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**Article**

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# Factors of Tax Decentralization in OECD-Europe Countries

*Milan Jílek\**

## **Abstract:**

The article deals with the issue of tax decentralization to local government. The aim of the article is to describe the tax decentralization to local governments with respect to its possible determinants and to verify empirically the relevancy of theoretical factors generally explaining fiscal decentralization to the tax decentralization. The analysis is based on data panel of OECD-European covering the period of 1995 to 2013. Upon these data we build panel regression model. Estimated equations provide support for the hypotheses that the countries with larger geographical area tend to decentralize more tax revenue to local governments. Surprisingly, the slope parameters of population and population density have negative sign and are statistically significant. The real GDP per capita proved to be a significant factor of tax decentralization. The inequality of household income, as well as the share of urban population, although having correct sign, is not statistically significant. The size of redistribution function is highly statistically significant, suggesting that countries with higher redistribution decentralize more taxes to local government. The heterogeneity variable showed results with correct sign, where religious and language fractionalization were statistically significant. The very fact that the country is or is not federated or belong or not to group of Central and Eastern European Country seems to be unimportant for tax decentralization to local government level.

**Key words:** Fiscal decentralization; Tax decentralization; Taxation autonomy; Local government.

**JEL classification:** H71.

## **1 Introduction**

The issue of centralization and decentralization of government and public finance has been an important and frequent topic of economic and political discussions. Among the most important questions to answer are the effects of decentralization in the fields of resource allocation are wealth distribution in society. One of the most important tasks to solve is the size and way of tax decentralization. This article deals with the problem of tax decentralization and tax assignment to local

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government level. The aim of the article is to find whether the theoretical factors of fiscal decentralization are relevant empirically for tax decentralization to local government level.

The following text provides the overview of tax decentralization theory and defines theoretical factors of tax decentralization. Second part of the text formulates hypothesis and empirical approach based on the contemporary knowledge in the field. Third and fourth section of the text empirically investigates the tax decentralization in European OECD countries.

The contemporary theory of public finance widely accepts the traditional thesis about the contribution of fiscal decentralization to social welfare maximization (Musgrave, 1959, Oates, 1968), declared repeatedly by Oates (Oates, 2008). The theory of taxation in a decentralized system suggests two main approaches to tax decentralization. The first one is the traditional normative approach (Musgrave, 1959, Oates, 1968), where the optimal tax assignment is derived from the normative optimum of expenditure assignment. Due to the dominant role of allocation function for local government levels, we should start with the condition of effective resource allocation for public goods provision, formulated by Samuelson (1954, 1955) as the equality of marginal rate of substitution (or marginal social benefits in the model of partial equilibrium) in summation for all individuals and marginal rate of transformation of production (resp. marginal social cost). Samuelson followed the thoughts of Eric Lindahl (Lindahl, 1919), who formulated the “tax price” or “tax share”, which was supposed to be paid by public goods consumer equivalently to his/her marginal benefit. It is possible to conclude that this benefit principle of taxation (see Musgrave, 1959 and Musgrave and Musgrave, 1994) enhances allocation efficiency. The closer the individual tax share fits the individual benefits of a public goods consumer, the closer the provided quantity of public goods to the effective quantity is.

However, the benefit principle of taxation is not generally applicable for pure public goods due to non-excludability and consequent free riding and also due to the fact that the benefit principle is neutral in distribution. Despite, the use of benefit principle of taxation is frequently recommended (Musgrave, 1959, Musgrave and Musgrave, 1994, Oates, 1972). Because it is not possible to obtain sufficient revenue to finance local government functions from benefit taxation or user charging, it is necessary to use non-benefit taxation (McLure, 1998).

Oates (Oates, 1972) builds his argumentation about the benefits from fiscal decentralization upon the “decentralization theorem”, where the necessary condition of effective decentralization is the heterogeneity of preferences. Also Tiebout (1956) highlighted, discussing the former works of Samuelson (1954, 1955), the possible mobility of citizens and concluded that the decentralized provision might bring, under certain circumstances, allocation efficiency.

Therefore, both authors stress the heterogeneity of preferences among jurisdictions and imply possible benefits of a decentralized taxation.

On the other hand, the tax decentralization and tax autonomy of local governments might bring the problem of tax competition and consequently distortions in location and level of economic activity. Decentralized taxation of highly mobile tax bases is the cause of differences in net benefits (Oates, 1999, Gramlich, 1993) and of fiscal externalities (Boadway et al., 2003). Both factors significantly limit the possibility of tax decentralization. Numerous literature resources (Musgrave and Musgrave, 1994, Oates, 1999, Ter-Minassian, 1997) recommend decentralizing taxes with relatively immobile and equally distributed tax base, with potential of stable revenue.

Olson (1969) and Tullock (1969) defined the fiscal equivalence related to the local government unit. Their contribution is very important for the use of non-benefit taxes to finance local governments. Application of the fiscal equivalence principle results in establishing local taxes with local government tax autonomy. To meet the condition of allocation efficiency, local government must have the right to alternate their marginal revenue related to financed government policies (McLure, 1998).

The results of theoretical and empirical studies can be summarized in the following way:

- It is widely accepted that the relation of expenditure and tax autonomy of local government is beneficial for the effective provision of local public goods. Local government must have the right to influence significantly the size of its marginal revenue related to its policies. The critical issue is not the total tax revenue but the tax autonomy, i.e. the possibility to decide about own tax revenue.
- There exist only few taxes, which can be decentralized to local government level without jeopardizing economic efficiency. Therefore, either taxes not suitable for decentralization are decentralized, or the vertical fiscal imbalance is solved with the use of tax sharing arrangements or intergovernmental grants.

The empirical literature consistently suggests determinants of fiscal decentralization, which can help to explain the variability across countries and time. There are numerous testable hypotheses and empirical results, among others Litvack and Oates (1970), Giertz (1976), Mullen (1980), Oates (1985), Nelson (1986), Hughes and Smith (1991), Wallis et al. (1991), Panizza (1999), Cerniglia (2003), Stegarescu (2006), King (2006), Schakel (2010), Stegarescu (2005), Arzagli and Henderson (2005), Ermini and Santolini (2014), Bodman and Hodge (2010). The most frequently discussed determinants of fiscal decentralization can be structured as following:

- a) Geography and population. In countries with larger geographical area and with higher population more important role of local governments can be expected (Wallis et al., 1991). The local governments in countries with smaller population might not be able to use the scale economies on both, expenditure and revenue side of budget. Decentralized taxes might bring a higher tax administration cost and lower efficiency of tax system as a whole. Important factor can be the population density and urbanization, where higher urbanization might exert higher decentralization (Litvack and Oates, 1970, Kee, 1977). With growing population number, in large and less densely populated countries it is likely that the decentralized public administration would be most costly (Arzaghi and Henderson, 2005, Panizza, 1999).
- b) Level of country development. According to numerous studies (Oates, 1985, Mullen, 1980) the decentralization itself is a superior good, where the demand is likely to grow with the income per capita.
- c) Size of redistribution. Recent research (Goerl and Seiferling, 2014) shows that decentralized redistribution can help achieve a more equal distribution of income, provided decentralization on the expenditure side is accompanied by decentralization on the revenue side.
- d) Income inequality. Wallis et al. (1991) argue that the demand for locally provided public goods is related to income inequality similarly to the demand for public (like private) goods typically tends to vary positively with income. Therefore, the determinant of the variation in demand (decentralization) should be the degree of inequality in the distribution of income.
- e) Preference heterogeneity. The higher heterogeneity of preferences is a classic argument supporting decentralization (Oates, 1968, Oates, 1999, Panizza, 1999). As it is not possible to measure the heterogeneity directly, it must be approximated by proxy variables, for example by language or ethnical fractionalization or even geographical fragmentation (Panizza, 1999, Canavire-Bacarreza and Martinez-Vazquez, 2012).
- f) Federalization. Political studies frequently emphasize differences among federated, supposedly more decentralized and unitary, more centralized countries. However, this contrast may not be necessarily high. Some unitary countries are strongly decentralized on both, expenditure and revenue sides of budget.

Few of these studies, however, focus the analysis on the revenue or even tax decentralization (Bodman and Hodge, 2010, Stegarescu, 2005, Cerniglia, 2003).

## 2 Empirical Approach

The tax decentralization covers the fiscal decentralization from the view of the most important local government revenue, i.e. taxes. The local government is defined consistently with the definition of International Monetary Fund Government financial statistics. The tax decentralization ratio is defined as the share of local government tax revenue ( $T_{LG}$ ) on total general government tax revenue. This is the standard approach used also by Stegarescu (2006), Bodman and Hodge (2010) and many others.

$$TD = \frac{T_{LG}}{T_{GG}} \cdot 100 \quad (1)$$

Because the above mentioned ratio does not reveal the autonomy of local government to influence the main parameters of taxation, we introduce the tax autonomy ratio (TA), which is the share of local government revenue with local government tax autonomy ( $T_{LG}^{(a,b,c)}$ ) on total local government tax revenue ( $T_{LG}$ ). The  $T_{LG}^{(a,b,c)}$  variable is defined as the summation of tax revenue in categories  $a$ ,  $b$  and  $c$  according the OECD methodology (*OECD, 1999, OECD, 2008*).

$$TA = \frac{T_{LG}^{(a,b,c)}}{T_{LG}} \cdot 100, \quad (2)$$

The local government tax categories  $a$ ,  $b$  and  $c$  include taxes, where the local government unit can alter either the tax rate, tax base or both parameters of taxation. The tax decentralization ratio (TD) is analysed during the years 1995 and 2013, the tax autonomy is analysed only in 2002, 2005, 2008 and 2011<sup>1</sup>.

The data panel includes local government levels in European OECD federal and unitary countries. Since we are interested in local government level, the data for federations omit the state level of government. OECD-Europe federations are following: Austria (AUT), Belgium (BEL), Germany (DEU) a Switzerland (CHE). Together with federations are analysed also highly decentralized Spain (ESP) and United Kingdom (GBP). The unitary countries group consist of Czech Republic (CZE), Denmark (DNK), Estonia (EST), Finland (FIN), France (FRA), Greece (GRC), Hungary (HUN), Ireland (IRL), Italy (ITA), Luxembourg (LUX), Netherlands (NLD), Norway (NOR), Poland (POL), Portugal (PRT), Slovakia (SVK), Slovenia (SVN), Sweden (SWE) and Turkey (TUR)<sup>2</sup>. Iceland, due to missing data, is not included.

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<sup>1</sup> More frequent data are not available from OECD statistics. In 1995 the data are available only for limited number of countries.

<sup>2</sup> For Turkey, Estonia, Poland and Greece, not all data are available. These countries are not included in panel data regression model.

Following the relevant literature, we formulate the following hypotheses:

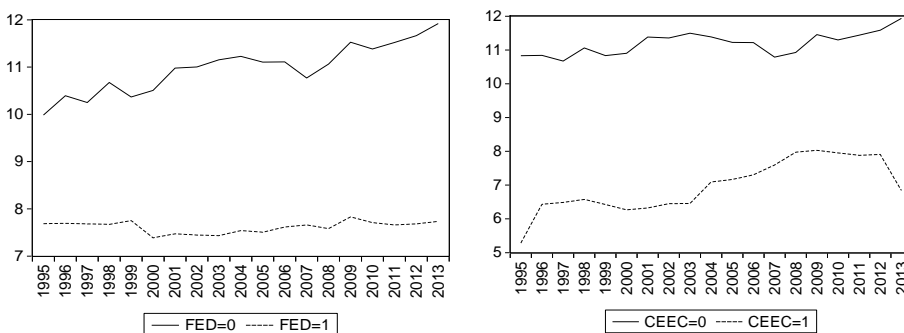
The higher surface area (AREA) The higher population (POP) The higher population concentration (URB) The higher population density (POPD) The higher size of general government redistribution function (SB) The higher distribution inequality (GINI) The higher average size of national income (GDPPC) The higher heterogeneity of preferences (ETH, LANG, REL) The higher relative size of local government sector (LEX)	...the higher tax decentralization
Federated countries (FED) are more tax decentralized	
Countries of CEEC are less tax decentralized	

Note: The details of explanatory variables and data sources are presented in Appendix 1.

### 3 Tax decentralization in OECD-Europe countries – an overview

The figure 1 (left panel) shows higher level and trend of growth of tax decentralization in unitary countries compared to federal countries. The fiscal decentralization is complicated process, where it takes time to develop all the necessary institutions. Therefore, one can expect lower tax decentralizations ratios in central and eastern European OECD countries. The right panel of figure 1 seems to confirm such a hypothesis, but the difference is not statistically significant.

**Fig. 1: Tax decentralization (TD) in OECD-Europe federations and unitary states (1995 – 2013) and in CEEC and other OECD Europe Countries**



Source: OECD Revenue Statistics, authorial computation.

Note: FED=0...unitary states, FED=1...federations and regional states, CEEC=1...Central and Eastern European OECD Countries. TD in percentage

Table 1 and 2 show tax decentralization ratio (TD) to local government level in OECD Europe in 2012 and well as the local government tax to GDP ratio. The variability is indeed very high, starting from the Czech Republic<sup>3</sup> with the lowest level (TD = 1,25 %) to Sweden with the highest level (TD = 36,93 %). The average decentralization ratio is much higher in unitary states (TD = 11,51 %, resp. 4,56 % of GDP) than in OECD-Europe federations (TD = 7,68 %, resp. 2,54 % of GDP). Since we focus on local government only, omitting state level in federations, the explanation lies in the fact that the local government levels in unitary states perform similar task as state levels government in federations, especially considering small European federations.

**Tab. 1: Tax revenue of local government, 2012, OECD Europe unitary countries**

	% of total tax rev.		% of GDP
Sweden	36,93	Sweden	15,64
Denmark	26,86	Denmark	12,67
Finland	22,70	Finland	9,73
Italy	16,38	Italy	7,00
France	13,18	France	5,80
Estonia	13,07	Norway	5,29
Poland	12,69	<b>Mean</b>	<b>4,56</b>
Norway	12,51	Estonia	4,20
<b>Mean</b>	<b>11,51</b>	Slovenia	4,08
Slovenia	11,16	Poland	4,07
<b>Median</b>	<b>10,04</b>	<b>Median</b>	<b>3,27</b>
Turkey	8,93	Turkey	2,47
Portugal	6,74	Hungary	2,42
Hungary	6,28	Portugal	2,10
Greece	4,03	Luxembourg	1,54
Luxembourg	4,01	Greece	1,36
Ireland	3,83	Netherlands	1,34
Netherlands	3,70	Ireland	1,04
Slovak Republic	2,99	Slovak Republic	0,84
Czech Republic	1,25	Czech Republic	0,42

Source: OECD Rev. Statistics.

<sup>3</sup> In agreement with Government Financial Statistics the local government includes both municipal and regional levels of government.



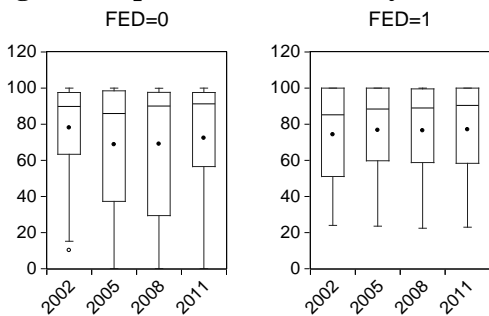
**Tab. 2: Tax revenue of local government, 2012, OECD Europe federations and regional states**

	% of total tax rev.		% of GDP	
Switzerland	15,26	Switzerland	4,11	
Spain	9,91	Spain	3,18	
Germany	8,16	Germany	2,98	
<b>Mean</b>	<b>7,68</b>	<b>Mean</b>	<b>2,54</b>	
<b>Median</b>	<b>6,51</b>	<b>Median</b>	<b>2,52</b>	
United Kingdom	4,86	Belgium	2,06	
Belgium	4,68	United Kingdom	1,61	
Austria	3,23	Austria	1,34	

Source: OECD Rev. Statistics.

When analysing the tax decentralization, we must not forget the high variability of tax arrangements at local levels of governments. The tax revenue of local government differs in terms of the tax autonomy, i.e. the ability to influence parameters of taxation. Therefore, even in countries with the same tax decentralization ratio, the tax autonomy might differ. The tax autonomy ratio of local governments (TA) seems to be higher in federations than in unitary countries, although the difference is not statistically significant (Fig. 2).

**Fig. 2: Boxplot of Tax autonomy**



Source: OECD Revenue Statistics, authorial computation.

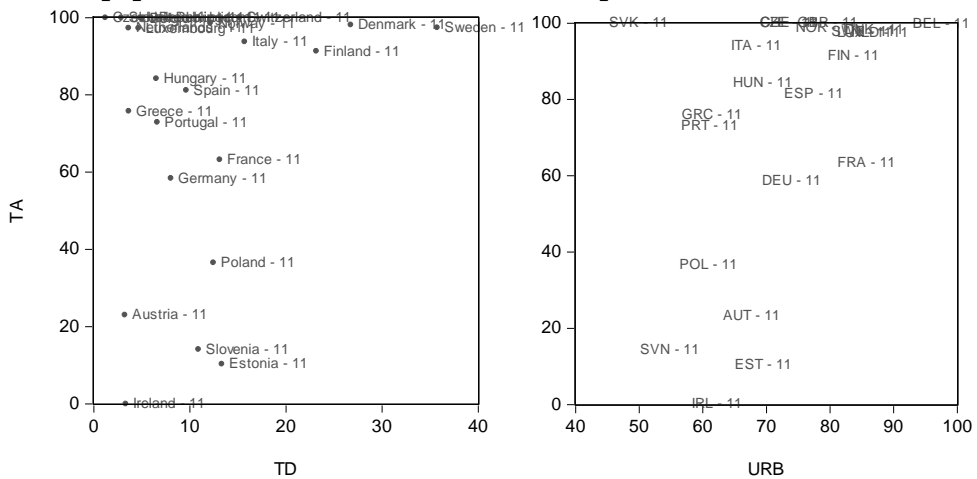
It is useful to view the tax autonomy in the context of tax decentralization ratio. If there is some positive link between both variables, the correlation is weak. There are countries:

- 1) with high tax decentralization and high tax autonomy (Denmark, Finland and Sweden),
- 2) with almost full tax autonomy but very low tax decentralization ratio (Czech Republic, Slovakia, Netherlands, Luxembourg, Ireland, Belgium),
- 3) with almost full tax autonomy and medium tax decentralization (Norway, Switzerland, Italy),

- 4) with medium to high tax autonomy and medium to low tax decentralization (Hungary, Greece, Spain, Portugal, France, Germany),
- 5) with medium tax decentralization and low tax autonomy (Slovenia, Estonia, Poland),
- 6) with low tax decentralization and low tax autonomy (Austria and recently Ireland without tax autonomy).

The left panel of figure 3 shows the scatterplot of both variables.

**Fig. 3: Tax autonomy ratio (TA), tax decentralization ratio (TD) and urban population share (URB) in OECD-Europe countries (TD) (2011)**



Source: OECD Revenue Statistics, authorial computation.

For the initial overview of mutual variable relationships, correlation matrix based on 2011 data is useful (table 3). The tax decentralization (TD) is statistically significantly correlated, considering possible explanatory variables, with the relative size of local government sector (LEX), geographical area of country (AREA) and also with average area of municipality (MUNA). The tax autonomy ratio correlates with urban population share (URB). However, these results are not particularly strong due to missing time dimension.

**Tab. 3: Correlation coefficients**

Correlation	TA	TD
TA	1,000	0,163
TD	0,163	1,000
LEX	0,304	0,777***
GDPPC	0,281	0,061
GINI	-0,170	-0,217
SB	-0,113	0,039

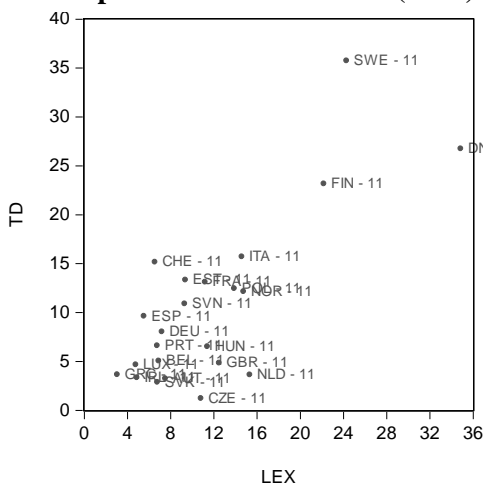
Correlation	TA	TD
URB	0,502**	0,323
POPD	0,341	-0,384**
POP	0,054	-0,037
AREA	0,107	0,426**
ETH	0,072	-0,221
LANG	0,204	-0,118
REL	0,175	-0,270
MUNA	0,061	0,630***
MUNP	0,115	0,032

Source: Authorial computation, data sources in appendix 1.

Note: Included observations. 23, balanced sample. P-values \*\*\*...1%, \*\*...5%, \*...10%. Data 2011.

The figure 4 suggests positive linear relationship between tax decentralization and relative size of local government sector, corresponding with initial theoretical expectation. Interesting point is that there are some countries, where the tax decentralization is much lower than expected values considering the relative size of local government sector (Czech Republic, Netherlands, Denmark) and in some countries much higher (Sweden, Switzerland, Spain).

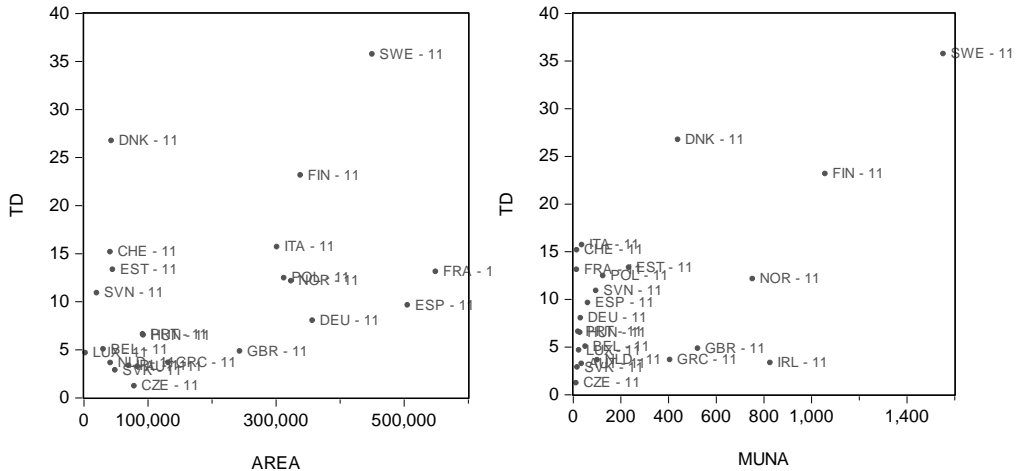
**Fig. 4: Scatterplot of tax decentralization ratio (TD) and local government expenditure to GDP ratio (LEX) (2011)**



Source: Authorial computation, data sources in appendix 1.

The explanation of different tax decentralization ratios may lay in the differences in geographical area (AREA), or the size structure of local governments measured by area (MUNA) (figure 5). The tax autonomy (TA) tends to rise with the urban population share (right panel of figure 3).

**Fig. 5: Scatterplot of tax decentralization ratio (TD) and geographical area of country (AREA) and average area of municipality (MUNA) (2011)**



Source: Authorial computation, data sources in appendix 1.

#### 4 The model specification and estimation

To test the hypotheses, the balanced panel data regression model with random effects specification is used. The panel includes 17 periods (1996-2012) and 20 cross sections (Greece, Estonia and Poland were excluded due to missing data). The analysis focuses primarily on slope parameters, rather than on individual differences. Differences among countries are presumed to stem from non-observable random (for example historical) factors. The panel data contain a time invariant variables<sup>4</sup>, which makes the use of fixed effects specification impossible. The estimated equation is following:

$$TD_{it} = a + bX_{it} + w_{it} \quad (3)$$

$$i = 1 \dots N, \quad t = 1 \dots T$$

where  $a$  is a scalar and  $X_{it}$  is the vector of explanatory variables. The residual  $w_{it}$  consists of two components:

$$w_{it} = \varepsilon_i + u_{it} \quad (4)$$

where  $\varepsilon_i$  is the cross-section error component and  $u_{it}$  is the combined cross-section and time error component. We assume validity of standard assumptions for

<sup>4</sup> The case of surface area. Also the heterogeneity proxies and Gini coefficient are considered to be time invariant.

random effects model, that the country error term is not correlated with the predictors.

The cross section random effect model is estimated using OLS estimator with White robust standard errors. All the continuous explanatory variables (AREA, POP, POPD, GDPPC) as well as the dependent variable (TD) entered the model in natural logarithm specification, since it resulted in improved fit of the model. Because the dependent variable TD is fraction expressed in percentage, bounded by 0 and 100, we have to consider the possible bias resulting from such boundedness (Greene, 1985). Following the study of Papke and Wooldridge (1996), as demonstrated by Cerniglia (2003), the model is estimated in second step with log-odd ratio of dependent variable<sup>5</sup>.

Results of the model estimation are presented in table 4.

**Tab. 4: Econometric results**

Dependent variable	LOG(TD)					LOG(TD/100-TD)				
C	-6,716*	0,492	-5,179	-4,930	-4,736	-11,310**	-3,632	-9,764**	-9,484**	-9,237**
	(-1,858)	(0,195)	(-1,558)	(-1,408)	(-1,478)	(-2,556)	(-1,286)	(-2,478)	(-2,356)	(-2,563)
FED	0,464	0,320	0,572	0,188	0,268	0,426	0,291	0,530	0,150	0,237
	(0,424)	(0,551)	(0,792)	(0,270)	(0,410)	(0,530)	(0,463)	(0,680)	(-1,350)	(0,348)
CEEC	-0,277	-0,256	-0,376	-0,946	-0,773	-0,383	-0,369	-0,488	-1,063	-0,865
	(-0,407)	(-0,413)	(-0,537)	(-1,336)	(-1,158)	(-0,504)	(-0,537)	(-0,643)	(4,705)	(-1,189)
LOG(AREA)	1,142***	-	1,038***	1,052***	0,900***	1,201***	-	1,096***	1,110***	0,932***
	(5,305)		(4,987)	(1,195)	(4,343)	(4,487)		(4,439)	(4,705)	(3,904)
LOG(POP)	-1,296***	-	1,270***	-1,448***	-1,218***	-1,342***	-	-1,316***	-1,500***	-1,228***
	(-3,704)		(-3,617)	(-4,056)	(-3,410)	(-3,519)		(-3,454)	3,822)	(-3,138)
LOG(POPD)	-	-1,203***	-	-	-	-	-1,251***	-	-	-
		(-4,085)					(-3,842)			
URB	0,001	0,001	0,001	0,002	0,002	0,001	0,001	0,002	0,002	0,002
	(0,270)	(0,173)	(0,345)	(0,399)	(0,344)	(0,335)	(0,260)	(0,411)	(0,647)	(0,399)
LOG(GDPPC)	0,345***	0,337***	0,341***	0,357***	0,328***	0,353***	0,346***	0,350***	0,366***	0,332***
	(8,175)	(8,826)	(0,345)	(8,521)	(7,765)	(7,604)	(8,175)	(7,452)	(7,839)	(7,044)
SB	0,051***	0,051***	0,051***	0,052***	0,051***	0,054***	0,054***	0,054***	0,055***	0,054***
	(10,703)	(11,101)	(10,522)	(11,161)	(11,425)	(10,520)	(10,837)	(10,389)	(10,985)	(11,405)
GINI	9,806	8,365	8,625	9,694	8,857	8,833	7,436	7,619	8,745	7,671
	(1,232)	(0,995)	(1,096)	(1,264)	(1,277)	(0,969)	(0,765)	(0,859)	(1,016)	(1,010)
LANG	1,084**	1,569	-	-	-	1,117**	1,549	-	-	-
	(2,320)	(1,632)				(2,041)	(1,574)			
ETH	-	-	0,116	-	-	-	-	0,158	-	-
			(0,196)					(0,277)		
REL	-	-	-	2,462***	1,816***	-	-	-	2,501***	1,741**
				(3,949)	(2,910)				(3,605)	(2,576)

<sup>5</sup>  $\log[TD/(100 - TD)]$

Dependent variable	LOG(TD)				LOG(TD/100-TD)					
LEX	-	-	-	-	0,017** (2,124)	-	-	-	-	0,019** (2,198)
Adjusted R-squared	0,296	0,295	0,294	0,300	0,313	0,269	0,270	0,268	0,274	0,288
No. of observations	340	340	340	340	340	340	340	340	340	340
No. of countries	20	20	20	20	20	20	20	20	20	20
F-statistics	16,803	18,744	16,998	17,176	16,466	14,886	16,648	14,802	15,193	14,698
p-value	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000

Source: Authorial computation

Note: p-values \*\*\*...1%, \*\*...5%, \*...10%, t-statistics in brackets.

## 5 Conclusion

The aim of the article was to find whether the theoretical factors of fiscal decentralization are relevant empirically for tax decentralization to local government level. The motivation of the article was to contribute to the knowledge of drivers behind the fiscal decentralization observed in numerous countries in recent decades.

Estimated equations provide support for the hypotheses that the countries with larger geographical area tend to decentralize more tax revenue to local governments. This result is consistent with findings of most studies (Oates, 1972, Panizza, 1999, Cerniglia, 2003, Arzagli and Henderson, 2005).

Surprisingly, the slope parameters of population and population density have negative sign and are statistically significant. Therefore, countries with higher population and population density tend to decentralize less. The explanation of this phenomenon may lay in the fact that the analysis deals with local government levels only, omitting therefore the state level of federations. Federations covered by the model have much higher average population than unitary states. At the same time the state levels of federations capture part if the tax decentralization in the country.

The real GDP per capita, reflecting the level of economic development proved to be significant factor of tax decentralization, supporting the findings of Oates (1972), Panizza (1999) and Arzagli and Henderson (2005). The inequality of household income, as well as the share of urban population, although having correct sign, is not statistically significant. The size of redistribution function is highly statistically significant, suggesting that countries with higher redistribution decentralize more taxes to local government. The explanation might lay in the increasing role of local governments in redistribution processes.

The heterogeneity variable showed results with correct sign, where religious and language fractionalization were statistically significant, as proved by Panizza (1999). The very fact that the country is or is not federated or belong or not to

group of Central and Eastern European Country seems to be unimportant for tax decentralization to local government level.

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**Appendix 1: List of explanatory variables and hypotheses**

Variable	Symbol	Data source	Units	Expected sign of slope parameter
Federation	FED	OECD	dummy fed=1	+
Central and eastern European Countries	CEEC	-	dummy CEEC=1	-
<b>Geographical size, population and population concentration</b>				
Population	POP	OECD Stat.	Population in thnds.	+
Surface area	AREA	World Bank WDI	sq. km	+
Population density	POPD	World Bank WDI	People per sq. km	+
Urban population	URB	World Bank WDI	Percentage of total	+
<b>Relative size of local government sector</b>				
Consolidated local government expenditure	LEX	OECD Stat	percentage of GDP	+
<b>The size of general government redistribution function</b>				
Social benefits other than social transfers in kind: general government	SB	Ameco	percentage of GDP	+
<b>Inequality of income distribution</b>				
Gini coefficient	GINI	OECD	coefficient	+
<b>Average size of income</b>				
GDP per Capita	GDPPC	OECD Stat.	USD per capita, PPP	+
<b>Heterogeneity of preferences</b>				
Ethnic fractionalization	ETH	Alesina (2003)	Index, higher value mean higher fractionalization	+
Language fractionalization	LANG	Alesina (2003)	dtto	+
Religious fractionalization	REL	Alesina (2003)	dtto	+

