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DETERMINANTS OF LOCAL GOVERNMENT DEBT IN THE FEDERATION OF BOSNIA AND HERZEGOVINA

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Abstract

The theory of fiscal federalism suggests that debt of subcentral levels of government is closely related to the internal organization of the country, defined through intergovernmental fiscal relations. Due to a great importance of subcentral levels of government in the theory and practice of fiscal federalism, the aim of the research is to empirically investigate the determinants of local government units' (LGUs) debt in the Federation of Bosnia and Herzegovina (FBiH). Based on panel data from 2011 to 2019 and by using a generalized method of moments (GMM), we estimate the model using sets of fiscal, institutional, economic, and demographic variables. The results indicate that the debt of LGUs in FBiH is significantly determined by intergovernmental fiscal relations defined through a group of fiscal and institutional variables and demographic factors. Significant determinants of LGU's debt in FBiH in the both short and a long term include financing of special expenditure needs of some LGUs together with LGUs within a canton with special expenditure needs. Furthermore, transfers from other government levels are also significant in the short and a long term. Based upon our results, we conclude with several policy implications important for the upcoming intergovernmental decision-making processes in FBiH.

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Introduction

Public debt is an important indicator of sustainable public finances and an instrument of fiscal policy in each country. After the global financial crisis (GFC) in 2008-2009, local government units (LGUs) in Bosnia and Herzegovina (BiH) were inevitably faced with a 'scissors effect' of increased local public expenditures and, under high dependence on shared revenues, falling public revenues which lead to higher local public borrowing. Basarić et al., (2018) state that from 2008 until 2015 the total aggregate local public debt (loans and issued securities) for all LGUs in BiH more than doubled.

Bosnia and Herzegovina (BiH) consists of two separate entities (FBiH and Republika Srpska (RS)) where FBiH is more fiscally decentralised entity (federal level, cantons, and municipalities and cities (LGUs)) and where LGUs in both entities have a low level of fiscal autonomy. This unique and complex constitutional structure represented as an asymmetric confederation inevitably affects intergovernmental fiscal relations and therefore requires further analysis of the position of LGUs within such a constitutional structure.

Public debt is a complex phenomenon and empirical research attempts to capture its complexity. Academic interest using different methods and available literature on determinants of subcentral public debt across (see: Cropf & Wandel, 1997, Feld et al., 2011, Balaguer-Coll et al., 2015, Galiński, 2023 and others) and between countries (Bellot et al., 2017) has been increasing over the last three decades.

However, there is no available empirical literature that investigates determinants of subcentral or local debt of LGUs in BiH (FBiH) by applying dynamic panel modelling. Balaguer-Coll et al. (2015) in their research on the determinants of public debt indicate that the same regulatory rules cannot be applied to all countries, nor can the same rules be applied to all LGUs within one country. Therefore, our model will include the specifics of rules that regulate intergovernmental fiscal relations in FBiH as variables of interest for this research and measure their impact on LGU local public debt. Bearing in mind the unique and complex constitutional organization of BiH that inevitably affects subcentral public revenues, expenditures and borrowing capacity, we wish to explore the determinants of LGU debt in FBiH in the short and in the long term. The specific reason behind our investigation lies in the future policy recommendations of intergovernmental fiscal relations that would consider the impact that fiscal, legal and institutional regulation has on LGU debt in the short-term and long-term. For such purposes, we define the following research questions:

1. What are the determinants of LGU debt in FBiH in the short and the long run?
2. Do country-specific fiscal and institutional variables affect LGUs debt in FBiH in the short and the long run?

By applying dynamic GMM modelling, we measure the determinants of LGU debt for the period 2011-2019 by using total local debt (in BAM) as a dependent variable. Based upon previous academic literature, independent variables are divided into several groups: fiscal, institutional, economic, and socio-demographic variables. After the introduction, the article is divided into four additional chapters – literature review followed by the methodology section and results and discussion section. The conclusion section tries to shed some light on the importance of intergovernmental fiscal relations in all aspects of public finance as well as in public borrowing, especially for small, post-transition countries with complex constitutional organization.

Literature review

The existing academic literature related to determinants of LGU or subcentral debt has been gaining prominence in the last thirty years. However, due to each country's specifics, in terms of empirical modelling, there is no single econometric model that represents a scientific standard in determining the factors of local debt at the subcentral level within countries. In this paper, we provide an overview of the literature that analysed the debt of LGUs. In the literature review, we will present the methods, dependent and group of independent variables used in previous academic research.

Early research of the 42 largest American cities from 1980-1990 applied a pooled time-series regression model in the works of Cropf and Wandel (1997). The authors concluded that city debt was influenced by intergovernmental grants and federal reform over which most cities can have little or no control. The authors also find that local political factors do not have a determining influence on the debt policy of the observed American cities. The variables used were classified as political variables (debt limits, the existence of referendums on borrowing, tax and expenditure restrictions, etc.) and socioeconomic variables (population density, federal grants, the tax reform law of 1986, etc.).

Feld and Kirchgassner (1999) by using the SUR (Seemingly Unrelated Regression) model for the year 1990 and by analysing 131 Swiss municipalities concluded that the procedure "top-down" does not affect the debt and that voters themselves care more about fiscal discipline than their elected representatives even if there are no limits on borrowing. The variables they

used were the unemployment rate, the number of taxpayers in the municipality, the average taxable income, the share of left-wing parties in the executive power, the number of parties in the executive power, a dummy variable if there was democratic decision-making on the budget deficit, and indices related to budget planning, etc.

Benito and Bastida (2004) by using OLS between-groups (BG) and within-groups (WG) for the period 1994-1998 analysed a sample of 130 cities in Spain and concluded that non-financial surplus/deficit, financial independence, capital expenditure, and capital income are the variables that best explain the indebtedness at the municipal level in Spain. The explanatory variables they used were non-financial surplus/deficit, ratio of tax revenue to total revenue, capital expenditure, capital revenue, population, economic level (measured by household disposable income), and political ideology.

Ashworth et al. (2005) by using a FMOLS (Fully Modified Ordinary Least Squares) regression model for the period 1977-2000 analysed a sample of 298 Flemish municipalities (Belgium) and concluded that there is a strong relationship between public borrowing and income, population, and debt servicing costs. The explanatory variables they used were income, population, income per capita, debt servicing cost, number of political parties, and number of political parties in coalition.

Bridges (2005) by using simple regression analysed the per capita debt for the population of 6 Kentucky cities in 2005 and concluded that governments with higher per capita tax revenues were less debt-financed than governments with lower tax revenues, and that densely populated areas have had higher public debt than sparsely populated areas.

Cabases et al. (2007) by using panel data stratified by population analysed a sample of 8102 municipalities in Spain in the period 1988-2000 and concluded that investments determine the public borrowing of Spanish municipalities and that municipalities with greater fiscal capacity borrow less. The explanatory variables they used were municipal GDP per capita, ratio of real investment to GDP, ratio of own tax revenue to GDP, ratio of debt service to current revenue in the previous year per size of population, net saving in debt servicing costs, and dummy variables.

Feld et al. (2011) by using a cross-sectional analysis for the years 1990 and 2004 examined the local debt per taxpayer of 137 large Swiss towns and villages and concluded that direct democratic rights and a high degree of fiscal autonomy led to a lower level of local debt and that the share of own revenues in total revenues has a significant negative effect on local debt. The explanatory variables they used were unemployment, the share of own income in the total income of the municipality, the number of taxpayers in the community, the tax rate of the average taxpayer, the role of the Minister of Finance, the number of political parties in the executive branch, a dummy variable for the fiscal referendum, etc.

Veiga and Veiga (2014) by using FE and System GMM for the period 1979-2012 and the period 2003-2012 examined a sample of 308 Portuguese municipalities and concluded that higher average salaries of the private sector at the municipal level led to lower public borrowing and that the public debt had grown in the election year and by the higher unemployment rate. The explanatory variables they used were share of capital expenditures in total expenditures, share of tax revenues in total revenues, percentage of population over 65-years, unemployment rate, population density, monthly salary per inhabitant, share of the population employed in the private sector, percentage of the municipal area assigned to urban use, election year, number of tourists offers per inhabitant, etc.

Bogumil et al. (2014) by using OLS examined the budget debt of 1,111 cities and municipalities with over 10,000 inhabitants in Germany in 2010 and concluded that exogenous factors such as the share of the population in basic social security, the importance of the place of work (East or West Germany), and the status as a district-free city were significant explanatory factors for the debt of cities and municipalities and that the debt increased with socio-economic problems. The explanatory variables they used are unemployment rate, sales tax revenue, number of social welfare recipients, fragmentation of local Parliament, membership of the CDU mayor, number of CDU members in the city council, place of work (East or West Germany) and others.

Galiński (2015) by using OLS for the period 1995-2013 investigated the determinants of LGU borrowing in Poland and concluded that the debt grew regardless of investment activities, which lead to the conclusion that some dysfunctions within the system of LGU revenues and expenditures lead to greater borrowing.

Balaguer-Coll et al. (2015) by using OLS quantile regression for the year 2008 analysed 1381 municipalities in Spain with over 1000 inhabitants concluded that the variables such as non-financial surplus/deficit, the ratio of tax revenues to total revenues, capital expenditures, and the level of economic activity have had a significant impact on public borrowing. Balaguer-Coll et al. (2015) says: "(…) the impact of the controllable debt drivers depends on the specific point of departure, so the imposition of strict and rigid limits on the level of debt may have an undesirable impact on the investment and development plans of wealthy munici-

palities, while arriving late to fiscally irresponsible municipalities (p. 31)."

The explanatory variables they used are non-financial surplus /deficit, ratio of tax revenues to total revenues, capital expenditures, population density, level of tourism development, level of economic activity (measured by the ratio of corporate income tax to total municipal revenues), net savings (funds for investment) and others.

Medve-Balint and Bohle (2016) by using RE (Random Effects Model) for the period from 2007-2013 analysed the relationship between public borrowing and EU grants and projects financed by EU funds in Poland and Hungary and concluded that access to EU funds caused an increase in debt at the subcentral level due to the need to co-finance such projects. The increase in the debt of the local level in Hungary has resulted in the taking away of certain responsibilities from the local level, thus reducing their role to a minimum.

Ehalaiye et al. (2017) by using pooled OLS regression for the period 2004-2015 analysed the debt of 78 local and regional governments in New Zealand and concluded that the own revenues of regions and provinces are the key determinant of their borrowing (not infrastructural spending) and that the post-GFC period is associated with an increase in infrastructure expenditures and borrowing. The explanatory variables they used were capital expenditure and investment in infrastructure assets, net surplus/net deficit, dummy variable for the years 2007 and 2008 (GFC), other assets (except infrastructure), other income (except income that is assigned to them at certain rates).

Most recently, Galiński (2023) by using panel data models with fixed effects (FE) for the period 2010-2021 for 222 municipalities from Wielkopolski Region in Poland concluded that there is a direct relationship between the share of PIT and CIT in own revenues and indebtedness of the municipalities. The decrease of unemployment rate and the growth of business density contributed to the decrease in the debt to revenue ratio. The increase of the indebtedness resulted from an increase in the investment activity, the share of spendings on wages as well as expenditures on education.

Data and methodology

As per available literature indicated in the previous section, Table 1 represents variables of interest we used in our research. Over the past thirty years, data availability has always been the major obstacle for any analysis within BiH/FBiH, and therefore it remains so for specific investigation into the topic of LGU debt and its determinants.

Table 1: List of variables in the research

Variable	Label	Description of variable
Dependent variable		
The debt of LGUs	DEB	Debt of LGUs, which includes foreign borrowing, domestic borrowing, securities, and issued guarantees (in BAM)
Fiscal/budget variables		
The budget deficit in a previous year	DEF-lag	Deficit shown in the financial reports of LGUs. If a surplus is shown, the unit is presented as having no deficit for the given year, i.e., with a value of zero (in BAM)
Capital expenditures/ Total expenditures	CAPITAL	Capital transfers and expenditures for the acquisition of fixed assets (in BAM) / Total expenditures (in BAM)
Share of tax revenues in total revenues	TAX	Tax revenues (in BAM)/ Total revenues (in BAM)
Share of current expenditures in total expenditures	EXP	Current expenditures (in BAM) /Total expenditures (in BAM)
Current and capital transfers of all levels of government	TRANS	The sum of current and capital transfers received by all levels of government (Federation, cantons and other LGUs) (in BAM)
Transfers according to the decisions of the Federal Government	TRANS FBiH	Amounts of allocated transfers taken from FBiH government decisions (in BAM)

Variable	Label	Description of variable
Institutional variables		
LGUs that have a special expenditure needs due to the financing of material costs of primary schools and that have more than 60,000 inhabitants	LAW SPEC dummy	The dummy variable has a value of 1 for LGUs that have a special expenditure needs, 0 for LGUs that do not have special expenditure needs.
LGUs in cantons that have a special expenditure need	CANTONSPEC dummy	The dummy variable has a value of 1 for LGUs in cantons that have special expenditure needs, 0 for LGUs in cantons that do not have special expenditure needs.
Economic variables		
Average annual net salary in LGUs	ACTIVITY	Average annual net salary in LGUs in all sectors according to NACE rev. 2 classification (in BAM)
Trade balance of LGUs	TRDB	Disaggregated trade balance as a difference between exports and imports at the level of LGUs (in BAM)
Gross profit of companies on an annual level in LGUs	B-PROFIT	The sum of the gross profit achieved by companies in LGUs for each year of observation (in BAM)
Demographic variables		
Population	POP	Total number of residents of LGUs
Population density per km^2	DENSITY	LGUs population/ LGUs area

Source: Author's own work.

We combined the data from the following institutions: Federal Ministry of Finance, Center for the Representation of Civil Interests (www.cpi.ba), Financial and Information Agency (FIA), Federal Office of Statistics, Published decisions of the FBiH Government, Dun & Bradstreet and the authors' calculations (dummy variables).

According to the literature review, there is no unique methodology used in the research of debt at the subcentral level. In the literature review section, we have determined several types of econometric estimations and methods deployed for the purposes of estimating local debt at the subcentral level (OLS, OLS quantile regression, FE, RE, SUR model and SGMM). Among the studies preferring the dynamic panel model in the analysis of debt at the local level within the country, we single out Veiga and Veiga (2014). As our research aim is to distinguish between short-term and long-term determination of debt at the local level in FBiH, the dynamic panel model is a suitable method of estimation. Specific characteristics of the sample (covering 79 local units for 9 years), in the situation when T < N, is an important argument for choosing a dynamic panel model (Greene, 2008). The dynamic panel model is also a good method of estimation when potential endogeneity is considered (Greene, 2008), which is the case in our model. The dynamic panel model offers the possibility of generating internal instruments, so the treatment of potential endogeneity is comprehensive and the estimation more consistent (Roodman, 2006 and 2007; Baum, 2006). Based on the above, we use a dynamic generalized method of moments (GMM) estimation established by Arrelano and Bover (1995) as well as Blundell and Bond (1998). In the situation of imbalanced panel models, the gaps and the lack of data are best tackled in the SGMM (Roodman, 2007). The initial general specification of our model is as follows:

$$DEB_{it} = \alpha_i + \beta * DEB_{it-1} + \delta * X_{it} + \lambda * T_t + u_{it} \qquad (1)$$

The dependent variable in model (1) is local public debt presented by DEB, while DEBit-1 presents the first lag of the dependent variable, and uit the error including all unobserved impacts on local public debt. The index "it" presents the LGUs in FBiH "i" in time "t". X_{it} is 1 x k vector of control variables identified as important determinants of local public debt, "d" presents k x 1 vector of parameters to be estimated while "T" presents the vector of time dummy variables included in the analysis. To examine the determinants of LGUs debt in FBiH, the article includes all 79 local units (N = 79) in FBiH over 2011-2019 period (T = 9). The dependent variable is debt of LGUs, similar to previous research as indicated in the work Ehalaiye et al. (2017).

Specification of the final dynamic panel model is in the following developed form:

$$DEB_{it} = \beta_0 + \beta_1 DEB_{it-1} + \beta_2 DEF_{it-1} + \beta_3 CAPITAL_{it} + \beta_4 TAX_{it} + \beta_5 EXP_{it} + \beta_6 TRANS_{it} + \beta_7 TRANS - FBiH_{it} + \beta_8 TRDB_{it} + \beta_9 ACTIVITY_{it} + \beta_{10} B - PROFIT_{it-1} + \beta_{11} LAW - SPECdummy_{it} + \beta_{12} CANTON - SPECdummy_{it} + \beta_{13} DENSITY_{it} + \beta_{14} POP_{it} + \varepsilon_{it} \quad (2)$$

For an initial empirical check, we estimate the Pearson coefficient of correlation and examine the coefficients of correlation for all variables in the model. We find that there is no problem of high correlation between variables (correlation coefficients as a rule of thumb are below the level of 0.7, Appendix 1).

Specifically with its policy implications, we expect that intergovernmental fiscal relations and fiscally, legally and institutionally established rules in FBiH, which in our model are measured by the variables of interest (LAW - SPECdummy, CANTON - SPECdummy and TRANS) have short and long-term effects on debt of LGUs and we want to investigate this impact.

Result and discussion

The results of our specification model are presented in Table 2. We treat the lagged effect of debt as predetermined, i.e., endogenous variables instrumented with lagged levels and differences. All other independent variables are treated as instruments. The sample has 79 groups, i.e., LGUs, and the model was estimated by using 25 instruments. We estimated specification by using the SGMM method and reported the obtained results in Table 2.

Table 2: Base model - SGMM dynamic panel - one-step robust estimate

The dependent variable is debt on subcentral level – LGUs in FBiH in current BAM (DEB)			
Variables (Short explanation of variable)	**Coefficients**	**z-statistic**	**p-value**
Constant (Intercept term)	-7,018,575.000	-2.08	0.037
DEB_lag (lagged dependent variable, 1st lag)	0.595	5.55	0.000
DEF_lag	0.248	0.73	0.466
CAPITAL	179.780	1.07	0.287
TAX	12,043.550	0.94	0.346
EXP	44,405.060	1.99	0.047
TRANS	0.753	1.68	0.092
TRANSFBiH	-0.340	-0.37	0.715
LAWSPECdummy	1,196,506.000	2.40	0.017
CANTONSPECdummy	-672,626.000	-1.97	0.049
TRDB	-0.000	-0.05	0.963
ACTIVITY	2,376.690	1.69	0.092
BPROFIT_lag	-0.000	-0.45	0.649
DENSITY	-623.030	-1.96	0.050
POP	36.840	2.50	0.012
Set of time dummy variables included			
_Iyear_2012	-1,089,931.000	-2.30	0.022
_Iyear_2014	-86,299.830	-0.20	0.844
_Iyear_2015	187,430.300	0.54	0.588
_Iyear_2016	-13,587.310	-0.06	0.954
_Iyear_2017	-13,350.530	-0.04	0.971
_Iyear_2018	-834,142.000	-1.78	0.075
_Iyear_2019	950,225.800	2.18	0.029
Model diagnostics			
Number of observations			598.000
Number of groups (i.e. LGUs)			79.000
Number of instruments			25.000
F test of joint significance *H_0: Independent variables are jointly equal to zero*			Wald $chi^2(21)$ = 1,357.870 Prob > chi^2 = 0.000
Arellano-Bond test for AR (1) in first differences *H_0: There is no first-order serial correlation in residuals*			z = -2.140 Pr > z = 0.032
Arellano-Bond test for AR (2) in second differences *H_0: There is no second-order serial correlation in residuals*			z = 0.350 Pr > z = 0.732

Model diagnostics	
Hansen J-test of overidentifying restrictions *H_0: Model specification is correct and all overidentifying restrictions (all overidentified instruments) are correct (exogenous)*	$chi^2(3) = 4.070$ $Prob > chi^2 = 0.254$
Difference in Hansen tests of exogeneity of GMM instrument subsets: Hansen test excluding SGMM instruments (i.e., the differenced instruments) *H_0: GMM differenced instruments are exogenous*	$chi^2(2) = 3.570$ $Prob > chi^2 = 0.168$
Difference in Hansen tests of exogeneity of GMM instrument subsets: *H_0: system - GMM instruments are exogenous, and they increase Hansen J-test*	$chi^2(1) = 0.500$ $Prob > chi^2 = 0.476$

Source: Author's calculations using STATA 15.

Statistical diagnostics suggest that all relevant tests for the SGMM type of modelling are appropriate. According to Arrelano and Bond (1991), the GMM requires that there is first-order serial correlation but that there is no second-order serial correlation in the residuals. As we may see from Table 2, those tests support the validity of the model specification. Baum (2006) argues that the Hansen J-test is the most used diagnostic in GMM estimation for assessment of the suitability of the model. The Hansen test of overidentifying restrictions does not reject the null hypothesis at any conventional level of significance (p = 0.254) and it is an indication that the model has valid instrumentation. The estimated coefficient of lagged dependent variable in the model has a value less than unity according to Roodman (2007). The estimated coefficient of lagged dependent variable in the model is 0.59 which means that the steady-state assumption holds. Bond (2002) suggests additional detection of the dynamic panel estimates validity by checking if the estimated coefficient of the lagged dependent variable lies between the values obtained from OLS and FE estimators, which is confirmed in our model (i.e., the following values are obtained: OLS = 0.81 > GMM = 0.59 > FE = 0.33). In our research, 25 instruments originated from the restrictions to use one lag for levels and three for differences in the data (i.e., the restriction is set to (13) in xtbond2) using special user-written command collapse for decreasing instruments. The number of instruments is lower than the number of observations and number of groups indicating that the model is appropriate.

The model indicates that the debt of LGUs in FBiH is auto regressive in the observed period indicating that local debt from the previous period is a significant determinant of the current local debt. The statistical significance of the lag-dependent variable (at the conventional 1% level) suggests that the current level of local debt presents the reflection of the historical effect of the debt at LGUs of FBiH. Other independent variables that were statistically significant are: EXP - current expenditure in total expenditure in LGUs; TRANS - transfers of all levels of government to LGU; LAWSPECdummy - LGUs that have a special expenditure needs due to: financing material costs in primary schools, +60,000 inhabitants, or have been assigned a special expenditure needs; CANTONSPECdummy - LGUs belonging to cantons with special expenditure needs; ACTIVITY - average net salary in the LGUs; DENSITY - population density in LGUs, POP – population in LGUs.

Our research results indicate the significance of the country specific variables, namely fiscal and institutional variables. Some of them represent the specifics of fiscal relations within FBiH meaning they could not be the subject of earlier research. Specifically, the short-term impact of the LAWSPECdummy is interpreted that LGUs that have a special expenditure need (due to the financing of material costs in primary schools or because of the number of inhabitants over 60,000 or those LGUs that have been assigned special expenditure needs) tend to have a higher level of debt on average by 1,196,506 BAM compared to those LGUs that have not been assigned special expenditure need (ceteris paribus, statistically significant at 5%). Furthermore, the short-term impact of CANTONSPECdummy means that LGUs that belong to cantons that have special expenditure needs tend to have a lower level of debt by 672,626 BAM on average compared to those LGUs that do not belong to cantons that are assigned a special expenditure need (ceteris paribus, statistically significant at 5%). Similarly, the short-term impact of the TRANS variable indicates that an increase in received transfers from all levels of government by 1 BAM leads to an increase in LGU debt by 0.75 BAM (ceteris paribus, statistically significant at 10%). The resented results contribute towards the investigation of secondary research question regarding the impact that specific institutional and legal variables have on LGU debt in FBiH.

Furthermore, the short-term impact of other variables on the debt of LGUs indicate that an increase in current expenditures to total expenditures by 1 per-

centage point is associated with an increase in LGU debt by 44,405.06 BAM (ceteris paribus, statistically significant at 5%). Similarly, an increase in the average salary by 1 BAM leads to an increase in LGU debt on average by 2,376 BAM (ceteris paribus, statistically significant at 10%). An increase in the number of inhabitants by 1 leads to an average increase in the LGU debt by 36 BAM (ceteris paribus, statistically significant at 1%) and an increase in population density by 1 person per km^2 leads to a reduction of LGU debt by 623 BAM on average (ceteris paribus, statistically significant at 5%).

The long-run coefficient suggests that all variables that were statistically significant in the short run are also important in the long run and have the same direction of impact on local debt (Table 3).

Table 3: Determinants of LGUs debt in FBiH in the long run

The dependent variable is debt on the subcentral level – LGUs in current BAM (DEB)			
Independent variables	**Coefficients**	**Standard eror**	**z**
EXP	109,797.000	37,657.140	2.92
TRANS	1.860	0.754	2.47
LAWSPECdummy	2,958,532.000	875,035.400	3.38
CANTONSPECdummy	-1,663,164.000	725.820	-2.29
ACTIVITY	5,876.000	3,084.000	1.91
DENSITY	-1,540.540	725.360	-2.12
POP	91.100	28.140	3.24
Independent variables	**P>|z|**	**[95% Interval]**	
EXP	0.004	35,991.170	183,604.50
TRANS	0.014	0.382	3,341.00
LAWSPECdummy	0.001	1,243,494.000	4,673,570.00
CANTONSPECdummy	0.022	-3,085,746.000	-240,582.00
ACTIVITY	0.057	-167.950	11,921.00
DENSITY	0.034	-2,962.230	-118.85
POP	0.001	35.950	146.25

Source: Author's own work.

Results of our research lead to the answer of our first research question which implies that the dynamics of debt of LGUs in FBiH are significantly determined by sets of fiscal, institutional, and demographical determinants both in the short and in the long term.

Country specific findings of the variable LAWSPECdummy indicate that special expenditure needs for LGUs that have more than 60,000 inhabitants and/or finance material costs in primary schools (LGUs of Herzegovina-Neretva Canton, West Herzegovina Canton and Canton 10) or where the LGU is assigned special expenditure needs, increases debt in those LGUs. CANTONSPECdummy indicates the fact that LGUs belonging to cantons that have defined special expenditure needs in the Law on Allocation of Public Revenues in FBiH borrow less than LGUs belonging to cantons that do not have special expenditure needs. However, research that analyses debt within a country must consider the specifics of defined intergovernmental fiscal relations.

The studies that used intergovernmental transfers in their specification are Cropf and Wendel (1998), Feld and Kirchgassner (2006), Kim and Lim (2018). In their analysis, transfers lead to a lower level of debt (bail-out effect). Our results are not complementary to other findings because they have indicated a positive impact of transfers of higher levels on the public borrowing of LGUs. The specifics of the legal regulations within the FBiH on public debt contributed to the fact that transfers have a positive impact on public debt. In the LGUs of FBiH transfers together with other LGU revenues, present the basis for determining the upper limit of the permitted debt level. In other empirical works (Feld and Kirchgassner, 2006) authors find that the subcentral levels of developed countries have a strong interest in maintaining their sovereignty and therefore try to avoid a situation where they must be rescued (bailed out) by a higher level of government. Autonomy and sovereignty in decision-making is a resource that the subcentral levels of developed countries strive to preserve without compromise. Unlike developed countries, BiH/FBiH has still not reached that level of development within the framework of public finances, which can be seen through the legislation itself. The current legal framework does not recognize this mutual influence between the two pillars of fiscal federalism (transfers and public borrowing).

Our results also include time dummy variables for the years in which local and general elections were

held in BiH. The year 2012 was an election year (local elections) in FBiH and it had a significant negative impact on the debt of LGUs. In addition, 2018 is the year of general elections (which also include subcentral, namely, cantonal level) and it had a significant negative impact on the debt of LGUs. Following these significant results, we can conclude that LGUs in FBiH borrow less in election years, with a significant positive impact in 2019 whereby LGU debt increased in the year before local elections (local elections were held in 2020).

We also wanted to perform a robustness check of our specified model. For such purposes and as part of our sensitivity analysis, we have expanded our specification with several other available variables that can be identified in the literature as relevant, including POP1865 – population between 18 and 65 years, POP65 – population over 65-year, NUMBER - employees in the private sector, UNE- unemployment, ELECTIONdummy - election year. However, neither of the variables provided an improvement in the estimated model in terms of its statistical properties, which lead us to conclude that our preferred specification was a better choice. Variables from the final model specification remained statistically significant and statistical properties of relevant testing procedures (AR1, AR2, Hansen test statistic, etc.) were satisfactory. We have also estimated the final model without time dummy variables. Under such circumstances, the Hansen test was not appropriate, confirming that the universal time related shocks must be controlled for and that the final model is a better choice of interpretation, confirming that the model is robust.

Conclusion

This paper investigates determinants of debt at the subcentral level in BiH – 79 LGUs of FBiH by using dynamic panel modelling. According to the available literature, the empirical model includes relevant determinants of debt at the subcentral level. The main contribution of this study is an empirical analysis of debt at the subcentral level in BiH that, for the first time, includes the specifics of intergovernmental fiscal relations defined through fiscal federalism in FBiH as fiscal and institutional variables of interest that affect debt at the subcentral level - LGUs.

The research results also confirm the specificity of the defined intergovernmental relations in FBiH which indicates that LGUs belonging to cantons that have defined special expenditure needs in the Law on the Allocation of Public Revenues in FBiH borrow less than LGUs belonging to cantons that do not have a special expenditure need. Also, the specificity of the defined intergovernmental relations indicates that a significant positive impact on LGU debt was noted for special expenditure needs for LGUs that have more than 60,000 inhabitants and/or finance material costs in primary schools or that have assigned special expenditure needs.

Through the application of the SGMM model, we can conclude that determinants of debt changes in LGUs in FBiH in the short term and long term are fiscal, institutional, and demographic factors as well as intergovernmental fiscal relations.

The research limitations include the data availability limitations for all LGUs in BiH (including LGUs from the second entity of BiH - RS), as well as the lack of available data in FBiH for some variables presented in the literature review (GDP, inflation rate and other for LGUs) as well as the availability of data for research over a longer period. Recommendations for future research are analyses of the debt of LGUs throughout the entire BiH (including the RS), using the dependent variable of debt with the ratio to revenues and/or in per capita form.

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Appendix

Appendix 1: Correlation matrix

Variables	DEB	DEF_leg	INVEST	TAX	EXP	TRANS	TRANS FBiH	LAWSPEC dummy	CANSPE Cdummy	TRDB	AKTIVITY	BPROFIT	DENSITY	POP
DEB	1.0000													
DEF_leg	0.1986	1.0000												
INVEST	-0.0255	-0.0202	1.0000											
TAX	0.0863	-0.0214	-0.0113	1.0000										
EXP	0.1034	0.0366	-0.0227	0.1767	1.0000									
TRANS	0.5283	0.1809	-0.0039	-0.1872	-0.3434	1.0000								
TRANSFBiH	0.1380	-0.0546	0.0401	0.0461	-0.0234	0.1798	1.0000							
LAWSPECdummy	0.3204	0.0717	-0.0273	-0.1948	-0.0148	0.0970	0.0777	1.0000						
CANSPECdummy	-0.1920	-0.0578	0.0026	-0.3164	-0.3262	0.1123	-0.0521	0.0919	1.0000					
TRDB	-0.1077	0.0172	-0.1073	-0.0876	0.1775	-0.1565	-0.1285	-0.0726	-0.1372	1.0000				
AKTIVITY	0.1727	0.1101	-0.0159	-0.3616	-0.1274	0.1683	0.0259	0.3199	0.2684	-0.3000	1.0000			
BPROFIT	0.2650	0.0784	0.0597	0.0736	-0.2325	0.3987	0.1014	0.0550	0.1437	-0.6246	0.3898	1.0000		
DENSITY	-0.0713	0.0741	0.0067	0.0014	-0.2046	0.1621	-0.0474	-0.1363	0.2755	-0.4357	0.3433	0.4576	1.0000	
POP	0.5419	0.2586	-0.0040	0.2580	-0.1675	0.5888	0.0727	0.0517	-0.0306	-0.3690	0.1986	0.6618	0.3633	1.0000

Source: Author's own work.