CAN SHIFT IN PUBLIC DEBT STRUCTURE AFFECT DYNAMICS OF COST OF PUBLIC DEBT SERVICE?

Martin Murín[1]

Abstract

It is possible that a shift in the public debt structure can influence economic growth of advanced economies. The main channel to recognize this effect seems to be through the cost of public debt service. Hence, the aim of this contribution is to investigate what is the effect of the shift in structure of public debt on the cost dynamics of public debt service. From empirical point of view the panel data regression of 22 chosen OECD countries in the period from 2000 to 2015 is used and done by several estimation techniques used (OLS, one-way and two-way fixed effect model and GMM). It's found that the shift from the short-term to the long-term debt obligations is positively correlated with the higher cost dynamics of public debt service. The shift from domestic to foreign creditors seems to have similar impact but not as unambiguous as the previous one is.

Keywords

Structure of Public Debt, Public Debt Cost, Economic Growth, Panel Regression, Advanced Economies

I. Introduction

The development of the public debt quota since the Great Recession puts light on several fiscal problems. Furthermore, it led to opening of the economic discussion whether the public debt might be harmful to the economic growth or not. Empirical studies face a problem of the endogeneity which makes the influence of the public debt on the economic growth hard to recognize. One must see that the level of debt quota is dependent on the economic performance, then a regression of an impact of the debt quota on the economic growth seems to be ambiguous, see Panizza and Presbitero (2013). This type of the endogeneity might be dealt by following the public debt shift rather than the level. From Murín (2016a) stems that some shifts in the structure of public debt can play a significant role in the economic growth performance. These effects were explained using some theoretical hypothesis rather than empirical investigation. Connection between the public debt shift and the economic growth was also outlined through the cost of public debt service or the debt cost. Some shifts in the public debt structure might have influence on the level and the dynamics of public debt cost. This hypothesis would be important and interesting to test. Hence the aim of this contribution is to investigate what is the effect of shift in the structure of public debt on the public debt cost dynamics. To explore this hypothesis, it is used the panel data regression and several estimated techniques like the OLS, one-way fixed effect model, two-way fixed effect model and the dynamic setting estimated by GMM. Dataset consists of 22 chosen OECD countries in the period from 2000 to 2015. There are two public debt decompositions explored. The first is the decomposition by the origin maturity of debt instruments where are followed the short-term debt instruments and the long-term debt instruments. The second is the decomposition by the residency of creditors. This decomposition follows who's held the public debt and there are domestic creditors and foreign creditors. From results of estimation it seems the public debt structural shift plays a significant role in the dynamics of the debt cost. Mainly shifts by the origin maturity seems to be important and robust.

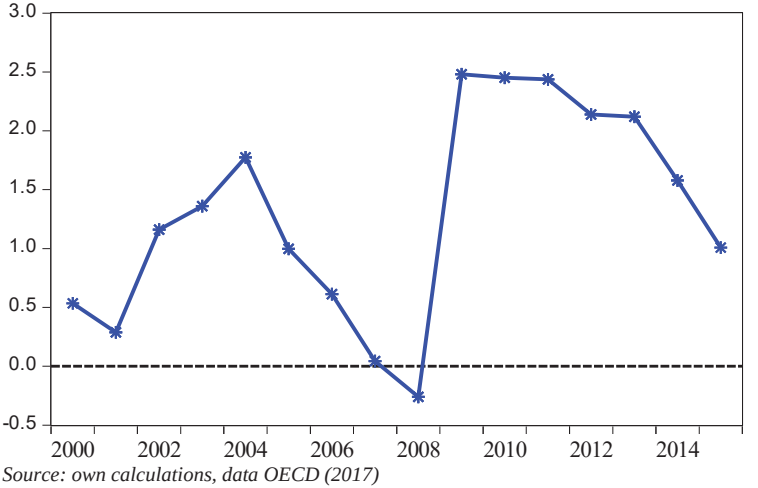
[1] Masaryk University, Faculty of Economics and Administration, Lipová 41a, 602 00 Brno, Czech Republic. E-mail: martin.murin@mail.muni.cz.

II. Public debt, economic growth and cost of debt service

As it was already mentioned the impact of public debt on the economic growth might be ambiguous due to the endogeneity of the relationship between the public debt quota and the economic performance, for more details see Panizza and Presbitero (2014). From a theoretical point of view there are several papers suggested that the public debt is harmful to the economic growth. For instance, the result of analytical work in Teles and Mussolini (2014) shows the effect of public debt to be similar to the PAYG system and confirms the intergeneration transfer of debt burden of Buchanan (1958). It means when public debt appears the burden for the next period to growth is higher the higher is cost of the debt. In Murín (2016a) this statement is used to explained why it is possible the shift from short-term debt obligations to the long-term debt obligations to be harmful to the economic growth of 14 EU countries in the same period that is explored in this contribution.

It is quite intuitive if one links the debt obligation by the maturity to its interest rate. If situation is normal then the yield curve is increasing, see Grauwe (2016) which indicates the difference between long-term interest rates and short-term interest rates to be positive. Figure 1shows the development of a difference between long-term and short-term interest rates on average of sample 22 OECD countries in the period from 2000 to 2015. It can be seen that the long-term interest rates are higher except for 2007 and 2008 and near to zero in 2000 and 2001. These years are remembered with the economic downturns; hence these situations can be called unnormal. It usually holds that the long-term obligations are expansive than the short-term ones.

Figure 1 Development of average difference between long-term interest rates and short-term interest rates



Source: own calculations, data OECD (2017)

Direct effect of the public debt on interest rates could not be unambiguous. For instance, Checherita and Rother (2010) investigate 12 euro area countries in period from 1970 to 2011 and show that the public debt has impact on long-term, as well as real, interest rates only in first difference. Level of debt seems to play no significant role here. It would be interesting to investigate what is the impact of the debt structure on the long-term interest rates. In this way Dell'Erba et al. (2013) shows that structure of public debt can play significant role in affecting the sovereign spreads.

The debt decomposition by the residency done by Murín (2016a) highlights that the shift in the structure of public debt which goes from domestic to foreign creditors is detrimental to the economic growth. From Buchanan (1958) point of view there is no difference whether the debt is sold abroad or not. Only the debt cost matters. Similar results can be obtained from Darreau

a Pigalle (2013). Hence, the government should make decisions mainly about the debt cost not the residency of the creditors. In little contradiction with the last idea stays Adam a Bevan (2005). They claim that the external debt can be positive to the economic growth if the interest rate on external debt is lower than the rate of growth of real output in domestic economy. It seems that it is possible to connect decomposition of debt by the residency of the creditors.

III. Data and methodology

The aim of this contribution is to investigate what is the effect of the shift in structure of public debt on the cost dynamics of public debt service. This aim stems from Murín (2016a). The attempt is to explore some conclusions of quoted paper that sounds more like hypothesis to be tested.

From methodological point of view, the panel data regression is used. The researched sample consists of 22 chosen OECD countries in the period from 2000 to 2015 using annual periodicity. Countries are Australia, Austria, Belgium, Czech Republic, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Great Britain and USA. Data were captured from Murín (2016b) dataset and they were complemented by the long-term and short-term interest rates, the inflation and the interest payable using statistical database OECD (2017). All variables employed in the empirical analysis are captured and described in table 1. The dependent variable, *Inter_p*, is a share of interest payable by general government to GDP. It is assumed that this variable allows for capturing of relative size of cost of debt service in comparison with the size of the economy. Another option is to used interest rates as an indicator of the cost of debt service. However, the question is which interest rates should be chosen to. Other issue of the interest rates is they don't show real debt cost or as Buchanan (1958) says debt burden. It should be clear that the debt cost is dependent on the size of the public debt and on the interest rates, see Teles and Mussolini (2014).

Table 1 Description of all variables used in empirical analysis

Inter_p	Interest payable, general government, share of GDP (%), in log
Debt	Gross public debt, general government, share of GDP (%)
Growth	Growth rate of real GDP per capita (%)
Infla	Inflation, percentage change of whole CPI on the same period of the previous year (%)
Gov	General government expenditure, share of GDP (%), in log
Short	Short-term debt, share of gross public debt (%)
Long	Long-term debt, share of gross public debt (%)
CreD	Debt held by domestic creditors debt, share of gross public debt (%)
CreF	Debt held by foreign creditors, share of gross public debt (%)

Source: Murín (2016b) and OECD Statistical Database (2017)

Control variables in this contribution are *Growth* which is the growth rate of real GDP per capita and it is assumed that the effect of *Growth* on *Inter_p* is negative (if there is a period of high economic growth, society gets richer and debts are likely to be paid-off more easily, furthermore, *Inter_p* is a variable is presented as the share of nominal GDP); *Infla* which is the rate of inflation and it is assumed to have positive impact on the dependent variable (if there is a high inflation the state of a debtor is better than the state of a creditor, it creates incentive to get into debt); *Gov* is the variable which should reflect a size of the public sector on whole economy. Assumption about its effect is unambiguous. On the one hand, it is possible that the large public sector creates higher debt on the other hand if the public sector is large it could mean the government is able to collect enough taxes to provide such size.

The last control variable is *Debt*, which is the public debt quota. It is assumed the higher debt quota the higher *Inter_p*. Furthermore, the application of debt quota has special meaning. This contribution deals with shifts in public debt structure. As Murín (2016a) claims an application of the regression allows for use of method or approach which is employed by Heady et al. (2009). They modify Kneller et al. (1999) omitted variable approach for slightly different purpose, however, the idea is consisted with the aim of this contribution (mentioned approach is discussed later).

The set of variables of interest consists of 4 variables. All 4 are calculated as a percentage share of gross public debt, *Debt*. There are 2 decompositions of the structure of public debt made. The first one is done by the origin maturity of debt instruments and the debt is divided into the short-term debt instruments, *Short*, and the long-term debt instruments, *Long*. In this analysis data are available only for Australia, Austria, Belgium, Czech Republic, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Luxembourg, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Great Britain and USA.

The second decomposition of the public debt structure is followed by the residency of creditors. There are two variables. Debt held by domestic creditors, *CreD* and debt held by foreign creditors, *CreF*. In this analysis data are available only for Australia, Austria, Canada, Estonia, Finland, Hungary, Ireland, Italy, Luxembourg, Poland, Portugal, Slovakia, Spain, Sweden, Great Britain and USA.

Table 2 shows simple descriptive analysis of variables of the interest complemented by public debt, *Debt*, using mean, minimum and maximum values of whole sample. There are some countries with a relatively small amount of public debt in relation to the size of their economy (on average below 50% of GDP). These can be Australia, Czech Republic, Estonia, Luxembourg, Norway, Poland, Slovakia. The minimum is Estonia (6.48). Nevertheless, there are Belgium, Canada, Italy with an average level of public debt in researched period above 100% of GDP. The maximum is Italy (111.61).

Table 2 Descriptive statistics of variables of interest and public debt

Variable	Mean	Minimum	Maximum
Debt	63.37	3.66	139.64
Short	18.46	0.10	71.92
Long	81.54	28.08	99.90
CreD	65.29	20.66	100
CreF	34.69	0.00	79.34

Source: Own calculations

Pairs of variables *Short* and *Long*, *CreD* and *CreF* are shares of the *Debt*. It means that the sum of *Short* and *Long* is 100 (same as *CreD* and *CreF*). Austria, Estonia (1.57), Germany, Poland are countries with the average share of short-term instruments below 10% and Australia, Ireland, Norway (51.29), Portugal, Sweden and Switzerland are countries mostly in range from 25.02 to 30.19 except for Norway. Debt held by domestic creditors, *CreD*, generate almost 65.3% of public debt, however, in Australia (99.43), Canada (84.69) and Luxembourg (98.16) is almost whole debt obligated to domestic subjects. On the other hand, Austria (27.77), Finland (29.21), Ireland (47.18) and Portugal (37.27) are countries which can be considered as countries to borrow abroad more.

It seems that the sample is not homogenous enough, especially I one looks at the public debt variables. Because of this it has been selected several estimated techniques. From relatively simple one (OLS) to dynamic specification borrow from Arellano and Bover (1995). To capture time invariant unobserved heterogeneity the one-way fixed effects is used, then the two-way fixed effects model is comparing with, similar to Kneller et al. (1999) or *Afonso a Alves (2014)*.

There is at least one think left which is needed to be explained. It is the approach employed in estimates. As it was already mentioned above, the modified omitted variable approach is used. Heady et al. (2009) use this approach to examine the tax shift effect on economic performance. The point is to calculate the share of the tax revenue categories (sum of them gets 1, or 100) and put whole tax quota into the set of control variables and let one share of tax revenue to be omitted. The regression is got estimates effect of taxation and parameters of the tax shares show effect of the tax shift goes from the omitted share to the share in the regression output. This is the purpose why the debt structure variables are calculated as shares of gross public debt, *Debt* and the *Debt* is put into the set of control variables. This is allowed due to the nature of the regression. All parameters estimated are evaluated under ceteris paribus condition.

As Wooldridge (2009) mentions, variables in regression should be stationary. All variables were tested and *Debt*, *Gov*, *Inter_p* need to put into first difference. Estimated model without AR is as follows:

$$dInter\_p_{it} = \beta_0 + \beta_1 dDebt_{it-1} + \beta_2 Growth_{it} + \beta_3 dGov_{it} + \beta_4 Infla_{it} + \\ + \sum_{k=1}^{K-1}(\varphi_k - \varphi_m) D\_S_{kit-1} + \cdots \quad (1)$$

$$\ldots + e_{it} \quad (1.1)$$

$$\ldots + u_i + \epsilon_{it} \quad (1.2)$$

$$\ldots + \mu_i + c_t + \varepsilon_{it} \quad (1.3)$$

where mark *d* stated before the variable name stands for the first difference, index *i* stands for the country, index *t* stands for the period, index *k* is the number of specific share of public debt and index *m* is the number of omitted share of *Debt*. The label D_S_k is the share of public used in specific estimate. Eqs. (1.1), (1.2). and (1.3) are the error terms of OLS, one-way fixed effect model and two-way fixed effects model respectively.

To check robustness of the results it is use a dynamic specification of the eq. (1) estimated by GMM using Arellano and Bover (1995) estimator, see eq. (2).

$$dInter\_p_{it} = dInter\_p_{it-1} + \alpha_1 dDebt_{it-1} + \alpha_2 Growth_{it} + \alpha_3 dGov_{it} + \alpha_4 Infla_{it} + \\ + \sum_{k=1}^{K} \gamma_k D\_S_{kit-1} + \omega_i + \vartheta_{it} \quad (2)$$

It needs to be emphasized that the public debt and the debt shares are lagged by one period to secure estimates for endogeneity between the public debt and the interest payable from the public debt. This approach and approach to selection of instruments is similar as Afonso a Alves (2014), Checherita and Rother (2010) or Murín (2016a).

IV. Results

Tables 3, 4 present the estimates of relation (1), while table 5 is an output of the estimates of eq. (2). In table 3 and 4 are output of estimates presented by the estimating technique (Model). The first one is the OLS, followed by the one-way fixed and the last is the two-way fixed effects model. From point of view of the results of control variables their impact on difference of *Inter_p* is of assumed direction. It needs to be emphasized that *Inter_p* and *Gov* are in natural logarithms and then put into the first difference. This kind of treatment leads to differences between parameters of *dGov* and others which must be multiply by 100 to get the same result as for the *dGov*.

Based on the output of table 3, it can be said that if the difference of public debt increases by 1% to GDP the growth rate of debt cost will increase by 1 percentage point (p. p.). An average effect of increase of the economic growth leads to decrease of the growth rate of interest payable by 0.67. The effect of increase of the first difference of *Gov* goes from 0.23 to 0.43 on *dInter_p*. Nevertheless, this effect is not statistically significant in every estimate done. Despite this we can

say that if the public sector starts to growth faster it leads to increase of the cost of debt service. The last not least control variable is *Infla*. The effect of inflation seems to be positive on the dynamics of public debt cost., nevertheless not in every estimate made.

For the aim of this contribution is more important to look at the result of variables of research interest. Table 3 shows analysis following debt decomposition by the origin maturity of debt instruments. Firstly, it presents outputs of the results of *Short* where the long-term debt instruments are omitted. Then it shows results for the opposite analysis and the shift goes from short-term debt instruments to the long-term.

Table 3 Results of shifts by origin maturity of debt instruments on dynamics of public debt cost

Model	OLS	1-way FE	2-way FE	OLS	1-way FE	2-way FE
β_0		-0.1275***	-0.0792***		0.1571*	0.1240
		(0.0227)	(0.0278)		(0.09)	(0.1024)
dDebt	0.0098***	0.0102***	0.0106***	0.0112***	0.0102***	0.0106***
	(0.002)	(0.0021)	(0.0019)	(0.0019)	(0.0021)	(0.0019)
Growth	-0.0075***	-0.0042*	-0.0084*	-0.0043**	-0.0042*	-0.0084*
	(0.0017)	(0.0026)	(0.0045)	(0.0018)	(0.0026)	(0.0045)
dGov	0.2316	0.3288	0.4267**	0.3633*	0.3301*	0.4269**
	(0.2251)	(0.2054)	(0.1872)	(0.1942)	(0.2051)	(0.187)
Infla	0.0020	0.0136***	0.008	0.0127***	0.0136***	0.0008
	(0.0029)	(0.0051)	(0.0057)	(0.0047)	(0.0051)	(0,0057)
Short	0.0016***	0.0029***	0.0021*			
	(0.0004)	(0.0010)	(0.0012)			
Long				-0.0009***	-0.0028***	-0.002*
				(0.0001)	(0.0011)	(0.0012)
Adj. R^2	0.1928	0.2745	0.3691	0.2688	0.2739	0.3689
N	317	317	317	317	317	317

*Notes: Standard deviations are included in parentheses; standard deviations are calculated using robust estimates; *, **, *** stand for significance levels of 10%, 5% and 1%.*

Source: Own calculations

Results of the shifts in public debt structure by the origin maturity of debt instruments suggest that if the shift goes from long-term to the short-term debt instruments is correlated with the higher growth rate of interest payable. The opposite shift is detrimental to the cost of public debt. It can be said that if the share of short-term debt instruments increases by 1 p. p. the growth rate of interest payable by the general government increases by in range from 0.16 to 0.29 p. p. It should be note that OLS specification could be biased due to heterogeneity between countries which has been shown in previous section that there are differences between countries. Similar issue can arise if one looks on time development. Hence in statistic specification the one-way and two-way fixed effect models are benchmarks.

Table 4 shows the results of estimates which were conducted to examine whether the change within the public debt structure by the residency of creditors could affect the dynamics of the cost of public debt service. From table 4 stems that impact of the public deb shift is not as statistically significant as the previous one is. Parameters of *CreD* and *CreF* in two-way fixed effect specification are insignificant. If the one-way fixed effect is right the effect from the shift from *CreD* to *CreF* is similar to the sift from *Long* to *Short*. Therefore, if the government decides to increase the share of foreign creditors of the gross public debt by 1 p. p. it will leads to increase of the growth rate of

interest payable by 0.25 p. p. However, if one looks at the results of two-way fixed effect the effects of the shift are not significant at any level of significance (1%, 5% and 10%).

Table 4 Results of shifts by residency of creditors on dynamics of public debt cost

Model	OLS	1-way FE	2-way FE	OLS	1-way FE	2-way FE
β_0		0.0653	0.0159		-0.1790***	-0.059
		(0.0867)	(0.0774)		(0.0496)	(0.05)
dDebt	0.0102***	0.0109***	0.0098***	0.0102***	0.011***	0.0098***
	(0.0023)	(0.0025)	(0.0027)	(0.0023)	(0.0025)	(0.0027)
Growth	-0.0072***	-0.0057**	-0.008	-0.009***	-0.0057**	-0.008
	(0.0023)	(0.0028)	(0.0054)	(0.0023)	(0.0028)	(0.0054)
dGov	0.1962	0.2847	0.3295*	0.1666	0.2847	0.3292*
	(0.2309)	(0.1869)	(0.1742)	(0.2634)	(0.1859)	(0.1735)
Infla	0.0115**	0.0218***	-0.0021	0.0054	0.0218***	-0.002
	(0.0059)	(0.0052)	(0.0056)	(0.0036)	(0.0052)	(0.0056)
CreD	-0.0009***	-0.0024*	-0.0007			
	(0.0003)	(0.0013)	(0.0013)			
CreF				0.001***	0.0025*	0.0008
				(0.0003)	(0.0013)	(0.0012)
Adj. R^2	0.2926	0.3366	0.4383	0.2698	0.3374	0.424
N	220	220	220	220	220	220

*Notes: Standard deviations are included in parentheses; standard deviations are calculated using robust estimates; *, **, *** stand for significance levels of 10%, 5% and 1%.*

Source: Own calculations

To check robustness of presented results and use a dynamic specification was chosen to estimate eq. (2) by GMM. The Arellano-Bover estimator (1995) estimator is used. Results of this treatment are presented in table 5. Models 1 and 2 are analysis of debt decomposition by the origin maturity and models 3 and 4 are by the residency of creditors. Results of control variables are similar to the previous specification except for *Growth* which is now insignificant in every model and *dGov* which is significant in model 1 and 2. Model 1 and 2 are also the outputs of estimates where the AR term, $dInter\_p_{(-1)}$, is significant.

Effect of a change in the public debt structure by the origin maturity of debt instruments are similar to previous findings, however, the significance is lower. It could be said that the dynamic specification confirms results of the statistic one in this decomposition.

In terms of the decomposition of public debt by the residency of creditors results seem to be different in comparison with the statistic one. The dynamic specification suggests that the effect of the shift within domestic and foreign creditors is higher and more significant than it is suggested by the statistic estimates. The magnitude of the parameters of *CreD* and *CreF* is even larger than of *Short* and *Long* which is something not observed in tables 3 and 4.

Results of estimates of the dynamic specification, eq. (2), are as follows. If the shift in public debt structure goes towards short-term debt instruments and the change in the debt structure is by 1 p. p. the growth rate of interest payable increases by 0.26 p. b. When the shift is done by the change within the residency of the creditors, the shift going from domestic creditors to the foreign by 1 p. p. leads to increase in the growth rate of cost of public debt service by 0.34.

Tables 3, 4 and 5 shows that findings in this contribution seem to be robust to chosen estimation technique mostly in the analysis of debt decomposition by the origin maturity of debt instruments where it is obtained similar results among all estimates. This is not the case of the decomposition of the debt structure by the residency of the creditors, where the two-way fixed effect does not confirm results of all other estimates.

Table 5 Results of dynamic specification

Model	1	2	3	4
dInter_p$_{(-1)}$	0.1357***	0.1369***	0.0869	0.0847
	(0.0378)	(0.0381)	(0.0591)	(0.0599)
dDebt	0.0102***	0.0102***	0.0098***	0.0098***
	(0.0007)	(0.0007)	(0.0014)	(0.0014)
Growth	-0.0016	-0.0016	-0.006	-0.0059
	(0.0016)	(0.0016)	(0.0043)	(0.0043)
dGov	0.4444**	0.4439**	0.1704	0.0262
	(0.2079)	(0.2087)	(0.1796)	(0.1799)
Infla	0.02***	0.02***	0.0261***	0.0262***
	(0.0035)	(0.0036)	(0.0029)	(0.0028)
Short	0.0026*			
	(0.0014)			
Long		-0.0026*		
		(0.0014)		
CreD			-0.0033***	
			(0.0006)	
CreF				0.0034***
				(0.0006)
J-stat.	18.081	18.077	11.090	11.035
Ins. rank	21	21	16	16

*Notes: Standard deviations are included in parentheses; standard deviations are calculated using robust estimates; *, **, *** stand for significance levels of 10%, 5% and 1%.*

Source: Own calculations

V. Conclusion

The topic of public debt and indebtedness of public sector is still one of the required topics of economic policy, especially in advanced economies with high level of the debt quota. In this contribution, it is dealt with the cost of debt service and the shifts in public debt structure. The aim of this contribution was to investigate what is the effect of the shift in structure of public debt on the cost dynamics of public debt service of advanced countries. This purpose has been derived from Murín (2016a) who examines the influence of the shifts of public debt structure on the economic growth of the EU member countries. From the methodological point of view the panel data regression of 22 OECD members in period from 2000 to 2015. There are two specifications tested. The first is the static specification and the second is the dynamic specification with lagged dependent variable. The cost of public debt service in this paper is approximated by the interest payable of the general government as a share of GDP. Two types of the public debt structure decomposition were examined. The first one is a decomposition by the origin maturity of debt instruments, where two shares of debt are. Namely short-term and long-term. The criterion is one

year. The second one is a decomposition by the residency of creditors and there are domestic and foreign creditors. Sum of shares in each decomposition is 100.

According to Buchanan (1958) or Teles and Mussolini (2014), the linkage between the public debt and the economic growth is represented by the amount of expenditure spent on debt service. From Murín (2016a) the hypothesis was derived that if some shifts in public debt structure increase the economic growth the situation appears because the shift creates pressures on the cost of public debt. In this contribution, we conclude that there is a statistically significant and robust impact of debt structure shift when the debt decomposition is made by the origin maturity of debt instruments. The shift from the long-term to short term debt instruments appears to have positive impact on the debt cost. The effect of the shift from the domestic to foreign creditors seems to have positive impact but not as robust as previous one. These results stay in direct contradiction with the hypothesis derived from Murín (2016a). It could mean that the hypothesis is wrong, or the estimates in Murín (2016a) are not correct or in this contribution the dependent variable is not chosen right. Despite of these, it needs to be said that the findings suggest that if the government would prefer long-term debt instruments more and would sell them to domestic creditors more, it creates pressures for debt interest paid by the general government to slow down at least.

Acknowledgements

This work was supported by funding of specific research at Faculty of Economics and Administration – project MUNI/A/1076/2016. This support is gratefully acknowledged.

References

Adam, C. S.; Bevan, D. L. (2005). Fiscal deficits and Growth in Developing Countries. *Journal of Public Economics*, 89(1), 571–597.

Afonso, A.; Alves, J. (2014). The Role of Government Debt in Economic Growth. Lisboa Scholl of Economics and Management Working Paper WP16/2014/DE/UECE. Retrieved from: http://pascal.iseg.utl.pt/~depeco/wp/wp162014.pdf.

Arellano, M.; Bover, O. (1995). Another Look at the Instrumental Variables Estimation of Error-components Models. *Journal of Econometrics*, 68(1), 29–51.

Buchanan, J. M. (1958). *Public Principles of Public Debt: A Defense and Restatement*. Homewood: Richard D. Irwin.

Checherita C.; Rother, P. (2010). The Impact of High and Growing Government Debt on Economic Growth: An Empirical Investigation for the Euro Area. ECB Working Paper No. 1237. Retrived from https://www.ecb.europa.eu/pub/pdf/scpwps/ecbwp1237.pdf.

Darreaue, P.; Pigalle, F. (2013). Equivalence in the Internal and External Public Debt Burden. *Economics Bulletin*, 33(4), 2475–2482.

Dell'Erba, S.; Hausmann, R.; Panizza, U. (2013). Debt Levels, Debt Composition, and Sovereign Spreads in Emerging and Advanced Economies. CID Working Paper No. 263. Retrieved from https://research.hks.harvard.edu/publications/getFile.aspx?Id=972.

Grauwe, P. (2016). *Economics of Monetary Union* (11th ed). Oxford: Oxford University Press.

Heady, Ch.; Johansson, A.; Arnold, J.; Brys, B.; Vartia, L. (2009). Tax Policy for Economic Recovery and Growth. University of Kent School of Economics Discussion Paper No. 0925. Retrieved from: https://www.kent.ac.uk/economics/documents/research/papers/2009/0925.pdf.

Kneller, R.; Bleaney, M.; Gemmell, N. (1999). Fiscal Policy and Growth: Evidence from OECD Countries. *Journal of Public Economics*, 74(2), 171–190.

Murín, M. (2016a). Public Debt and Economic Growth: An Empirical Analysis of the Structure Changes of Public Debt in the EU Countries. In Majerová, I.; Kotlánová, E. (eds.). *Proceedings of 14 th International Scientific Conference "Economic Policy in the European Union Member Countries".* Karviná: Silesian University. 841–849.

Murín, M. (2016b). Role of Debt Structure on Economic Growth of Advanced Economies. In Machová, Z (ed.). *The 6th International Scientific Conference "Taxes in the World"*. Krakow: European Association Comenius – EACO and VSEO. 101–110.

OECD Statistical Database (2017). *France: OECD.Stat*. Retrieved June 7, 2017, from http://stats.oecd.org/.

Panizza, U.; Presbitero, A. F. (2014). Public Debt and Economic Growth: Is There a Causal Effect? *Journal of Macroeconomics*, 41, 21–41.

Panizza, U.; Presbitero, A. F. (2013). Public Debt and Economic Growth in Advanced Economies: a Survey. *Swiss Journal of Economics and Statistics*, 149(2), 175–204.

Teles, V. K.; Mussolini, C. C. (2014). Public Debt and the Limits of Fiscal Policy to Increase Economic Growth. *European Economic Review*. 66, 1–15.