

# ANALYSIS OF PUBLIC DEBT AT SUBNATIONAL GOVERNMENT LEVELS: EVIDENCE FROM CANTONS IN THE FEDERATION OF BOSNIA AND HERZEGOVINA

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## Abstract

*Total public debt of ten cantons in the Federation of Bosnia and Herzegovina (FBiH), one of the two entities in BiH, have substantially increased in recent years. Since it is relatively small in nominal terms, this galloping trend have not attracted enough attention of decision makers. If these developments continue in the future, the public debt at cantonal level in FBiH might create serious fiscal problems and become one of central issues for policy makers. This has motivated our investigation of determinants that caused the increase in public debt over the period 2012-2018.*

*We apply a panel regression analysis and investigate how budget deficit, trade balance, unemployment rate, size of population and institutional changes affect public debt. We find that public debt is positively associated with budget deficit but negatively associated with trade balance, the size of population and institutional changes. These findings motivated policy recommendations presented in the paper.*

**Key words:** public debt, Federation of Bosnia and Herzegovina, subnational governments

**JEL classification:** H68, H74

## 1. INTRODUCTION

Public debt is an important indicator of sound and sustainable public finance and fiscal policy in each country. When public debt increases it is inevitable to expect negative effects in the economy over time, including decrease in investments and a need to introduce austerity measures, which by definition can have regressive consequences. Accumulation of current public debt in many emerging markets' and developing economies might turn into financial crisis with immense negative consequences (Kose et al. 2020).

Public debt and its effects on economic outcomes are on-going topic in the literature, but still the subject remains unexplored, especially for the country in our focus. Generally, researchers investigate the effects of public debt at country level using various aggregate variables from the System of national accounts (Sinha, Arora, and Bansal 2011; Bittencourt 2015; Omrane

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Belguith and Omrane 2017). Special research attention in the related literature has been given to the European Union and the Eurozone countries, as one of the convergence criteria for joining the Eurozone is appropriate control of public debt (Franks et al. 2018). Those countries that managed to keep their public debt below the Maastricht criteria level (60% of GDP) have experienced higher economic growth rates, which applies to both, the Euro and non-Euro EU member countries (Bökemeier and Clemens 2016). It is also well recognized that excessive debt levels in Eurozone member countries create substantial risk to the EMU itself. In some cases, public sector debt is also linked with the current account deficit, which creates burden to national budgets when it reaches high levels (Tokarski 2019).

As a matter of fact, public finance analysis at subnational level is less accentuated in the literature than that of national level. This might be due to the fact that national statistical agencies rarely publish subnational public finance data. Therefore, a lack of research and consequently poor policy recommendations in this subfield is a feature of this literature. But, importance of investigation of the public debt at subnational levels is emphasized by the fact that most questions of practical nature for ordinary citizens and SMEs are regulated very often at subnational levels. Additionally, if public debt at subnational level is considered sustainable in eyes of investors then interest payments for the debt financed investments will be more affordable. Hence, sound public finance and manageable public debt at subnational levels are of crucial interest for citizens and businesses.

It is stipulated in relevant laws in FBiH that local governments, within their competence and jurisdiction, bear the sole responsibility for their own public debt management. Higher levels of government do not take any responsibility whatsoever related to public debt management of local governments. No-deficit-carryover principle is also one of fiscal rules in FBiH that contributes to debt accountability of lower-tier governments at all levels. However, cantons (there are ten cantons in FBiH<sup>1</sup>) do not have sufficient financial power since only few laws that generate public revenues are in cantonal jurisdiction.<sup>2</sup> About 5% of budget revenues is generated by laws in cantonal jurisdiction and cantons cannot rely on it in their debt management strategies. In some other countries, such as Switzerland, cantons are provided with stronger financial basis having tax autonomy in personal, corporate and property taxes (Kirchgässner 2013). Hence, the question of successful debt management at cantonal levels in FBiH becomes even more important.

Bosnia and Herzegovina is a decentralized country

in terms of financial competences. For instance, Value Added Tax (VAT) and other forms of indirect taxation are in jurisdiction of the state level, while income tax, profit tax, property tax and other forms of direct taxation are at the lower levels of government. Since BiH is composed of two entities, namely, FBiH and the Republika Srpska entity, plus the District Brcko of BiH, public debt is administered at numerous levels. Cantons are intermediate level of government located between the FBiH level and the municipalities. Furthermore, FBiH is organized as a fiscally decentralised entity (federal level, cantons, cities and municipalities). Subnational level in this paper refers to ten cantons in FBiH.

The issue of sustainability of public debt is not considered priority in the current institutional environment of FBiH since the relevant laws for budget planning and public borrowing impose strong fiscal rules starting from the borrowing level restrictions to the conditioning the positive primary budget balance and total budget balance (where revenues and receipts are equal to expenditures and outlays). Relevant laws in FBiH also prioritize the debt repayment over other payments from budget, so the risk of default on public debt repayment nearly does not exist.

Sustainability of public debt correlates with fundamental macroeconomic indicators (Albu and Pelinescu 2000) and also depends on the primary fiscal balance. According to the Law on budgets in FBiH, the primary fiscal balance ought to be positive or neutral (i.e. equal to zero) and this fiscal rule enormously contributes to the public debt sustainability.<sup>3</sup> Moreover, fiscal rules are often designed without possibility for monetization of public debt by monetary policy, which applies to BiH. In the absence of active monetary policy in BiH, it is important to rely on strong fiscal rules to prevent the necessity of monetization of the public debt. Regardless, the context of public debt as a part of fiscal policy will be important to study in the near future (when more data become available for FBiH) including all elements of sustainability that can be found in the relevant literature.<sup>4</sup>

The main purpose of this paper is to address public debt at subnational levels in FBiH and examine factors which affect the size and variability of public debt. We investigate the public debt of ten cantons in FBiH, while the bulk of the public debt is at FBiH entity level and less of it at municipality level. Subnational governmental levels in FBiH have begun to increase their public debt as a result of decreasing public revenues during the crisis period (Basaric, Brankovic, and Lazovic-Pita 2018). Similar debt structures are observed in other countries (Kirchgässner 2013). However, we hypothesize that public debt of

subnational levels, i.e. cantons, is a consequence of different economic determinants. Some authors who are mainly coming from the political sciences (e.g. Ellis and Schansberg 1999; Feld and Kirchgässner 2001), also include non-economic factors in their analyses, stressing a way of budgeting and other aspects of political life that change debt accumulation in times of fragmented/unstable governments. From that politico-economic perspective, a group of empirical models appeared in the literature (e.g. Pettersson-Lidbom 2001; Benito and Bastida 2004; Ashworth, Geys, and Heydels 2005). However, we restrained from that line of reasoning and limited the scope of the paper to standard economics analytical framework.

The paper is structured as follows. After this introductory section in the next one we present literature review and introduce our econometric model. The third section describes methodology and the data used in the empirical investigation. The econometric analysis and the obtained results are presented in the fourth section. In concluding section, we summarize the main findings and propose some recommendations, both of practical and of theoretical nature.

## 2. LITERATURE REVIEW

The existing literature explains several ways in which public debt affects economic activity. We consider the debt as the accumulation of previous public deficits (Stiglitz and Rosengard 2015). An increasing public debt can have the following consequences: transfer of the burden of current expenditures to future generations; reduction of investment and capital accumulation since economic subjects tend to substitute debt for capital; lowering of living standards in the future through unavoidable foreign borrowing; negative savings of the state which cannot be reduced by private savings, etc. It also might affect consumption or limit the size and effectiveness of expansionary fiscal policy measures during economic downturns and dampen long-term growth by weighing on productivity-enhancing private investment (Kose et al. 2020).

Obviously, the debt will not get out of control at any government level if incumbent government increases revenues and/or cut expenditures (Mahdavi 2014). From a long-run perspective, cutting expenditures in subnational governments in order to achieve sustainable public debt levels can also cause some negative consequences, if it is done through reduction of investments in local infrastructure programs or financing services and communal public utilities (Bröthaler, Getzner, and Haber 2015). Problems with unsustainable fiscal policies at (sub)national levels

could be further exacerbated with economic crises bursting or volatility in foreign exchange rates if the debt were issued in foreign currency.

Borrowing as a way of financing local government capital projects is also emphasized in the literature (Kitchen, McMillan, and Shah 2019). Higher levels of government often exert control over local governments' access to capital markets because the former reluctantly accepts any responsibility holding the latter completely accountable for sustainability of its own fiscal policies. Local debt burden is a particularly relevant indicator of fiscal sustainability of a government (Gorina 2013) and it is usually measured as a ratio of local direct debt or total local long-term debt divided by population or personal income or some form of asset revaluation.

Skidelsky (2018) points out that the UK Treasury policy in period 2010-2016 aimed to implementing government austerity measures were motivated to reducing deficits and consequently reducing public debt. The author explains that this policy was unsuccessful because at the same time the austerity measures caused shrinking of the economy (measured by real GDP growth), which resulted in higher non-expected debt levels. Contrary to this policy, Bittencourt (2015) reports evidence that economic growth is able to significantly reduce the debt ratios.

The trade deficit has a significant impact on the budget deficit. In the case of trade deficit, tax revenues are higher and the budget deficit tends to be smaller in the short run, thus often motivating the government to lean less on debt issuance for financing of its programs. Importantly, Santini (2020) argues that there is no difference between increasing tax revenues based on foreign trade deficits and public debt.

Public debt of Austrian municipalities, for example, increased in years when Austria joined the EU and, consequently, the country had to reduce public deficits substantially (Bröthaler et al. 2015). The authors also observed the primary surplus of municipality as one of the central indicators for the sustainability of budgetary policies, and besides debt, they focused on the unemployment rate, GDP of the municipality and population as explanatory variables in their analysis. One of conclusions was that larger municipalities, compared to smaller ones, were able to respond in different ways to increasing local debt, such as: easier access to provincial or national funds and stronger fiscal strength with respect to higher fiscal revenues of their own, thanks to attractive location for businesses.

Research on public debt within a country is recommended in literature (e.g. Alesina and Passalacqua 2016) since different public policies may exist in localities within one country. This kind of studies

should focus on determinants of public debt in a current institutional setting. Therefore, we focus on literature including primarily Benito and Bastida (2004); Ashworth, Geys, and Heydels (2005); Veiga and Veiga (2014); Bogumil et al. (2014); Balaguer-Coll, Prior, and Tortosa-Austina (2015); Ehalaiye, Botica-Radmayne, and Laswad (2017); Bellot, Sellva, and Menendez (2017); Omrane Belguith and Omrane (2017); etc. This literature review revealed a whole list of public debt determinants at subnational level. From the literature review we could not identify a unique model specification for our investigation and model. These authors also focus on financial, social and political variables, which make such investigation even more demanding. However, following the investigated literature, BiH specifics and data availability, we built an empirical model which includes economic variables: budget deficit, trade balance and unemployment rate as important economic determinants of public debt. Moreover, our model controls for specific institutional changes and the size of population as relevant determinants for investigation of public debt at cantonal levels in FBiH.

### 3. RESEARCH METHOD AND DATA

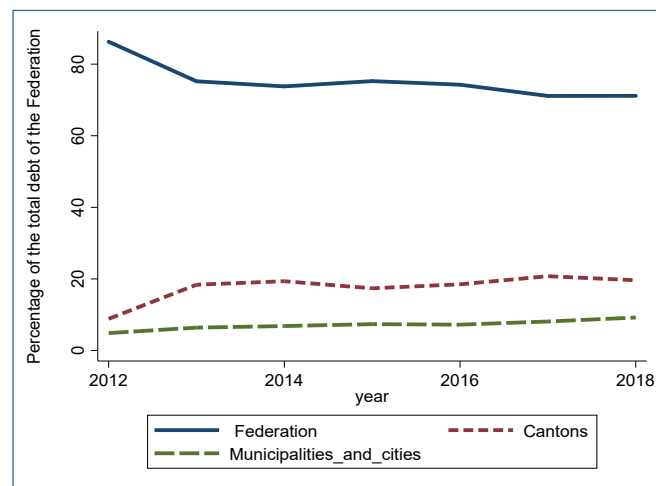
In comparison with other countries, local governments in FBiH have accumulated lower debt than higher levels of government.<sup>5</sup> Figure 1 presents public debt at different administrative levels in FBiH for the period 2012-2018.

In the examined period, subnational public debt at cantonal level exceeded 20% of the public debt in FBiH, confirming that the major part of the public debt is located at the entity level. With the growth of debt at the cantonal level in year 2013, the debt at the entity level of FBiH decreases in almost the same proportion. Thus, such behaviour of public debt indicators gives rise to the importance of our research focus.

#### 3.1 Data Collection

In this paper we focus on 10 cantons in FBiH over the period 2012-2018. The data at cantonal government debt levels were taken from the Federal Ministry of Finance, which is in charge of the debt data collection at all levels of government in FBiH. The data on cantonal deficits are taken from the Centre for Advocacy for Civic Interests,<sup>6</sup> which maintains a public finance database at all levels in BiH.<sup>7</sup> The data on trade balance, unemployment and population were taken from the Federal Institute for Statistics.

**Figure 1.** Public debt in Federation of BiH (%)



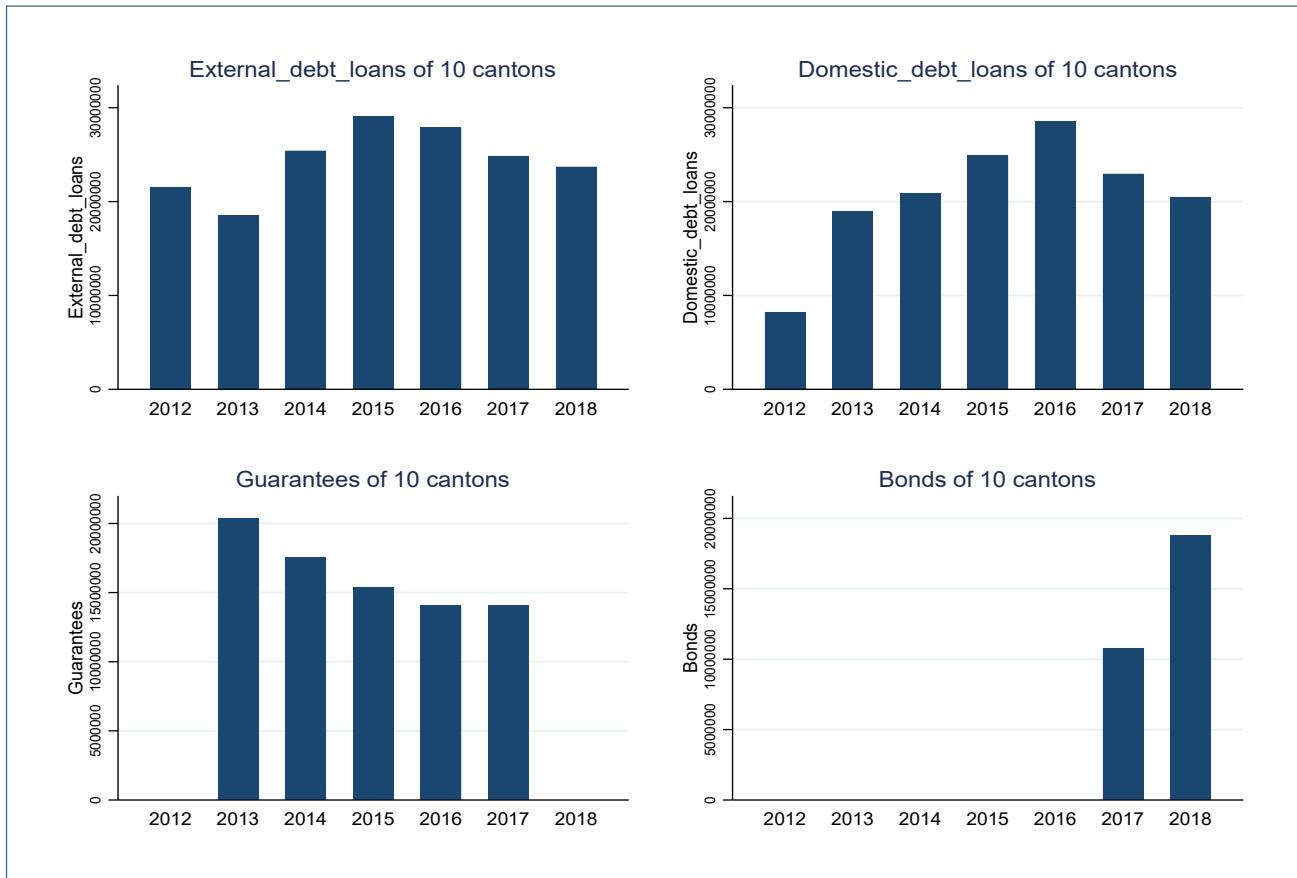
Source: Ministry of Finance and Treasury of BiH 2012-2018

#### 3.2 Variables

In order to measure the level of indebtedness in 10 cantons of FBiH and to analyse how the relevant variables influence the levels of this debt we specify a model in which dependent variable is public debt per capita at cantonal level. Public debt appears in different forms as the dependent variable and a measure of fiscal sustainability in the existing literature (e.g. Benito and Bastida 2004; Gorina 2013; Mahdavi 2014; Veiga and Veiga 2014; Brothaler et al. 2015; Alesina and Passalacqua 2016; Omrane Belguith and Omrane 2017; etc.).

However, due to severe data limitations at the cantonal level in FBiH, we were unable to build the debt-to- or primary surplus-to-nominal GDP ratio variables, often identified in the previous studies. Consequently, we rely on a proxy variable formed as a summation of external debt loans, domestic debt loans, guarantees and bonds as presented in Figure 2, and used in some research (e.g. Balaguer-Coll, Prior, and Tortosa-Ausina 2015). Summation of all these types of debt in per capita terms represents the dependent variable of the model.

Following the existing literature, we include budget deficit as the independent variable in the model. The relationship between spending and taxes do not provide a complete picture of government policy. Thus, deficit and deficit policy have a major impact on the level of borrowing and, consequently, on public debt. In our model the budget deficit (i.e. total revenues minus total expenditures) is lagged for one year. Namely, in accordance with the law, the budget deficit in the previous year might create an obligation for borrowing in the next year, which motivated this choice

**Figure 2.** Structure of total debt at the cantonal level 2012-2018

Source: Federal Ministry of Finance in BiH 2012-2018.

VAT is the most important source of public revenues in all cantons in FBiH. It makes the highest percentage share of the total tax revenues in all cantons. Generally, public revenues from indirect taxes are not always an outcome of increased economic activity, but can also be caused by higher imports activities, i.e. by increasing trade deficit. Therefore, the larger the trade deficit, the lower the cantons' public debt level. Accordingly, following the existing literature (e.g. Santini 2020) we assume that one of the determinants of public debt in the cantons is their trade balance, which is the second independent variable in the model. There are theoretical implications of the impact of trade balance on public debt on country level (Santini 2020), but the issue is still empirically under investigation.

The size of population is one of the criteria for the distribution of public revenues from indirect taxes in FBiH. As an illustration, a higher population density in Portuguese local governments' was found to be associated with lower indebtedness (Veiga and Veiga 2014), although the effect of density is not always found to be relevant (Balaguer-Coll, Prior, and Tortosa-Ausina

2015). A significant positive relationship between the size of local population and per capita debt service was also confirmed in the literature (e.g. Medve-Balint and Bohle 2016). Population size has statistically significant positive effect on debt (Ashworth, Geys, and Heyndels 2005) since debt arises from additional demand for public expenditures in the long run in countries with larger population. Simply, this is a variable worth controlling in our model.

Strong economic growth should reduce total unemployment, which leads to additional public revenues. According to the Okun's law, there is a negative relationship between output gap and unemployment (Krugman and Wells 2018). An increase in output and decrease in unemployment can lead to higher tax revenues that, in turn, can lead to a smaller public debt. Consequently, our next independent variable is cantonal unemployment rate as proxy for the output level performance (following Okun's law arguments). Unemployment is identified as a variable used in similar models (e.g. Wassmer and Fisher 2011; Veiga and Veiga 2014; Bogumil et al. 2014; Bröthaler et al. 2015; Medve-Bálint and Bohle 2016).

In the end, it is important to mention that the Law on Public Revenues Determination (LPRD) has been changed in 2015, which affected the public revenue distribution at subnational levels in FBiH. Other aspects of the relationship established between subnational and national levels (i.e. cantons and FBiH and the state) have been pretty much unchanged during the period. Having in mind that this structural brake could systematically affect public debt at cantonal level, we control for this institutional change <sup>8</sup> by introducing a dummy variable (*LAW*: 0 for period prior to 2015 and 1 for period afterwards). Some authors took similar approach by analysing changes in local government institutional conditions, for example, in pre- and post-crisis periods (Bisogno et al. 2019).

While some authors argue that political variables are not relevant to debt financing (Ellis and Schansberg 1999), others introduce political variables to measure the effects of electoral cycles on fiscal outcomes (Kachelein, Lami, and Imami 2010; Lami, Kachelein, and Imami 2014). The authors scrutinized carefully the effect of electoral cycles on fiscal outcomes and made a case in favour of the influence of political cycles on number of economic indicators. Thus, elections were identified as a potential determining factor of public debt with assumption that public debt could increase in the election years due to the fiscal illusion of voters. However, electoral cycles are very specific in FBiH because they are being organized every second year as general and local elections. Besides this, our research is focused on economic determinants, therefore elections as a variable are out of the scope of this research, but worth exploring in the future. All in all, we complete our discussion with Table 1, which summarizes variables used in the model, including expected sign to be estimated.

Eventually, it is inevitable to mention the issue of causality between institutions and fiscal outcomes, which has been recommended to be considered in similar research (Alesina and Passalacqua 2016). Unfortunately, the data availability at the cantonal

level, including the sample size, did not give us more space for such kind of empirical testing, and this remains to be addressed in the future research when more data will be available.

### 3.3 Model specification

The main variables of our model specification are introduced in the previous section and linked to the existing literature. Thus, the model specification reflects the existing literature by using the following independent variables, starting with budget deficit/surplus <sup>9</sup> (e.g. Benito and Bastida 2004; Balaguer-Coll, Prior, and Tortosa-Ausina 2015) and the size of population (e.g. Benito and Bastida 2004; Bogumil et al. 2014; Bittencourt 2015). Next, unemployment is identified as a relevant variable in similar models (Wassmer and Fisher 2011; Veiga and Veiga 2014; Bogumil et al. 2014; Bröthaler et al. 2015; Medve-Bálint and Bohle 2016) but we use unemployment rate to take into account the size of cantons (e.g. Koomin and Seunghoo 2018) including change in fiscal institutional environment which is specific to FBiH and the period under observation (similar research is by Koomin and Seunghoo 2018). The literature (e.g. Omrane Belguith and Omrane 2017) often uses the openness variable (exports + imports as a share of GDP) as an independent variable that explains public debt. Recall, there are no GDP statistics for 10 cantons in FBiH, and we use the trade balance (exports-imports of goods) as the best available proxy.

Finally, we estimate the model based on panel data from 10 cantons in FBiH and the period 2012-2018 with the following empirical specification:

$$\ln DEB_{pcit} = \beta_0 + \beta_1 DEF_{it-1} + \beta_2 TRDB_{it} + \beta_3 \ln POPUL_{it-1} + \beta_4 UNE_{it} + \beta_5 LAW_t + \varepsilon_{it}$$

where  $\ln DEB_{pcit}$  denotes the dependent variable, i.e. total public debt per capita,  $\beta_0$  refers to a constant term,  $DEF_{it-1}$  stands for budget deficit lagged for one year,  $\beta_1$  denotes the regression coefficient which reflects the impact of deficit on the public debt.  $\beta_2$  manifests the impact of trade balance ( $TRDB_{it}$ ) on public debt, while  $\beta_3$  shows the impact of the size of population ( $\ln POPUL_{it-1}$ ) lagged for one year in accordance with the LPRD. According to this law, the number of inhabitants is one of the criteria for the distribution of public revenues from indirect taxes in the cantons in FBiH. Coefficient  $\beta_4$  captures the impact of unemployment rate ( $UNE_{it}$ ) while coefficient  $\beta_5$  indicates the

**Table 1.** Independent variables and expected relationships

Independent variable	Expected relationships
Budget deficit rise	Positive
Trade balance rise	Negative
Population rise	Positive
Unemployment rate decline	Positive
Law amendments introduced	Positive

Source: Authors' creation

impact of law amendments, i.e. institutional change that occurred in 2015. We use logarithmic transformation of some variables as they provide a better statistical diagnostic.<sup>10</sup> Standard descriptive statistics and correlation matrix for variables used in the model are reported in Tables 2 and 3 below.

A look at the Pearson correlation matrix in Table 3 reveals that public debt at subnational government levels in FBiH is positively correlated with lagged budget deficit and with institutional change and negatively correlated with trade balance, lagged population and unemployment rate. We do not find worryingly high correlations between the variables which compose our model.

### 3.4 Empirical results

It is well known that the debt in one time period is affected by previous deficit and revenue distribution and therefore the variable that we use in our model

have elements of simple dynamic model with lagged influences. The results of our estimation are presented in Table 4 (from panel Random effect and heteroskedasticity robust model).

The Hausman test was used to decide between static panel models with fixed or with random effects. Results of the Hausman test (Prob>chi2=0.3808) suggested the random effects (RE) model as a better fit. The advantage of RE estimation of the variables used in the model is that the differences through the observed units (i.e. cantons) have an impact on the dependent variable. The Wooldridge test was applied to test for auto-correlation, which proved to be correct ( $p=0.3432$ ), indicating that no autocorrelation in the model is detected. The likelihood-ratio test was utilized for testing heteroskedasticity in RE regression model. The results of  $p$ -value were significant pointing to the presence of heteroskedasticity. In order to correct the model for heteroskedasticity, we used an estimate with robust standard errors.

**Table 2.** Descriptive statistics

Variable	Obs	Mean	Std.Dev	Min	Max
<b>Ln DEBpc</b> Debt per capita in BAM, logarithm	70	5.189	0.739	3.053	6.264
<b>DEF</b> Lagged budget deficit/budget surplus, in millions BAM	60	-0.308	1.369	-6.025	2.867
<b>TRDB</b> Export minus import, in millions BAM	70	-46.314	81.892	-313.760	35.017
<b>Ln POPUL</b> Lagged number of inhabitants, logarithm	60	11.962	0.983	10.058	13.120
<b>UNE</b> Unemployment rate, in % of labour force	70	44.540	7.685	29.733	59.398
<b>LAW</b> Law on PRD (0 for years before the Law was amended and 1 for years afterwards)	70	0.428	0.498	0	1

Source: Authors' estimates

**Table 3.** The correlation matrix

Variable	Ln DEBpc	DEF	TRDB	Ln POPUL	UNE	LAW
Ln DEBpc	1.0000					
DEF	0.1046	1.0000				
TRDB	-0.4370	0.0968	1.0000			
Ln POPUL	-0.2348	-0.1538	-0.3477	1.0000		
UNE	-0.5758	-0.2516	0.5120	0.3341	1.0000	
LAW	0.0814	0.4635	-0.0402	-0.0157	-0.3239	1.0000

Source: Authors' estimates

**Table 4.** Regression results: Public debt at subnational-cantonal level in FBiH

VARIABLES	lnDEBpcit RE robust (Est.1)	lnDEBpcit RE robust (Est.2)	lnDEBpcit RE robust (Est.3)	lnDEBpcit RE robust (Est.4)	lnDEBpcit RE robust (Est.5)
DEFit-1	0.053 (0.034)	0.054 (0.034)	0.048 (0.031)	0.056* (0.033)	0.071* (0.042)
TRDBit		-0.003*** (0.001)	-0.004*** (0.001)	-0.005** (0.002)	-0.004** (0.002)
lnPOPULit -1			-0.288** (0.135)	-0.322** (0.147)	-0.270* (0.153)
UNEit				0.008 (0.018)	-0.006 (0.014)
LAWt					-0.16 (0.104)
Constant	5.275*** (0.191)	5.149*** (0.197)	8.526*** (1.566)	8.568*** (1.621)	8.688*** (1.486)
Observations	60	60	60	60	60
R-squared	0.011	0.256	0.427	0.435	0.452
Number of Canton	10	10	10	10	10
Standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

Source: Authors' estimates

Table 4 reports panel random-effects estimates of coefficients with robust standard errors. In order to specify the model in the details, we opted for step-by-step approach, starting with introduction of public debt as an accumulation of past deficits. Hence, the lagged deficit for one year initially represents the only explanatory variable (Est. 1). In the next step, we introduced the trade balance variable (Est. 2) with statistically significant negative coefficient suggesting that the increase in cantonal trade balance influences the reduction of the public debt in cantons. Furthermore, we added the variable size of population lagged for one year (Est. 3) and this variable has a negative impact on public debt suggesting that population growth in the previous year leads to higher share of public revenues in the current year, and consequently, higher public revenues reduce the need for borrowing. Est. 4 accounts for the impact of unemployment rate on cantonal public debt. Cantonal unemployment rate as a variable appears insignificant in all models. The reason behind this finding might be that in the model we use unemployment rate based on registered unemployment data by statistical offices, which use less strict definition in comparison to the International Labour Organization (ILO). As a matter of fact, large number of employees works in undeclared economy of BiH, thus in FBiH as well (confirmed by

Pasovic and Efendic 2018; Efendic et al. 2018; Williams and Efendic 2020), which should be addressed in the future research. Finally, in our preferred model for interpretation, which is Est. 5, we introduce a dummy variable (*LAW*: 0 for period prior to 2015 and 1 for period afterwards) to control for institutional change introduced earlier.

The results in Table 4 demonstrate that  $R^2$  values of the model grow by including additional explanatory variables and values are significantly higher in the last estimation (Est. 5) than that of the basic regression model (Est. 1), which is expected by authors. Independent variables in the model explain around 45% of variance in the dependent variable. All significant variables (budget deficit, trade balance and population) included in the model are of the expected sign.

The findings of the paper are in line with the current literature. We confirm that an increase in the total deficit has a positive effect on total public debt (e.g. in Benito and Bastida 2004; Bogumil et al. 2014; Omrane Belguith and Omrane 2017). More precisely, increase in budget deficit in the previous year by 10 million BAM leads to increasing of the public debt at cantonal levels for about 7% on average, while holding all other predictors in the model constant (this caveat will not be repeated later). Additionally, an increase in trade



balance has the effect of reducing the public debt (see Santini 2020). Our model suggests that 10 million BAM of increase in the trade balance, *ceteris paribus*, reduces the public debt on subnational – cantonal level in FBiH for 0,4% on average. Furthermore, we find a significant and negative impact of the size of population on the public debt at subnational level in FBiH. Impact of population on the public debt in FBiH can be explained by the LPRD in FBiH which prescribes the population as one of the criteria for the distribution of public revenues from indirect taxes. Accordingly, increase in population by 1% is associated with lower public debt per capita at subnational – cantonal – level in FBiH by 0.27%. Thus, bigger cantons enjoy this feature of having more population.

The existing literature also points to a positive relationship between unemployment and public debt indicating that an increase in the unemployment ends in higher public debt level (Veiga and Veiga 2014). Unemployment rate in our model is not significant, possibly because of the existence of relatively large shadow economy, already explained above. In accordance with the literature review and taking into account the fact that the amendment of the LPRD may have an impact on the overall fiscal capacity of the cantons, and thus on the public debt, we included an institutional variable of law changes in the model (Est. 5). This variable has a significant impact (if rounded on two decimal digits) on the canton's public debt.

#### 4. DISCUSSION

Total public debt of cantons in FBiH in the period 2012-2018 increased from BAM 272 mil to BAM 420 mil, or from BAM 116 to BAM 191 per capita. Although still small as a nominal value per capita, the public debt in the period of seven years has increased for 65%. If decision makers design fiscal policies that prove ineffective in tackling this public debt tendencies, then further growing trajectory of the public debt might be expected. Inability to deliver local public goods, high quality public infrastructure or public capital formation are some of concerns of high and increasing public debt in cantons of FBiH. Management of public debt at subnational levels is seriously challenged in times of economic crises such as the economic recession of 2008-09. Such challenges might be expected in the current economic downturn caused by Covid-19 virus pandemics. In Switzerland, for instance, most cantons imposed 'debt-brakes' in form of strict rules for subnational governments to adhere to in times of considerably high debt levels. No such mechanisms exist in FBiH. Fiscal rules laid in the Law

on DBG are the only available tool in FBiH for public debt ceiling control while management of public debt is with subnational authorities.

In this paper a tribute is paid to fiscal institutions at state level when debt management is discussed (Musgrave and Musgrave 1989) meaning that even the strongest cantons, in terms of financial basis, cannot implement effective public debt management policy on their own. However, identifying influential determinants of public debt has utmost importance. First and foremost, public finance theory reminds us of public debt to be unavoidable consequence of large budget deficits. Whenever budget deficit at subnational government level surges it negatively affects total public debt, which our research confirms.

Cantons striving to alleviate public debt must design policies aiming at reducing budget deficits. In that context introduction of strong fiscal rules and other fiscal measures is highly recommended. At the same time government programs focused on alleviation of the unemployment can contribute to the fall in public debt. Although we lack sufficient economic growth data at cantonal level, recent economic growth in FBiH that was associated with public debt reduction clearly indicates that similar relationships can also be expected in cantons. This part of discussion should be explored in more details when more relevant data become available.

Other economic factors of influence on public debt, such as trade deficit that are examined in this paper, have been negatively associated with public debt. In this paper a trade-off between trade balance and public debt has been confirmed. If imports exceed exports then resulting indirect tax revenue increase (VAT, tariffs) alleviates fiscal deficit, but this is a short-run effect. However, other potentially negative effects of trade balance deficit in the long run, such as balance of payments changes and foreign exchange problems, must also be taken into account, but they are out of the scope of this paper. In future, reforms at cantonal levels oriented to creating business-friendly environment should be much more visible. International rankings such as Doing Business Report, The Global Competitiveness Report, Global Index of Economic Openness, etc. show that there is space for accelerating of market-oriented reforms in BiH.

The size of population as a variable in the model is identified to be important in the context of public debt at cantonal levels. An increase in the population size leads to smaller public debt per capita in cantons, which is not surprising outcome. However, this finding is very interesting in the light of external (out of FBiH and BiH), but also internal migrations. BiH and South East Europe is traditionally an emigration region

(Zbinden et al., 2016; Williams and Efendic, 2019), and this challenge should be carefully looked from the perspective of public finances in the future. We can identify both positive and negative internal migrations in cantons as well. Consequently, net internal annual migrations influence public debt per capita in the future period. Accordingly, cantons facing population decrease receive fewer public revenues, which is based on LPRD rule. This is a warning signal for cantons with negative internal migrations since they collect fewer financial resources for providing public goods which can further affect living standards in those cantons and cause even more migrations in the future.

Institutional changes in the form of changes in the formal rules (North 1990; Halebic 2011) that govern public finances, are also found to be important in debt management at subnational levels. Changes in laws that determine public revenues' shares between subnational units as well as intergovernmental levels can also affect public debt per capita in cantons and they need to be considered in the future considering rising debt tendencies.

Finally, as the main limitation of our research we faced lack of available data at cantonal level to consider some potentially relevant influences on public debt identified in the similar literature. This could include examples as GDP growth rate, gross fixed capital formation as percentage of GDP, share of government to GDP, ratio of regional GDP to the national one, net savings, and similar. However, this research provides an important insight to the policy makers but also serves as a platform for further investigations when more data will be available.

## 5. CONCLUSION

This research examines determinants of public debt at subnational level, i.e. cantons in FBiH over the period 2012-2018. An empirical analysis was conducted with panel data to examine socio-economic and institutional factors that literature indicates as potentially important in exploring public debt at subnational government level. The obtained results have suggested that budget deficit, trade balance, and the size of population in these cantons have important influences on the public debt per capita. Those variables have obtained expected direction of influence and are thus consistent with similar studies. Other variables examined in the model (including here unemployment rate and institutional change) proved to be insignificant (institutional influence was on the border line of statistical significance at the 10%). Sign of institutional variable was consistent while the unemployment rate proved to be inconsistent with relevant literature.

Analysis in this paper has shown that public debt at subnational levels can be caused by budget deficit, trade deficit, increase in size of population and specific institutional change. At the same time the paper also suggests that a weak link may exist between public debt and unemployment rate. Together these results provide important insights into the public debt analysis. However, more research should be done to examine other fiscal, economic and institutional factors that influence cantonal and municipal public debt in FBiH both in short and long term.

	Authors	Country	Time period	Article title	Determinants of public debt used in the research	Results
1	Ellis and Schansberg (1999)	SAD	1966-1994	The Determinants of State Government Debt Financing	Dependent variables: the ratio of a state's change in total debt to its expenditures for a given year, ratio of a state's change in total real debt to its population in a given year; Explanatory variables: Demographic variables, Control variables: annual per capita real income for each state, capital spending to total spending and amount of real capital spending per person; political variables (political party affiliation of the governor, the majority party of the state senate, and the majority party of the state House); Institutional variables (binary variable that indicates whether the state senate and state House are controlled by the same political party, amount of intergovernmental transfers from the federal government to each state government, whether the governor has line item veto power,	The age group effects and income growth exert important influences on state debt financing decisions. Political variables are largely irrelevant to debt financing. Strong balanced budget requirements and stringent debt limitations are effective at limiting debt.
2	Benito and Bastida (2004)	Spain	1994-1998	The determinants of the municipal debt policy in Spain	Dependent variable: Variation (increase/decrease) of annual debt stock/ total revenues (excluding indebtedness) Explanatory variables: dummy coastal (non-coastal and coastal municipalities), economic level, population, political ideology, capital expenditures, capital revenues, independence ratio (taxation revenues / total revenues, excluding indebtedness), non-financial surplus or deficit	Financial variables that better explain the issue of debt are non-financial surplus/ deficit, financial independence, capital expenditures and capital revenues. Political ideology does not affect local indebtedness, population growth has a positive effect on debt levels, non-coastal municipalities have a higher level of increase of borrowing than the coastal ones.
3	Bogumil et al. (2014)	Germany	2010	Determinants of local budget deficits	Dependent variable: municipal accumulated debt and annual budget deficit Explanatory variables: population, employment rate, purchasing power, workplace, share in employment in the services sector, population age quotient, Local council / City Parliament, a city without a district, political affiliation of the mayor.	Debt is affected by exogenous factors such as socio-economic and demographic variables, endogenous factors such as the city, income sizes such as sales tax revenues (for the debt level) as well the amount of staff costs, the size of parliament, reconciliation policies / conflict policies
4	Veiga and Veiga (2014)	Portugal	1979-2011	Determinants of Portuguese local governments' indebtedness	Dependent variable: real gross debt as a percentage of the three-year moving average of total effective revenues (without loans) of municipality "l" at year "t" (Debtit) (GMM) Explanatory variables: investment expenditures in total expenditures, interest on debt payments in total expenditures, own revenues in total revenues without loans, unemployment, earnings, type of area, building permits or number of tourist facilities per capita, election cycle or issues of the ruling party	Our results reveal that budget deficits and debt increase in the electoral year and, by a smaller amount, in the previous. The structure of expenditures and revenues also affects municipal budget balances and debt. Higher unemployment rates generate higher deficits and debt.

5	Balaguer Coll, Prior and Tortosa-Austina (2015)	Spain	2008.g	On the Determinants of Local Government Debt: Does One Size Fit All?	Dependent variable: debt level per inhabitant Explanatory variables: capital expenditures, net savings (funds available for investments), non-financial deficit/non-financial surplus, own fiscal capacity (revenues represented by municipalities' own resources) expenditure commitment (personnel and financial expenditures)/(total expenditures); level of tourism - index based on the (local) business tax, level of economic activity, population density; municipality's governing party;	Debt is affected by: capital expenditures, non-financial surplus (as a share of deficit), own fiscal capacity, and tourism.
6	Bittencourt (2015)	South America	1970-2007	Determinants of Gov't and External Debt: Evidence from ...	Dependent variable: government debt to GDP Explanatory variables: GDP growth rate, trade openness, ratio of liquid liabilities to GDP, inflation rate, share of urban population, accounts for constraints on the executive, share of gov't to GDP, population, Gini coefficients for income inequality.	Local government debt is affected by: growth and economic activity, which also reduces public debt by reducing government spending
7	Bellot, Sellva and Menendez (2017)	Europe subnational level	1996 - 2010	Determinants of sub-central European government debt	Dependent variable: direct debt variation in region "i" for period "j" Explanatory variables: GDP growth rate, ratio of regional GDPpc to national average, actual financing pc to regional average, total regional debt-free financing in constant € pc, operating income in constant € pc, share of tax revenues in total revenues, share of current expenditures in total expenditures, population + 65, population density, population of lower level of gov't related to total population, city as LGU, affiliation of regional and central gov't to the same political option, variable which identifies the cooperation of regional and central gov't and mutual assistance, election year,	Debt is affected by the amount of public financing per capita (lower financing per capita leads to higher levels of debt). In addition, regions characterized by higher debt-to-GDP ratios tend to have lower future deficits which is in line with theories and previous research. Almost all the political variables have not had any influence in debt variation.
8	Omrane Belguith and Omrane (2017)	Tunis	1986-2015	Macroeconomic determinants of public debt growth: Tunisia	Dependent variable: public debt as % of GDP Explanatory variables: GDP growth, gross fixed capital formation as % of GDP, inflation (CPI), real interest rate, Openness/ Trade (exports + imports as a share of GDP), budget deficit as % of GDP.	Inflation and investment reduce the level of public debt. The real interest rate, budget deficit and trade openness increase the public debt. Budget deficit is the most important determinant of public debt.

## Endnotes:

- 1 Una-Sana Canton, Posavina Canton, Tuzla Canton, Zenica-Doboj Canton, Bosnian-Podrinje Canton Gorazde, Central Bosnia Canton, Herzegovina-Neretva Canton, West Herzegovina Canton, Sarajevo Canton, Canton 10.
- 2 Such as: tax on property, property transactions, inheritance, transgressions, and some para-fiscal taxation in the field of communal, administrative and legal affairs.
- 3 Primary fiscal deficit is allowed only in times of natural disasters and government is obliged to counterbalance it during next five fiscal years.
- 4 Following equation:  $\Delta D = (\text{primary deficit}/\text{GDP}) + (\text{real interest rate} - \text{growth rate}) \times \Delta D$ ; where:  $\Delta D$  stands for the ratio of government debt to GDP, is standard formulae for debt dynamics discussion (Fisher and Easterly 1990). The basic logic of the equation is that change in the debt ratio (D) is equal to the primary deficit of public sector plus the debt ratio multiplied by the difference between average real interest rate on the debt and the growth rate of GDP. Obviously, the debt dynamics is influenced by this difference between the real interest rate and the economic growth rate. In case of positive primary deficit and the real interest rate being higher than the economic growth rate, the resulting debt to GDP ratio will continuously rise. This situation can hardly be sustainable since at some point in time the government will not be able to sell more debt for the purpose of financing the budget deficits. Another way of offsetting its initial debt for governments is to run primary surpluses (Romer 2019). Currently, measuring of GDP on subnational level in FBiH is not available, so discussion of government budget constraint for purposes of debt dynamics assessment is not possible.

As for the transversality condition which deals with sustainability of the debt in the context of this paper the subnational public debt in FBiH will be prevented from growing on an exponential rate (the snowball effect) only if the transversality condition is met. And this condition is met when the growth of private and of the public debt is lower than the real interest rate charged on this debt in the infinite horizon (Azizi et al. 2013). Again, here we were faced with data availability issue since real interest rate is not measured on subnational levels in FBiH.

Tax-smoothing model at its basic idea considers distortions in individual choices with resulting inefficiencies caused by taxes and recommends moderate tax rates over continuous changes of high and low tax rates periods. Since most important tax competences in FBiH regarding value added tax, corporate income tax and personal income tax are set on higher than subnational levels we considered tax-smoothing hypothesis not relevant for study in this paper. Fiscal system in FBiH is structured in a way to use the distribution of public revenues (more precisely, some cantons in FBiH have higher public revenues' distributional coefficients than others such as: Posavina Canton, Bosnian-Podrinje Canton) for smoothing insufficient taxes that are needed to finance government spending in those subnational government levels that are considered fiscally unsustainable.

- 5 According to the 2010 Law on Debt, Borrowing and Guarantees in FBiH (DBG), cantonal governments can contract long-term debt only if their total debt repayment in a given year does not exceed 10% of the previous year's revenues.
- 6 [www.cpi.ba](http://www.cpi.ba) (access: 28.01.2020.)
- 7 Except for 2018, which was taken from a report by the Federal Ministry of Finance.
- 8 The law amendments from 2015 did not change the main model of public revenues between FBiH and cantons but intergovernmental relations were modified in the way that the share of FBiH in indirect tax revenues' distribution increased while the share of cantons decreased. Financing of Canton Sarajevo dropped additionally upon inclusion of City of Sarajevo in this mode of revenue distribution.
- 9 In accordance with the Law on DBG in the FBiH, the budget deficit is used as a determinant of public debt, while the non-financial deficit/surplus is used in the literature review which we do not consider a problem since deficit definition might be country specific.
- 10 Variables with large monetary values as well as population were generally recommended to be inserted in models with logarithmic transformations (Wooldridge 2016). For variables that have had a large monetary value but some of them with negative sign such as DEF and TRDB, we did not use their logarithmic transformations.

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