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JEL Classification H70, H83
Original scientific paper
https://doi.org/10.32910/ep.70.2.1

DETERMINANTS OF VOLUNTARY ONLINE LOCAL BUDGET TRANSPARENCY: A CASE STUDY FROM CROATIA

This article analyses the determinants of the voluntary online local budget transparency (OLBT) of Croatian local governments. Budget transparency is one of preconditions for enabling citizens' participation and improving public sector outcomes; however, the previous empirical results are ambiguous and inconclusive, with particular gaps for ex-socialist, fiscally centralized countries. To contribute to the existing literature, this article uses the principal-agent and legitimacy theories and non-linear panel data models for the 2015-2017 period to analyse 128 cities and 428 municipalities in Croatia. The findings show that local governments with higher residents' per capita income, population, Internet access, and administrative and fiscal ca-

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The authors thank Valerija Botrić and Paolo de Renzio for their valuable comments and suggestions. This work, including the work of Branko Stanić, was fully supported by the Croatian Science Foundation grant IP-2014-09-3008.

The paper was received on July 9th, 2018. It was accepted for publication on November 16th, 2018.

pacity voluntarily publish more budget documents online. Policy recommendations point to the urge for the reform of the country's territorial and fiscal organisation, the promotion of budget transparency in less developed cities/ municipalities and for education of citizens about budgets. The main study limitation is the absence of a qualitative analysis of observed documents.

Key words: budget transparency, panel data, probit, Croatia, local government, political economy

1. Introduction

Budget transparency (BT) and citizens' participation are critical elements for the efficient public service delivery, government accountability and citizens trust, particularly at local government levels (e.g., OECD, 2017; Pina et al., 2010; Piotrowski & Van Ryzin, 2007).

Research on the determinants of BT is growing (e.g., Caba Pérez et al., 2005; Gandía & Archidona, 2008; Gesuele & Metallo, 2017; Lowatcharin & Menifield, 2015). The results at the local level are showing heterogeneity and dependency of determinants on the research context, e.g., voluntary vs. mandatory disclosure, date of publication, unit of measure, etc. (Alcaide-Muñoz & Rodríguez Bolívar, 2015; Alcaide Muñoz et al., 2017). To assist practitioners, more research of determinants of local budget transparency (LBT) is needed (Pina et al., 2010), especially in different research contexts.

The information and communication technologies (ICT) fostered the use of web-based tools, allowing governments to provide better information, facilitating citizens' access to information and enabling more constructive and effective participation in decision making (Wong & Welch, 2004). Regardless, a relatively small number of studies focus on online BT (e.g., Caba-Pérez et al., 2008; García-Tabuyo et al., 2016; Laswad et al., 2005; Lowatcharin & Menifield, 2015), and none on voluntary BT in an ex-socialist, fiscally centralized country.

This paper explores the effect of selected independent variables on the level of voluntary online local budget transparency (OLBT), measured by the five local budget documents - the year-end report, mid-year report, budget proposal, enacted budget and citizens' budget - published annually on 556 Croatian municipalities' and cities' websites, using the 2015-2017 panel data.

The OLBT is defined as citizens' ability to use the local government units' (LGUs') websites to obtain complete, accurate, timely and understandable budget information (Kopits & Craig, 1998; OECD, 2017; Ott et al., 2017). However, this

analysis focuses only on timely and understandable presentation of documents (as Caba-Pérez et al., 2008; Laswad et al., 2005). Due to time and funding constraints, the completeness and accuracy of the information is not analysed.

The next section presents the background and development of the hypotheses for the determinants of OLBT, the third offers the data description and the research methodology, the fourth provides results, and the fifth gives discussion and conclusion.

2. Background and Development of Hypotheses

There is no commonly agreed definition of BT, maybe because of its multidimensionality (Lowatcharin & Menifield, 2015) and dependence on the research context. Although fiscal and budget transparency are often used as synonyms (Alt et al, 2006; OECD, 2017), fiscal transparency is a wider concept, including the structures, functions, financial position and activities of government units and their economic and social implications (Kopits & Craig, 1998). A growing number of authors are investigating the determinants of fiscal transparency (Andreula et al., 2009; Esteller-Moré & Polo Otero, 2012). However, the reported ambiguous findings (e.g. political ideology, residents' income) point to the importance of further research of the context and country-specific characteristics.

2.1 Theoretical Background

The information gap between citizens and the government is a major obstacle to effective and constructive public participation. The public-choice theory explains it as the principal-agent problem, arising when an agent (politician) decides on behalf of the principal (citizens) but attempts to act in his/her own interests, which may be contrary to the interests of the principal. The informational asymmetry is then to the advantage of the agent, and the principals cannot be sure that the agents always represent their interests (Groenendijk, 1997). The Ferejohn (1999) model, in which the agent chooses how to make his/her actions evident to the principal, assumes that the incumbent is compensated with rents (re-election, advancement and current and future income) proportional to the scale of the government. The voters (also assumed to be self-interested) monitor the agents, because their wealth depends on the agents' actions (Laswad et al., 2005). In this regard, voluntary disclosure has been seen as a method of reducing information

asymmetry, limiting the arising conflicts (Zimmerman, 1977; Banker & Patton, 1987).

Voluntary transparency can also be explained by legitimacy theory i.e. "a generalized perception or assumption that the actions of any entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs and definitions" (Suchman, 1995, p. 574). If threatened, agents will disclose information to promote their legitimacy (Patten, 1992; Deegan, 2002). By voluntary transparency, they transmit the perception that their actions meet the principals' expectations, hoping to regain their confidence, changing the negative perceptions and enhancing their legitimacy and reputation (De Araújo & Tejedo-Romero, 2016; Alcaide Muñoz et al., 2017).

2.2 Development of Hypotheses

Motivated by the findings presented in Table 1, showing the ambiguity and heterogeneity of individual studies, and considering principal-agent and legitimacy theories, six hypotheses are developed in accordance with often-used socio-demographic, fiscal and political variables.

Table 1.

EMPIRICAL OVERVIEW OF THE DETERMINANTS OF THE FISCAL (BUDGET) TRANSPARENCY OF LGUS

Author(s)	Dependent variable – fiscal (budget) transparency			Methodology	Correlation of determinants		
	Measurement	Sample, time span	Online disclosure		Positive	Negative	Nonsignificant
Laswad et al. (2005)	*Internet financial reporting* - financial highlights; annual reports; annual plan; combinations of these elements	86 New Zealand municipalities (n.d.)	YES	Multivariate logistic regression analysis	Press visibility	-	Political competition; size; leverage; own revenue p.c.; council type
Caba Pérez et al. (2008)	Web site *disclosure index (DI)* modelling: (1) information content, (2) qualitative characteristics of information, (3) accessibility, (4) overall DI	65 Spanish municipalities (2007)	YES	Multivariable linear regression analysis	Cost of debt (model 1); households'' Internet access (all models)	-	Political competition; cost of debt p.c. (models 2, 3 and 4); population; state/regional funds; education level
Ma and Wu (2011)	*Fiscal transparency (responsiveness and completeness)* – 66 items for government, 30 for social security, and 17 for SOEs accounts	31 Chinese provinces (2008-2009)	NO	Panel data regression model	Total imports and exports; FDI p.c.; marketization index; budget deficit; tenure of governors; party secretary as chairman of the People's Congress	-	Education; aging citizens; GDP p.c.; urbanized citizens; netizens; budgetary misconduct; budgetary revenue p.c.; e-government; tenure of party secretaries; central connections of party secretaries and governors
Guillamón et al. (2011)	*Financial transparency index*: TI Spain questionnaire on transparency of: municipal corporations, relations with citizens and society, economy and finance, municipal service contracts bidding, urban development/public works.	100 Spanish municipalities (2008)	NO	Ordinary least squares (OLS) and two-stage least squares (2SLS) regressions	Population; tax revenue p.c.; regional and central transfers p.c.	Right political ideology	Debt p.c.; deficit p.c.; income p.c.; political strength; voter turnout; rate of female aldermen in the council; mayor gender; number of dependant entities

Author(s)	Dependent variable – fiscal (budget) transparency			Methodology	Correlation of determinants		
	Measurement	Sample, time span	Online disclosure		Positive	Negative	Nonsignificant
Esteller-Moré and Polo-Otero (2012)	*Transparency index*: Nine documents to be disclosed to the Public Audit Office	691 Catalan municipalities (2001–2007)	NO	Maximum likelihood estimation of binary logistic regression model for panel data	Political competition; population 65+	-	Political ideology; voter abstention; population size; current and capital transfers; public deficit p.c.
Caamaño-Alegre et al. (2013)	*Indices of general and partial transparency:* survey of 15 items based on the IMF's Fiscal Transparency Code	33 Galician municipalities (2007)	NO	OLS and quasi-maximum likelihood estimator (QMLE)	Budget balance p.c.; left-wing incumbent; effective number of political parties	Unemployment rate; municipal public expenditure; coalition incumbents	Debt p.c.; taxes p.c.
del Sol (2013)	*TI Spain index* based on questionnaires on corporate, social, fiscal, urban planning and procurement and services contracting transparency	110 Spanish LGUs, 2010 TI survey participants	NO	OLS and censored regression models	Population; elderly (65+); left-wing mayor; provincial capital	Unemployment; tourist activity p.c.	Gender; debt; budget imbalance; voter turnout; taxes p.c. on industry, trade and services
Lowatcharin and Menifield (2015)	*Government website transparency index* (the 10-point checklist), including budget, contracts, lobbying, public records, local taxes, etc.	816 US counties (2010 county website data evaluations by the Sunshine Review)	YES	Ordered logistic regression analysis	Internet access; population density; population change; minority population; education; income p.c.; form of government	-	Median age; poverty
De Araújo and Tejedo-Romero (2016)	Information transparency index (TI Spain) used previously by Sol (2013)	109 Spanish municipalities, 2012 TI survey participants	NO	OLS and IV-2SLS regression	Right political ideology; political competition; population size; capital investment p.c.	Voter turnout; unemployment	Gender; debt p.c.

Author(s)	Dependent variable – fiscal (budget) transparency			Methodology	Correlation of determinants		
	Measurement	Sample, time span	Online disclosure		Positive	Negative	Nonsignificant
García-Tabuyo et al. (2016)	*Indices of legal and voluntary disclosure*, composed of municipal government; relations with citizens and society; economic-financial and service-procurement transparency	200 municipalities in El Salvador, Nicaragua, Panama, Guatemala and Honduras (different years for different countries)	YES	Tobit regression analysis	Internet penetration and legal disclosure	Maturity of the freedom of information (FOI) law and legal disclosure, sanctions (stipulated in the FOI law) and legal disclosure; Internet penetration and voluntary disclosure, voter turnout and voluntary disclosure; corruption	Population size; political ideology

2.2.1 Residents' Income p.c.

Residents with higher incomes usually have greater Internet access and experience (Styles & Tennyson, 2007), demand additional public services (Giroux & McLelland, 2003; Piotrowski & Van Ryzin, 2007) and information (Piotrowski & Van Ryzin, 2007). By releasing information, politicians reduce the asymmetry and prove their legitimacy. LGUs with lower residents' income p.c. are less likely to adopt progressive web design due to the lower demand (Ho, 2002). In this regard, the technological and income levels are complementary (Serrano-Cinca et al., 2008). While Guillamón et al. (2011) found no significant correlation, Lowatcharin and Menifield (2015) showed a significant positive correlation between residents' income p.c. and government transparency. Therefore, we assumed that:

H1. As residents' income p.c. increases, the level of OLBT increases.

2.2.2 Population

Larger LGUs are more often pressured to provide information (Moon & Norris, 2005; Serrano-Cinca et al., 2008), usually have higher revenues and an IT department (Caba-Pérez et al., 2008). Serrano-Cinca et al. (2008) argue that conflicts of interest are more likely in more populated areas and the advantage of disclosing information is correspondingly greater.

Several authors found a positive and statistically significant relationship between population and data availability (Guillamón et al., 2011; del Sol, 2013; Lowatcharin & Menifield, 2015; De Araújo & Tejedo-Romero, 2016). Therefore, we assumed that:

H2. As the population increases, the level of OLBT increases.

2.2.3 Access to the Internet

As the citizens' Internet access increases, governments are expected to offer additional information and services online (Pina et al., 2010). New technologies facilitate online disclosure, especially in larger LGUs, reducing the costs of dissemination (García-Tabuyo et al., 2016).

Studies showed a positive relationship between Internet access and online mandatory disclosure (Lowatcharin & Menifield, 2015; García-Tabuyo et al.,

2016). Surprisingly, for voluntary online disclosure, García-Tabuyo et al. (2016) found a negative correlation. Therefore, we assumed that:

H3. As citizens' access to the Internet increases, the level of OLBT increases.

2.2.4 Fiscal Capacity

Fiscal capacity (FC) can be defined as the ability to raise revenues for public spending (Martinez-Vazquez & Timofeev, 2008). The term financial autonomy could be used as a synonym (Tavares & da Cruz, 2014). Residents' income p.c. is linked to the FC, since it implies higher tax and nontax revenues. Alcaide Muñoz et al. (2017) argue that larger cities are more likely to provide information, since they can afford it and that higher FC is followed by higher pressure to justify the use of resources, so agents are keen to show that they act responsibly.

There are various proxies for the FC. Guillamón et al. (2011) used p.c. tax revenues and obtained a positive correlation with financial transparency. Laswad et al. (2005) used general revenues minus intergovernmental transfers finding no significant correlation with voluntary Internet financial reporting. This study also uses operating revenues (excluding grants) as a proxy for FC. Therefore, we assumed that:

H4. As an LGU's fiscal capacity increases, the level of OLBT increases.

2.2.5 Administrative Capacity

The administrative capacity largely defines the ability to produce budget documents. Tavares and da Cruz (2014) show its influence associating it with a more professional organization and IT educated staff. This paper assumes that LGUs with a larger number of employees can more easily disclose more information.

The proxy for administrative capacity here is the natural logarithm of the annual average number of employees in LGU bodies (based on hours worked). This variable has not been previously used as a determinant of LBT.[1] It assumes that LGUs with a larger number of employees have specialized staff able to devote additional time to OLBT. Therefore, we assumed that:

[1] Manoharan (2013) found that the number of IT employees was positively associated with website adoption.

H5. As the number of employees in the LGU bodies increases, the level of OLBT increases.

2.2.6 Political Ideology

Wehner and de Renzio (2013) argue that BT has often been characterized as a bipartisan issue promoted by both the left and right, even if for different reasons. Alteration of power motivates BT, as all parties want to ensure access to information should they be voted out of power. In contrast, Caamaño-Alegre et al. (2013) and Guillamón et al. (2011) argue that left-wing parties/incumbents are more transparent, as they are more likely to expand public services.

While several papers did show a relationship between left-wing incumbents and greater transparency (e.g., Caamaño-Alegre et al., 2013; del Sol, 2013), other showed the opposite (De Araújo & Tejedo-Romero, 2016, 2018). Therefore, we assumed that:

H6. A right-wing political incumbent decreases the level of OLBT.

3. Data and Methodology

Besides the sample and methodology, this section shows an overview of the local government organization and BT in Croatia, and the information on the used variables.

3.1 Local Government and BT in Croatia

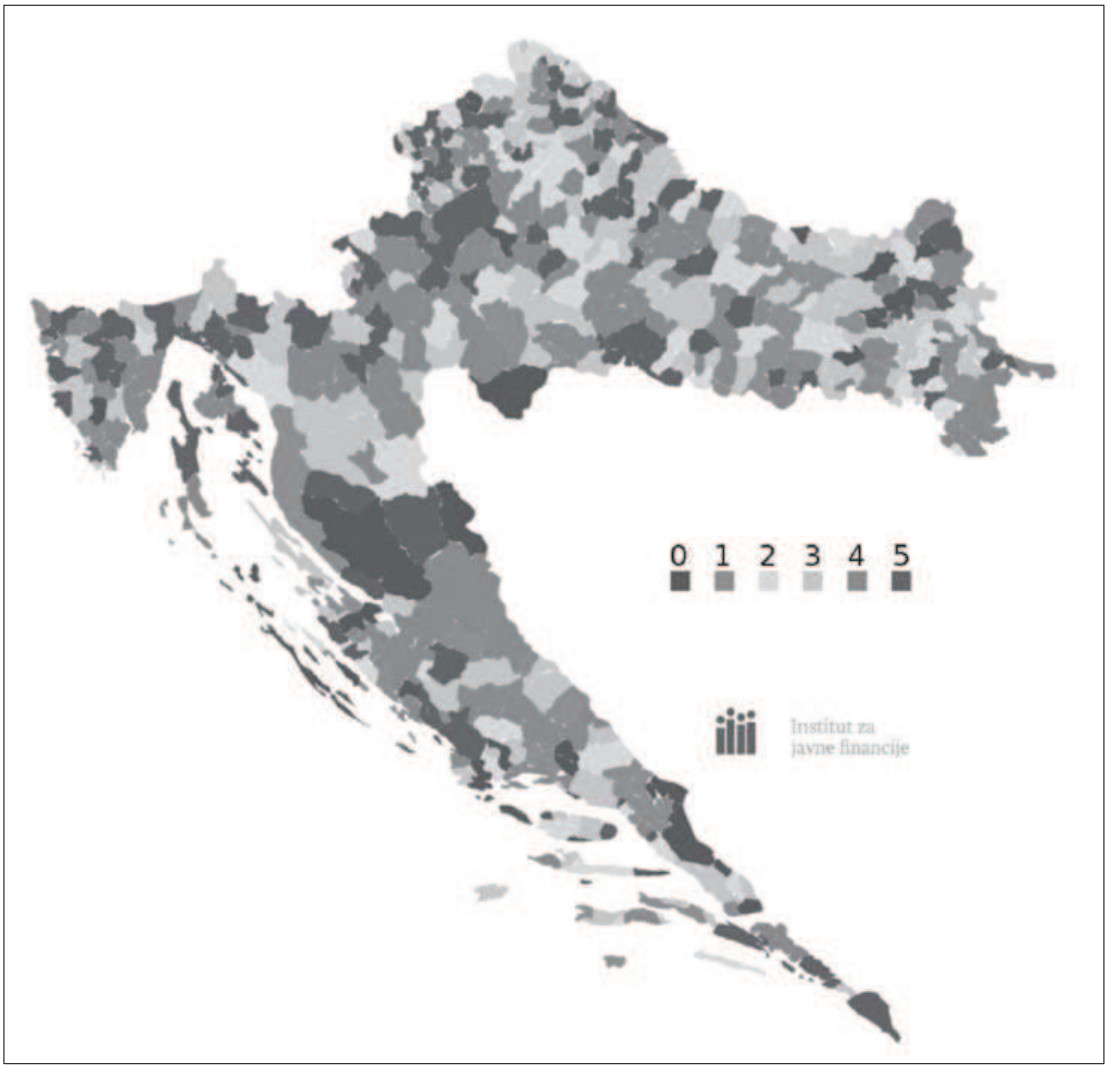
Croatia consists of 428 municipalities, 128 cities and 20 counties. The Budget Act (2008) with subsequent amendments and the Act on the Right of Access to Information (2013) require the online publication of a mid-year and year-end reports and the enacted budget. The Ministry of Finance (2012) recommended publishing budget proposals online and printing and/or posting the citizens' budgets online. However, no sanctions are imposed. This paper considers online publication of three mandatory (mid-year and year-end reports and the enacted budget) and two voluntary documents (budget proposal and citizens' budget).

3.2 Dependent Variable and Sample

The dependent variable (OLBT) is constructed by using the Online Local Budget Index (OLBI) (Ott et al., 2015; 2016; 2017), a simple data count index for 576 Croatian LGUs for three years (2015-2017). It measures the availability of five documents on LGUs websites (see Figure 1) chosen in accordance with the best international practices (e.g., OECD, 2002; IBP, 2016) and the Croatian legal requirements and recommendations.

Figure 1.

ONLINE LOCAL BUDGET INDEX OF CROATIAN CITIES AND MUNICIPALITIES 2017



Source: http://www.ijf.hr/transparency

The annual OLBI ranges between zero and five (e.g., one if the LGU published one, five if it published five documents). The overall average OLBI has improved from 1.75 in 2015 to 3.1 in 2017. The most transparent were counties (average 4.6), followed by cities (3.7) and municipalities (2.8).

Here, the OLBI is a binary variable, where 1 = transparent LGU (publishing four or five documents) and 0 otherwise. This classification is made since publication of four or five documents includes the publication of at least one voluntary document. First, it was tested if the variances of the OLBI changed significantly, as the variable was collapsed from six observations to the binary outcome. The first population was divided into six groups (publishing 0, 1, 2, 3, 4 or 5 documents) and the second into two groups (1 = publishing 4 or 5 budget documents and 0 otherwise). The F-test confirmed that variances of these two populations are equal. Therefore, the dependent variable is a dummy taking the value of 1 (a transparent) or 0 (a nontransparent LGU).

The sample includes Croatian 428 municipalities and 128 cities.[2]

3.3 Independent Variables

The independent variables are residents' income (INC), population (POP), Internet access (INTERNET), fiscal capacity (FC), administrative capacity (EMPLOYEE) and political ideology (RIGHT) (Table 2). Except political ideology, which stems from 2013 local elections, all include lag values (2014-2016).

[2] Counties are not the subject of this study.

Table 2.

DEFINITIONS OF VARIABLES AND EXPECTED RELATIONSHIPS

Variable	Description	Expected coefficient	Source
	Dependent variable		
OLBT	A binary variable: 1 for an LGU publishing four or five documents (budget proposal, enacted budget, mid-year report, year-end report, citizens' budget) and 0 otherwise (2015-2017)		Ott et al. (2015; 2016; 2017);
	Independent variables		
INC	A logarithm of the average residents' income p.c. (2014-2016)	positive	Ministry of Regional Development and EU Funds (2017), CBS (2017)
POP	A logarithm of the population estimate (2014-2016)	positive	CBS (2017)
FC	A logarithm of the annual fiscal capacity p.c. (operating revenues minus all grants) (2014-2016)	positive	Ministry of Finance (2017), CBS (2017)
INTERNET	The percentage of households with Internet access (transmission speeds of over 2 Mbit) (2014-2016)	positive	Croatian Regulatory Authority for Network Industries (2018)
EMPLOYEE	A logarithm of the average annual absolute number of employees in LGU bodies (based on hours worked) (2014-2016)	positive	Ministry of Finance (2017)
RIGHT	A dummy variable: 1 if the incumbent is a member of the Croatian Democratic Union, Croatian Peasant Party, Croatian Democratic Alliance of Slavonia and Baranja or a coalition in which these parties participate (2013 local elections)	negative	State Election Commission (2017)

To test whether the independent variables affect OLBT, an estimate of how the probability of the online publication of four or five documents depends on the level of independent variables is determined. Probit panel data analysis is used.

The following equation is estimated at the total sample level:

$$P(y_{it}=1)=\mu_0+\mu_1 POP_{it}+\mu_2 INC_{it}+\mu_3 FC_{it} + \mu_4 EMPLOYEE_{it}+\mu_5 INTERNET_{it} + \mu_6 RIGHT_{it}+\mu_7 CITY+\varepsilon_{it},\ i=1,\ldots N,\ t=1,\ldots T \quad (1)$$

where P represents the probability that an LGU achieves a higher level of BT (i.e., publishing four or five budget documents online) and $\mu 0$ is a constant term, while the six independent variables are defined above. The seventh variable (i.e., CITY) denotes a dummy variable taking the value of 1 if the LGU is a city and zero otherwise. This variable is not included once the equation is estimated separately at the city and municipality level. In equation (1), i represents the city or municipality, t time, and μ the parameters to be estimated, while ε represents the error.

4. Results

Table 3 shows the descriptive statistics for dependent variable OLBT and the remaining six independent variables for the total (cities and municipalities), city and municipality samples. The mean value of OLBT is significantly higher in the city sample than in the other two samples. The same finding applies to the population, the number of employees in the LGU bodies and Internet access, pointing to the necessity of conducting additional empirical investigations separately for cities and municipalities. The correlation matrices for the total, city and municipality samples are presented in Tables 4, 5 and 6, respectively. They all confirm that the selected variables, except for variable EMPLOYEE at the municipal level, have a statistical significant linear relationship with OLBT and that the direction of relationship is as the theory suggests (e.g. positive for population). Additionally, due to the multicollinearity problems between our independent variables (e.g. income≠internet access, population≠employees) we have estimated four different models at the total (city+municipality), city and municipality level.

Table 3.

DESCRIPTIVE STATISTICS

	Obs.	Mean.	Std. Dev.	Min.	Max.
OLBI	1 668	0.2577938	0.437551	0	1
POP	1 668	8.104642	0.992633	4.867534	13.59692
INC	1 668	10.06441	0.2735261	9.06943	10.87998
FC	1 668	7.602155	0.6699641	5.974857	9.757328
EMPLOYEE	1 568	2.367982	0.9770358	0	7.957877
INTERNET	1 668	42.61448	15.42516	0	99.68
RIGHT	1 668	0.5125899	0.4999914	0	1
City sample					
OLBI	384	0.5026042	0.5006455	0	1
POP	384	9.31659	0.9701179	7.31322	13.59692
INC	384	10.25165	0.1887675	9.787732	10.87998
FC	384	7.917304	0.5543017	6.644843	9.757328
EMPLOYEE	372	3.528552	0.923424	1.098612	7.957877
INTERNET	384	49.1203	12.88347	12.60288	99.52
RIGHT	384	0.5	0.5006523	0	1
Municipality sample					
OLBI	1 284	0.1845794	0.3881072	0	1
POP	1 284	7.742191	0.6543637	4.867534	9.70082
INC	1 284	10.00841	0.2700729	9.06943	10.80425
FC	1 284	7.507905	0.6729462	5.974857	9.702191
EMPLOYEE	1 196	2.007002	0.6613022	0	5.181784
INTERNET	1 284	40.66882	15.59306	0	99.68
RIGHT	1 284	0.5163551	0.4999272	0	1

Table 4.

CORRELATION MATRIX FOR THE TOTAL SAMPLE

	OLBI	POP	INC	FC	EMPLOYEE	RIGHT	INTERNET	CITY
OLBI	1.0000							
POP	0.3261	1.0000						
	0.0000							
INC	0.3056	0.3217	1.0000					
	0.0000	0.0000						
FC	0.2137	0.1123	0.6714	1.0000				
	0.0000	0.0000	0.0000					
EMPLOYEE	0.3134	0.7877	0.3548	0.3484	1.0000			
	0.0000	0.0000	0.0000	0.0000				
RIGHT	-0.0889	-0.0266	-0.1577	-0.1313	-0.0196	1.0000		
	0.0003	0.2777	0.0000	0.0000	0.4369			
INTERNET	0.2226	0.3097	0.5593	0.6354	0.3095	-0.1228	1.0000	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
CITY	0.3061	0.6679	0.3745	0.2573	0.6627	-0.0138	0.2307	1.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.5740	0.0000	

Table 5.

CORRELATION MATRIX FOR THE CITY SAMPLE

	OLBI	POP	INC	FC	EMPLOYEE	RIGHT	INTERNET
OLBI	1.0000						
POP	0.3080	1.0000					
	0.0000						
INC	0.4264	0.3615	1.0000				
	0.0000	0.0000					
FC	0.2394	0.0664	0.6299	1.0000			
	0.0000	0.1940	0.0000				
EMPLOYEE	0.3226	0.8644	0.4156	0.3276	1.0000		
	0.0000	0.0000	0.0000	0.0000			
RIGHT	-0.1927	-0.0628	-0.3703	-0.2212	-0.0995	1.0000	
	0.0001	0.2198	0.0000	0.0000	0.0552		
INTERNET	0.2511	0.2708	0.5220	0.7140	0.4096	-0.1871	1.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	

Table 6.

CORRELATION MATRIX FOR THE MUNICIPALITY SAMPLE

	OLBI	POP	INC	FC	EMPLOYEE	RIGHT	INTERNET
OLBI	1.0000						
POP	0.0945	1.0000					
	0.0007						
INC	0.1685	0.0310	1.0000				
	0.0000	0.2668					
FC	0.1208	-0.1412	0.6451	1.0000			
	0.0000	0.1940	0.0000				
EMPLOYEE	0.0457	0.4524	0.0727	0.2177	1.0000		
	0.1139	0.0000	0.0119	0.0000			
RIGHT	-0.0497	-0.0065	-0.1234	-0.1108	0.0223	1.0000	
	0.0749	0.8169	0.0000	0.0001	0.4410		
INTERNET	0.1403	0.2043	0.5256	0.5921	0.1483	-0.1075	1.0000
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	

Probit random effect models are estimated for the total (Table 7), city (Table 8) and municipality (Table 9) samples. In each of these estimations, four different probit models are executed due to collinearity between the independent variables (e.g., residents' income p.c. is correlated with Internet access and the LGUs' fiscal capacities); and their calculated marginal effects are presented.[3]

[3] A logit random effect model and a linear probability model (LPM) were also estimated. The results obtained were exactly the same in all the estimated logit models, while in the LPMs at the total sample level, the only difference was that the political ideology variable was statistically significant in the first model. The results are available upon request.

Table 7.

TOTAL SAMPLE – ESTIMATED PROBIT RANDOM EFFECT MODELS WITH CALCULATED MARGINAL EFFECTS

	Probit	Marginal effects	Probit	Marginal effects	Probit	Marginal effects	Probit	Marginal effects
POP	0.386	0.983***	0.381	0.090***	0.478	0.120***		
	(0.087)***	(0.021)	(0.093)***	(0.022)	(0.086)***	(0.021)		
INC	1.786	0.434***					1.728***	0.415***
	(0.275)***	(0.063)					(0.288)	(0.066)
RIGHT	-0.162	-0. 039	-0.243	-0.058*	-0.229	-0.058*	-0.122	-0.029
	(0.123)	(0.030)	(0.127)*	(0.030)	(0.117)*	(0.029)	(0.128)	(0.030)
INTERNET			0.025	0.006***				
			(0.005)***	(0.001)				
FC					0.464	0.117***		
					(0.091)***	(0.022)		
EMPLOYEE							0.286**	0.068***
							(0.086)	(0.021)
CITY	0.278	0.072	0.539	0.146**	0.334	0.091*	0.515	0.139**
	(0.190)	(0.053)	(0.196)***	(0.059)	(0.184)*	(0.054)	(0.190)***	(0.057)
_cons	-22.083		-5.169		-8.318		-19.142***	
	(2.880)***		(0.765)***		(1.057)***		(0.205)	
lnsig2 μ	-0.108		0.049		-0.210		-0.035	
_cons	(0.201)		(0.197)		(0.196)		(0.205)	
Mean VIF	1.49		1.46		1.47		1.49	
N	1668		1668		1668		1568	

t statistics in parentheses
* $p<0.1$, ** $p<0.05$, *** $p<0.01$

Table 8.

CITY SAMPLE – ESTIMATED PROBIT RANDOM EFFECT MODELS
WITH CALCULATED MARGINAL EFFECTS

	Probit	Marginal effects	Probit	Marginal effects	Probit	Marginal effects	Probit	Marginal effects
POP	0.537***	0.213***	0.747***	0.297***	0.805***	0.320***		
	(2.74)	(0.077)	(3.50)	(0.084)	(4.16)	(0.076)		
INC	4.900***	1.95***					4.989***	1.982***
	(4.32)	(0.451)					(4.07)	(0.486)
RIGHT	-0.176	-0.069	-0.693**	-0.270**	-0.627**	-0.245**	-0.166	-0.065
	(-0.54)	(0.128)	(-2.10)	(0.123)	(-2.10)	(0.113)	(-0.48)	(0.135)
INTERNET			0.0416***	0.016***				
			(2.97)	(0.005)				
FC					0.786***	0.312***		
					(2.89)	(0.108)		
EMPLOYEE							0.632***	0.251***
							(2.85)	(0.087)
_cons	-55.10***		-8.610***		-13.35***		-53.20***	
	(-4.71)		(-4.07)		(-4.50)		(-4.22)	
lnsig2 μ	0.489		0.703**		0.429		0.639*	
_cons	(1.37)		(2.04)		(1.30)		(1.74)	
Mean VIF	1.22		1.08		1.04		1.25	
N	384		384		384		372	

t statistics in parentheses

* $p<0.1$, ** $p<0.05$, *** $p<0.01$

Table 9.

MUNICIPALITY SAMPLE – ESTIMATED PROBIT RANDOM EFFECT MODELS WITH CALCULATED MARGINAL EFFECTS

	Probit	Marginal effects	Probit	Marginal effects	Probit	Marginal effects	Probit	Marginal effects
POP	0.253**	0.049**	0.209**	0.039**	0.326***	0.066***		
	(2.57)	(0.019)	(1.99)	(0.019)	(3.35)	(0.019)		
INC	1.297***	0.253***					1.187***	0.229***
	(5.06)	(0.047)					(4.51)	(0.048)
RIGHT	-0.0842	-0.016	-0.114	-0.21	-0.113	-0.022	-0.0220	-0.004
	(-0.66)	(0.024)	(-0.86)	(0.25)	(-0.92)	(0.025)	(-0.17)	(0.025)
INTERNET			0.0203***	0.003***				
			(4.44)	(0.000)				
FC					0.369***	0.074***		
					(4.03)	(0.018)		
EMPLOYEE							0.0948	0.018
							(1.00)	(0.018)
_cons	-16.09***		-3.602***		-6.394***		-13.26***	
	(-5.89)		(-4.29)		(-5.64)		(-4.97)	
	-0.462*		-0.306		-0.561**		-0.459*	
	(-1.77)		(-1.20)		(-2.16)		(-1.70)	
Mean VIF	1.01		1.04		1.02		1.02	
N	1284		1284		1284		1196	

t statistics in parentheses

* $p<0.1$, ** $p<0.05$, *** $p<0.01$

In the total sample (Table 7), both population (with marginal effects ranging from 0.09 to 0.983) and residents' income p.c. (with marginal effects ranging from 0.415 to 0.434) have a positive and statistically significant influence on the OLBT in all the estimated models. This finding is in line with the findings (del Sol, 2013; Lowatcharin & Menifield, 2015; De Araujo & Tejedo-Romero, 2016). In addition, Internet access (with marginal effects of 0.006), FC (with marginal effects of 0.117) and the number of employees in the LGU bodies (with marginal effects of 0.068) estimated in the separate models show a positive and statistically significant influence at all the usual significance levels. This article thus reports the first statistically significant finding in the literature regarding the number of employees. By confirming the positive influence of Internet access, the results are in line with García-Tabuyo et al. (2016), Caba-Pérez et al. (2008) and Lowatcharin and Menifield (2015), while the results for FC are in line with Guillamón et al. (2011). However, the political ideology variable has an expected negative sign in all the estimated models, but it is statistically significant only in the models estimating the effect of population, FC and Internet access (it is not significant in models with residents' income p.c.). Although the coefficients for political ideology are rather similar in all four models, a robust confirmation cannot be reported. Consequently, this hypothesis is only partially accepted, while the others are accepted.

The analysis of the city sample was conducted because the dummy variable denoting cities in the total sample was found to be significant in three of four models, but the obtained results are identical to those reported for the total sample. However, in the city sample (Table 8), residents' income p.c. has the highest marginal effect (ranging from 1.95 to 1.982), and the political ideology variable has a negative and statistically significant influence only in models with population and Internet access (marginal effect of -0.27) and in the model with FC (marginal effect of -0.245). Finally, the results regarding the effect of the number of employees in LGU bodies are clearly driven by the effect in the city sample, in which a positive and statistically significant marginal effect of 0.251 was reported.

The results at the municipality level (Table 9) show the expected negative sign for political ideology, although the result was nonsignificant, leading to the conclusion that this variable does not influence the OLBT in any of the estimated four models. The same goes for employees of LGU bodies, which is why these two hypotheses at the municipality level are rejected. The findings might indicate that higher levels of OLBT are unaffected by ideology and the number of employees at the municipality level, but additional empirical research is needed to confirm this conclusion. However, the results indicate other interesting findings. First, population and residents' income p.c. remain the most important determinants. Second, the calculated marginal effects are much lower in this sample. Third, the variable residents' income p.c. (marginal effects between 0.229 and 0.253) is the most influential. In the fourth model, residents' income p.c. accounts for all the varia-

tions, leaving the number of employees in LGU bodies statistically nonsignificant. Fourth, both Internet accessibility (marginal effect of 0.003) and the proxy variable for FC (marginal effect of 0.074) remain statistically significant with a positive sign.

Finally, in all three samples, residents' income p.c., population, Internet access and FC were always statistically significant with the expected positive sign. However, residents' income p.c. has the strongest impact at the city and municipality levels. The current size and wealth of LGUs determine the level of OLBT and not, for example, the party affiliation of the incumbent. Since both Internet access and FC are theoretically a clear externality of size and wealth of LGU, this is further confirmed in the empirical analysis.

5. Discussion and Conclusion

The paper addresses the determinants of voluntary OLBT in Croatian 428 municipalities and 128 cities in 2015-2017 period, using probit panel data models at three different sample levels to confirm the proposed hypotheses.

The first hypothesis is accepted, i.e. residents' income p.c. has direct and indirect effects on voluntary OLBT. Directly, according to the principal-agent and legitimacy theories, it is expected that residents with higher incomes tend to expect additional public services, have more access to and experience using the Internet, demanding increased online budget information. However, there might be a low demand for budget information among ex-socialist citizens, often unaware of and unaccustomed to using their rights. According to the Ott and Bronić (2015) survey concerning citizen participation in fiscal and budgetary processes in Croatia, 55% of the respondents believe that it is possible for citizens to be involved and 80% that citizens should be involved; however, a mere 7% have attempted to participate. Furthermore, especially in centralized countries, it is expected that citizens are less interested in LBT since less public goods are provided locally. In addition, according to the principal-agent and legitimacy theories, incumbents in LGUs with higher residents' income p.c. also have increased motivation to be voluntarily transparent. It is in their interest to disclose budget information to demonstrate how successfully they manage public funds.

Residents' incomes also indirectly affect OLBT through FC. Higher average residents' income p.c. leads to higher FC, enabling higher budget revenues and additional resources for voluntarily BT.

In all three samples, along with residents' income p.c., FC, population and Internet access were always statistically significant with the expected positive

sign. As argued in literature, higher income p.c. is directly linked to purchases of computers and technological devices. In such LGUs, due to greater Internet access, a higher demand for OLBT is expected. According to both principal-agent and legitimacy theories, higher voluntary OLBT is expected in LGUs with larger populations.

These results add to the literature. First, they prove that residents' income p.c. is a major determinant of voluntary OLBT in an ex-socialist, fiscally centralized state (with numerous small LGUs, often with low capacities and uninterested citizens). Second, a positive effect of the proxy for an LGU's FC is empirically confirmed in all three samples. Third, there is a clear positive effect of the number of employees in the LGU bodies on voluntary OLBT.

As voluntary OLBT is important for citizens' participation, government's accountability and efficiency of public goods provisions, the findings offer policy implications. First, the number of LGUs with low fiscal (and often administrative) capacity should be reduced through territorial and fiscal reorganization (including mergers or joint provision of public goods). Second, it is necessary to promote BT in less developed cities/municipalities. Third, with improved BT, citizens should be able to engage and participate in the local budget processes. However, they should first be educated (e.g. through budget literacy programs).

The results are robust and significant. However, with a longer time span and improved data availability, further studies might include qualitative analysis of the documents, employ other methods or analyse additional determinants (e.g. electoral cycles, education levels, civil society organizations' activities, indebtedness, corruption).

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ODREDNICE DOBROVOLJNE TRANSPARENTNOSTI PRORAČUNA LOKALNIH JEDINICA: PRIMJER HRVATSKE

Sažetak

Rad analizira odrednice dobrovoljne transparentnosti proračuna lokalnih jedinica (OLBT) u Hrvatskoj. Premda proračunska transparentnost predstavlja preduvjet participaciji građana i poboljšavanja ishoda u javnom sektoru, rezultati istraživanja su nejasni i neuvjerljivi, gotovo nepostojeći za post-socijalističke, fiskalno centralizirane države. Doprinos rada je primjena modela agenta i principala te teorije legitimnosti na primjeru jedne takve zemlje. Primjenom nelinearne panel analize na uzorku od 128 gradova i 428 općina u razdoblju od 2015. do 2017. godine utvrđeno je da lokalne jedinice s većim dohotkom po stanovniku, brojem stanovnika, boljim pristupom internetu, većim administrativnim i fiskalnim kapacitetom dobrovoljno objavljuju više proračunskih dokumenata. Preporuke ukazuju na potrebu reforme teritorijalnog i fiskalnog ustroja države, promicanja dobrih praksi proračunske transparentnosti u manje razvijenim gradovima i općinama te educiranja građana o proračunu. Glavno ograničenje istraživanja jest odsustvo kvalitativne analize dokumenata.

Ključne riječi: proračunska transparentnost, panel analiza, probit, Hrvatska, lokalne jedinice, politička ekonomija