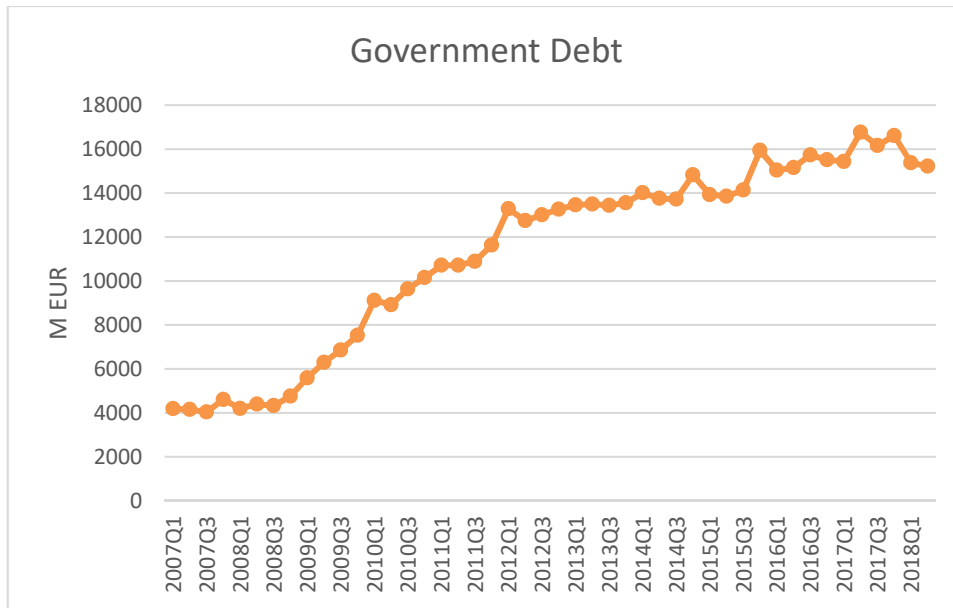
Figure 2. Government debt of the Republic of Lithuania
(source: Lithuanian Department of Statistics)

Trade. As shown in Figure 3 the foreign trade balance has been negative during the whole period under investigation. The trade deficit was especially significant in 2007 and started to improve in the 1st quarter of 2008. The recovery of the Lithuanian economy has been export driven. The trade balance was still negative but negligible in the 4th quarter of 2009 in sync with other indicators of economic recovery. Starting with 2010 the Lithuanian foreign trade deficit is fluctuating, and some seasonal patterns can be discerned with smaller deficits in the 4th quarter of the year. However, the persistent trade deficit must have a negative impact on financial stability. The expected sign for the variable "Trade" is negative.
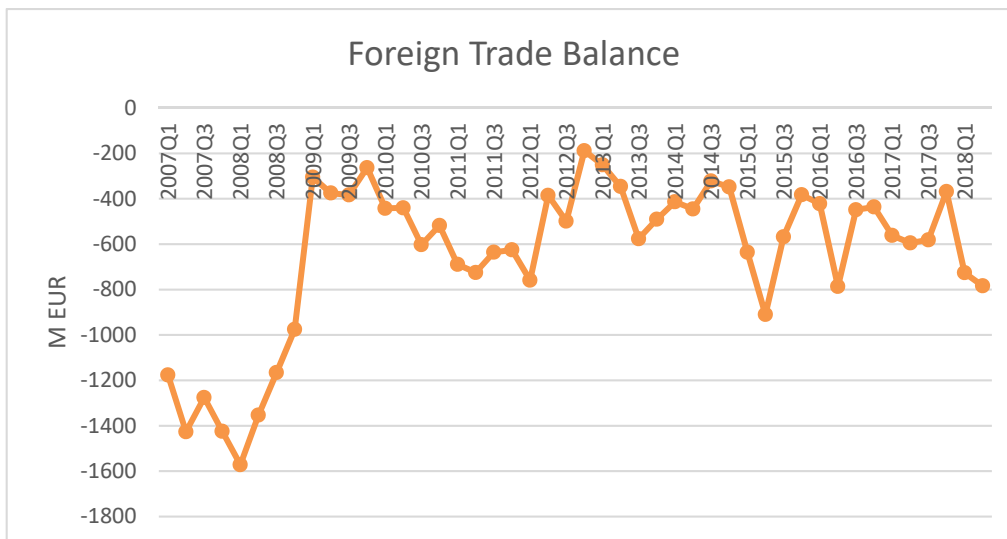

Figure 3. Foreign trade balance
(source: Lithuanian Department of Statistics)

Revenue. Tax revenue is an important indicator of the health of public finance. As shown in Figure 4 the tax revenue collected by the government reflects the economic cycle. Tax revenue has fallen sharply in the 3rd and 4th quarters of 2008 at the depth of the economic recession. However, collections levelled out in years from 2009 to 2012. The revenue collections follow an upward trend starting in 2012 with ups and downs probably reflecting the tax collection schedule. The tax revenue collections reached the pre-crisis level in the 1st quarter of 2016. In the 1st quarter of 2018, the government collected more tax revenue than before the financial crisis. The expected sign for the variable "Revenue" is positive.
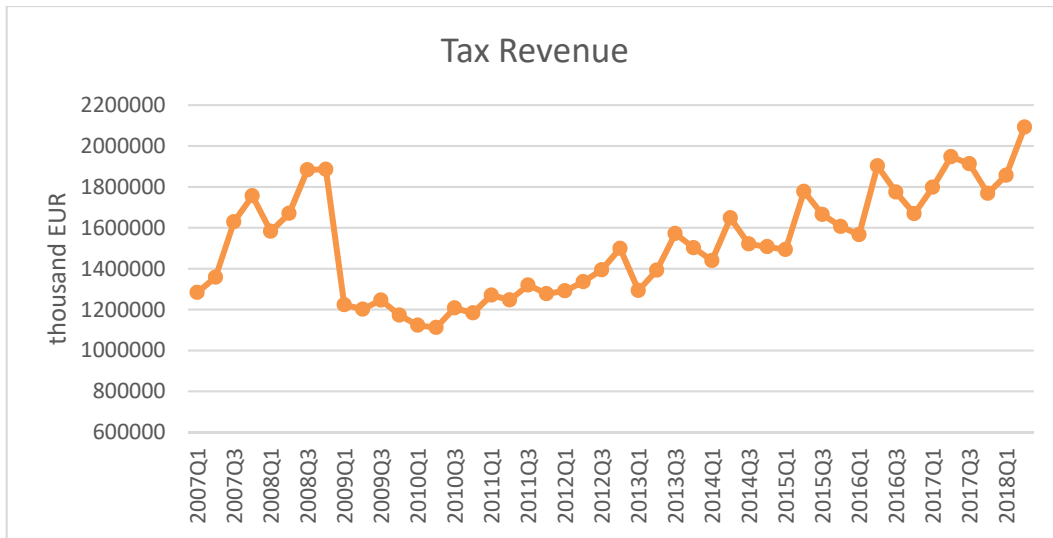
Figure 4. Tax revenue collected by the central government
(source: Lithuanian Department of Statistics)

Profit. As indicated in Figure 5 profit or loss reported by the corporations in the non-financial sector clearly reflects the economic recession with the largest corporate losses recorded in 4th quarters of 2008 and 2009. With the economic recovery, the profit in the corporate sector shows an upward trend. The profit in the 1st quarter of 2016 exceeds the profit reported prior to the financial crisis. The financial performance of corporations improves significantly in years 2017−2018. The corporate profit is the basis for tax revenue collections, the source of investment, and an overall important driver of economic activity. The expected sign for variable "Profit" is positive.
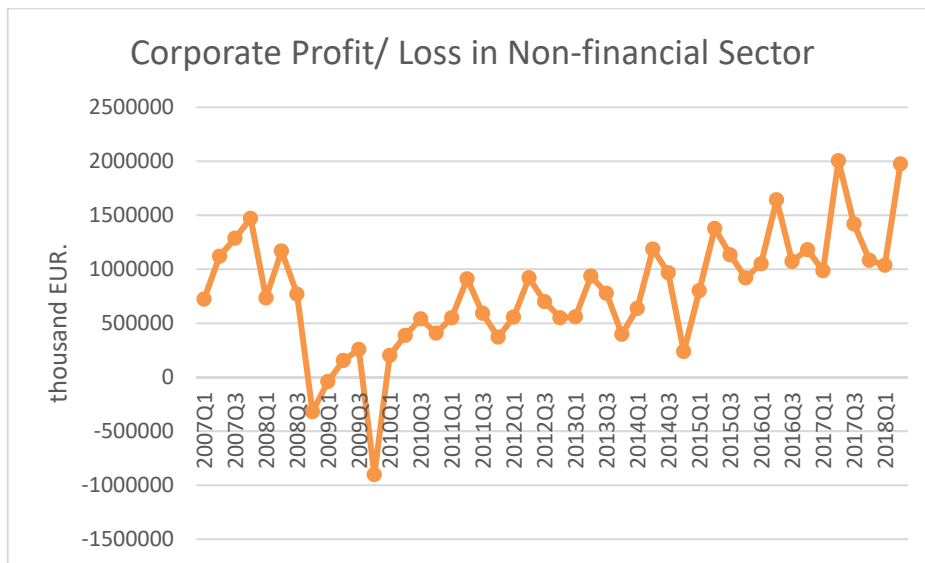

Figure 5. Corporate profit/loss in the non-financial sector
(source: Lithuanian Department of Statistics)

FDI. Foreign direct investment is an important indicator of the country's economic attractiveness and competitiveness. It also indicates the investors' confidence in the country's economic and financial stability. As shown in Figure 6 the FDI per capita is growing steadily in the period under investigation with a slight dip in 2008, the reflection of the global economic recession. FDI creates jobs in the local labour market, significantly contributes to the spread of innovations, and promotes overall economic and social development. Through these indicators, it influences the financial stability of the country. The expected sign for variable "FDI' is positive.
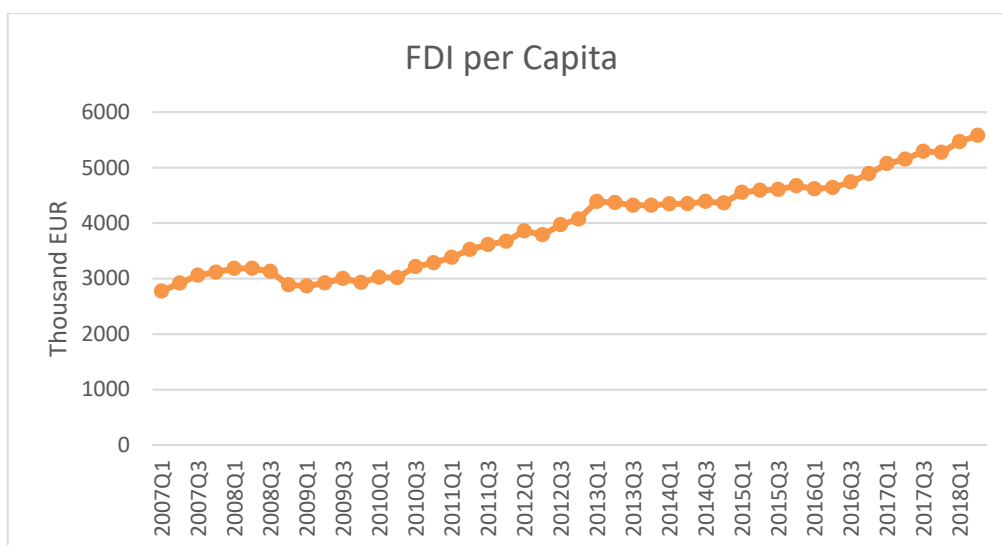
Figure 6. Foreign direct investment per capita
(source: Lithuanian Department of Statistics)

3. Results and discussion

Equation (3) is estimated using Ordinary Least Squares (OLS). Table 2 summarizes the results. The model shows a good fit with an adjusted R-squared equal to 0.80. Even 80% of the variation in the dependent variable FSI is explained by the explanatory variables. The overall model significance is quite strong, (F = 46.47, <0.001).

Table 2. OLS results. Dependent variable: financial stability index

Var	Coefficients	Standard Error	t Stat	P-value
Intercept	−0.25777309	0.100	−2.591	0.013
Debt	−0.00002342	0.000	−2.055	0.046
Trade	−0.00014819	0.000	−2.167	0.036
Revenue	0.00000007	0.000	0.770	0.446
Profit	0.00000007	0.000	1.820	0.076
FDI	0.00021792	0.000	3.443	0.001
Adjusted R Square	0.80			

N = 46.

  As expected, variable "*Debt*" has a significant impact on government's financial stability (t = −2.055, p = 0.05). This result allows rejecting the null hypothesis that there is no significant relationship between government borrowing and financial stability. Indeed, the level of government debt has a statistically significant negative impact on the stability of public finance, all else equal. Another factor that has a negative impact on the financial stability of the country is foreign trade balance which was negative during the period under the investigation. The variables that have a positive impact on financial stability are "*Profit*" and "*FDI*". This finding provides evidence the corporate profits earned at the non-financial sector increases the stability of public finance. However, the variable is only marginally statistically significant at the 0.1 level. The regression analysis shows that FDI per capita is a strong predictor of the financial stability of the country's public finance. The variable "*FDI*" is highly statistically significant at 0.00 level. Clearly, inflows of foreign direct investment into the country reflect the investors' confidence in the country's financial system and contribute to its stability. The variable "*Revenue*" is not statistically significant in this model but is kept in the model on theoretical grounds and to avoid omitted variable bias.

Conclusions

As a result of the recent financial crisis and subsequent increase in public debt preserving financial stability has become the principal objective of policymakers in economic and financial areas. In the case of Lithuania, the level of public debt is not excessive, but the borrowing has grown sharply since the crisis to alleviate its adverse effects on the economy. The objective of this paper was to find the relationship between government debt and public finance stability

controlling for other economic variables. The results of multiple regression analysis indicate that the government debt has a statistically significant negative impact on financial stability, *ceteris paribus*. Other findings of the research show that profit or loss of the non-financial sector, foreign trade balance as well as a foreign direct investment are significant determinants of public finance stability. In conclusion, the increase in public debt and foreign trade deficits are harmful to financial stability. While profit in the non-financial sector of the economy, as well as foreign direct investment, positively affect the stability of public finance.

Disclosure statement

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