THE ECONOMETRIC ANALYSIS OF THE TAXES AND TRANSFERS DEPENDENCE ON THE DIFFERENT GOVERNMENT LEVEL ON THE EXAMPLE OF VISEGRAD COUNTRIES

Nadiya Dubrovina[1]
Oleksandr Nestorenko[2]
Kristina Sirenko[3]
Olena Vasylenko[4]

DOI: https://doi.org/10.31410/ITEMA.S.P.2019.79

Abstract: *The features of the financial decentralization are closely connected with the public administration and self-governance systems in the separated countries. It should be mentioned that the problem of efficient allocation of the financial resources between social and economic institutions from the different territorial levels is not clearly solved in many EU countries, and in Visegrad countries particularly. It is important to study the relations between taxes and transfers on the different government level. In this work we presented one of the possible approaches to study relationship between taxes and transfers on the different government level in Visegrad countries. By means of econometric analysis and regression models we showed essentially strong vertical and horizontal relations for some countries of EU between their fiscal indicators on central and local government level. Nevertheless, we had the different estimations of the parameters for factor variables, as well as for trends, which can be explained by important differences in the policy of these V4 countries-neighbors in the policy of fiscal decentralization, social and economic development.*

Keywords: *Fiscal Decentralization, Fiscal Policy, Vertical and Horizontal Relation, Econometric Model, Visegrad Countries.*

1. INTRODUCTION

One of the important problems of the fiscal policy of EU countries is to improve the transparency and efficiency of the taxes and budget systems as the means of the realization of the main social and economic functions of the state and self-governing units (Buček et all, 2010; Crook, 2003; Crook & Manor, 2000). The features of the financial decentralization are closely connected with the public administration and self-governance systems in the separated countries. It means that if the number of self-governing regions is bigger the opportunity to introduce the financial decentralization mechanism is more. Nevertheless, taxation mechanism and budget systems differ in EU countries and this reflects the historical traditions and different structure of administrative systems (Dubrovina et all, 2016).

In the Visegrad countries, and Slovakia particularly, the problem of the regional disproportions is acute (Buček et all, 2010; Maaytová, 2015; Morvay, 2002; Ochrana et all, 2010). These significant regional disproportions in the social and economic development have negative impact to the budget systems, their financial stabilities and efficiency. The regional parts of gross do-

[1] School of Economics and Management in Public Administration in Bratislava, Slovakia
[2] University of Economics in Bratislava, Slovakia
[3] Academy of the State Penitentiary Service, Ukraine
[4] National Transport University, Ukraine

mestic product, gross value-added formation in the regions and incomes of the local inhabitants create the bases for taxation and collection of the different taxes for the budget system. Especially the necessity of reforms in public administration and budget systems is clearly visible for the former socialist countries of EU, where the traditions of the centralized systems and control were significant and experience of the financial decentralization is quite short (Crook, 2003; Crook & Manor, 2000; Markowska-Bzducha, 2006).

It should be mentioned that the problem of efficient allocation of the financial resources between social and economic institutions from the different territorial levels is not clearly solved in many EU countries, and in Visegrad countries particularly. For example, in Slovakia this problem is also actual, this is highlighted in many domestic reports and research papers (Buček et all, 2010, Morvay, 2002; Schultzová et all, 2009). The mechanism of tax system and taxation, the perspectives of their development, taxes and transfers are studied in the papers of Schultzová (2009), Zubaľová (2008), Morvay (2002), etc.

Nevertheless, one of the problems of public and local finances is to study the relations between taxes and transfers on the different government level. In this work we presented one of the possible approaches to study relationship between taxes and transfers on the different government level in Visegrad countries.

2. THE PURPOSE, DATA AND METHODOLOGY

The purpose of this work is to study relations between taxes and transfers on the different government level in Visegrad countries by means econometric approach and to compare the results of estimation to reveal some differences of fiscal policy in Czech Republic, Slovakia, Hungary, Poland and Slovakia.

For the evaluation of the position of EU countries we used available data from Eurostat for period of 2002-2017. For the purpose of the analysis of the vertical and horizontal relations between selected indicators characterized financial decentralization and local autonomy in SR and other Visegrad countries we used correlation matrices and multiple regression models. The analysis of the correlation matrices showed the existence of the essential relationship between indicators characterized financial decentralization and local autonomy on the vertical and horizontal levels.

As tools we used multiple regression model because the period of time series and limited number of countries (4 countries of Visegrad group) followed to some limitations in the selection of other, more advanced econometric methods.

3. THE MAIN RESULTS

In this work the analysis of the taxes and transfers dependence on the different government level is carried out on the example of Visegrad countries. We tested the hypothesis about relationship of the taxes and transfers on the different government level by means the econometric models.

For the analysis we used such set of the indicators:

V1_C – share of the capital and current transfers in the revenue on the central government level [(Capital transfers, receivable + Other current transfers, receivable)/Revenue]×100%;

V2_C – share of the capital and current taxes in the revenue on the central government level [(Capital taxes, receivable + Current taxes on income and wealth, receivable)/Revenue]×100%;

V3_C – share of the net social contributions in the revenue on the central government level [Net social contributions/Revenue]×100%;

V4_C – share of the subsidies, transfers and investment grants in the expenditure on the central government level [(Subsidies, payable + Other current transfers, payable + Investment grants, payable)/ Expenditure]×100%;

V5_C – share of the social benefits in the expenditure on the central government level [Social benefits other than social transfers in kind, payable/Expenditure]×100%;

W1_L – share of the social benefits other than social transfers in kind in the expenditure on the local government level, [Social benefits other than social transfers in kind, payable/ Expenditure]×100%;

W2_L – share of the social transfers in kind, purchased market production in the expenditure on the local government level [Social transfers in kind, purchased market production, payable/Expenditure]×100%;

W3_L – share of the social benefits and social transfers in kind in the expenditure on the local government level [(Social benefits other than social transfers in kind, payable+ Social transfers in kind, purchased market production, payable)/Expenditure]×100%;

W4_L – share of the capital transfers, investment grants and current transfers in the expenditure on the local government level [(Capital transfers, payable + Investment grants, payable + Other current transfers, payable)/Expenditure]×100%;

W5_L – share of the taxes in the revenue on the local government level [(Taxes on production and import, receivable + Current taxes on income and wealth, receivable + Capital taxes, receivable)/Revenue]×100%;

W6_L – share of the transfers in the in the revenue on the local government level [(Capital transfers, receivable + Other capital transfers and in investment grants, receivable)/Revenue]×100%.

For the analysis of the horizontal and vertical relations between taxes and transfers on the different government level we used such hypothesis given below.

For central government level and analysis of the horizontal relations we used such indicators:

1. Dependence of the share of the capital and current transfers in the revenue from share of the capital and current taxes in the revenue or V1_C=f(V2_C);
2. Dependence of the share of the social benefits in the expenditure from share of the net social contributions in the revenue or V5_C=f(V3_C);
3. Dependence of the share of the subsidies, transfers and investment grants in the expenditure from the share of the capital and current taxes in the revenue V4_C=f(V2_C).
4. Dependence of share of the capital transfers, investment grants and current transfers in the expenditure from share of the transfers in the in the revenue or W4_L =f(W6_L);
5. Dependence of the share of the transfers (social transfers and benefits, current transfers, investment grants and capital transfers) in expenditure from or the share of the taxes and transfers in revenue or W34_L=f(W56_L);
6. Dependence of the share of the taxes and transfers in revenue on local government level from the share of taxes and transfers in revenue on the central government level or W56_L=f(V12_C);

7. Dependence of the share of the transfers (social transfers and benefits, current transfers, investment grants and capital transfers) in expenditure on the local government level from the share of the social benefits, subsidies, transfers and investment grants in the expenditure on the central government level or W34_L=f(V45_C).

Because we used time series data which have some tendencies and correlated each other for the specification of the linear econometric model time as additional independent variable was included.

In table 1 the results of the econometric model were given for the analysis of the horizontal relations between taxes and transfers on the central government level.

Table 1. The results of the econometric model for the analysis of the dependence of the share of the capital and current transfers in the revenue (V1_C) from share of the capital and current taxes in the revenue (V2_C)

Variable	**Czechia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	25,1509	8,4205	2,9868	0,0105	F(2,13)=1.9106 p<0.18731	0.4766
V2_C	-0,7651	0,3928	-1,9477	0,0734		
T (time)	-0,2505	0,1663	-1,5061	0,1509		
Variable	**Hungary**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	18,7964	4,0896	4,5961	0,0005	F(2,13)=54.840 p<0.00000	0.9455
V2_C	-0,4986	0,1281	-3,8908	0,0019		
T (time)	0,5385	0,1191	4,5196	0,0006		
Variable	**Poland**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	17,7861	3,5209	5,0516	0,0002	F(2,13)=24.034 p<0.00004	0.8871
V2_C	-0,573	0,1673	-3,4261	0,0045		
T (time)	0,2338	0,052	4,4933	0,0006		
Variable	**Slovakia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	44,2298	9,5038	4,6539	0,0005	F(2,13)=8.3059 p<0.00474	0.7489
V2_C	-1,367	0,3552	-3,8486	0,002		
T (time)	0,3839	0,1636	2,3472	0,0354		

Source: own statistical elaboration in Statistica

As we can see from this table, for most Visegrad countries the econometric models have good values for the basic statistical criteria (Student criterion or t-value and Fisher criterion or F-value), it means that estimations for the parameters are statistically significant at level $p<0.05$ for each variable and for model at all. R-values are also relatively high and it means that these models are good fitted for the description of the relations between selected indicators. In the case of Czechia we observe that first parameter (intercept) is statistically significant at level $p<0.05$, but second parameter for variable V2_C is statistically significant at level $p<0.1$ and third parameter for time variable is statistically significant at level $p<0.15$. In addition, value for Fisher criterion is not high and statistically significant only at level $p<0.2$. R-value for model built for Czechia is not high, only 0.48. Nevertheless, this model can be used for the analysis of relations between selected indicators.

Let to interpret these models. For all models the estimations for the intercept are positive and can be explained as initial level for the share of the capital and current transfers in the revenue without the impact of such factors as the share of the capital and current taxes in the revenue. The highest estimation was used for Slovakia (44,22) and the lowest was for Poland (17,78). For all countries the estimations for variable V2_C (share of the capital and current taxes in the revenue) are negative, it means that the share of the capital and current transfers in the revenue reduced if the share of the capital and current taxes in the revenue increased. For Hungary, Poland and Slovakia the value of the V1_C (share of the capital and current transfers in the revenue) were increasing over time period from 2002-2017, the related estimations for the time variable are positive. In case of Czechia, the estimation for time variable is negative, it means that values of V1_C (share of the capital and current transfers in the revenue) have some tendency to reduce over time.

In table 2 the results of the econometric model were given for the analysis of the horizontal relations between social benefits and net social contributions on the central government level.

Table 2. The results of the econometric model for the analysis of the dependence of the share of the social benefits in the expenditure (V5_C) from share of share of the net social contributions in the revenue (V3_C)

Variable	**Czechia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	17,4104	8,7311	1,9941	0,0676	F(2,13)=43.728 p<0.00000	0.9330
V3_C	0,4689	0,2557	1,8338	0,0897		
T (time)	0,6576	0,0734	8,9558	0		
Variable	**Hungary**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	10,6406	2,412	4,4115	0,0007	F(2,13)=4.1519 p<0.04033	0.6243
V3_C	0,0676	0,4581	0,1476	0,8849		
T (time)	-0,1852	0,1187	-1,5597	0,1428		
Variable	**Poland**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	5,9316	5,1543	1,1508	0,2705	F(2,13)=5.1538 p<0.02249	0.6650
V3_C	0,2959	1,2166	0,2432	0,8116		
T (time)	-0,1115	0,0348	-3,2086	0,0069		
Variable	**Slovakia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	18,5559	3,0309	6,1221	0	F(2,13)=1.1648 p<0.34251	0.3898
V3_C	-0,7759	1,6218	-0,4784	0,6403		
T (time)	0,1178	0,1165	1,5262	0,1509		

Source: own statistical elaboration in Statistica

As we can see from this table only for Czechia the econometric models have good values for the basic statistical criteria (Student criterion or t-value and Fisher criterion or F-value), it means that estimations for the parameters are statistically significant at level $p<0.05$ for each variable and for model at all. R-values are also relatively high and it means that these models are good fitted for the description of the relations between selected indicators. In case for Hungary and Poland F-value is significant al level $p<0.05$, but estimations for some parameters are not statis-

tically significant at level p<0.05 according to t-value. In case for Slovakia only estimation for intercept is statistically significant at level p<0.05, other estimations for variables are not statistically significant at level p<0.05 and this model has relatively low value for Fisher criterion.

The estimations of the intercept are relatively high for case of Czechia and Slovakia and low for Poland.

Then, only for Czechia share of the social benefits in the expenditure (V3_C) has an essential impact on the change of share of the social benefits in the expenditure (V5_C) in this model, for other V4 countries in presented models the variable V3_C does not have statistically significant influence to V5_C. Also, in case for Czechia and Poland the linear trend for the development of share of the social benefits in the expenditure (V5_C) should be taken into account, because the estimations for the parameters for time variable are statistically significant at level p<0.05.

In table 3 the results of the econometric model were given for the analysis of the horizontal relations between subsidies, transfers, investment grants and capital and current taxes on the central government level.

Table 3. The results of the econometric model for the analysis of the dependence of the share of the subsidies, transfers and investment grants in the expenditure (V4_C) from the share of the capital and current taxes in the revenue (V2_C)

Variable	**Czechia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	30,5946	9,3884	3,2588	0,0062	F(2,13)=16.761 p<0.00025	0.8488
V2_C	0,0588	0,438	0,1343	0,8953		
T (time)	-0,591	0,1854	-3,1872	0,0071		
Variable	**Hungary**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	48,61	6,9545	6,9898	0	F(2,13)=7.3986 p<0.00716	R= 0.3281
V2_C	-0,0216	0,2179	-0,0992	0,9225		
T (time)	-0,5868	0,2026	-2,8967	0,0125		
Variable	**Poland**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	43,2944	7,1716	6,037	0	F(2,13)=0.78422 p<0.47692	R= 0.3281
V2_C	0,2002	0,3407	0,5876	0,5669		
T (time)	0,1314	0,106	1,2402	0,2368		
Variable	**Slovakia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	47,6912	9,7903	4,8713	0,0003	F(2,13)=2.8426 p<0.09460	0.5515
V2_C	-0,3838	0,3659	-1,0488	0,3134		
T (time)	-0,2984	0,1685	-1,7709	0,1		

Source: own statistical elaboration in Statistica

For this kind of the model only estimations for intercept are statistically significant at level p<0.05 and for cases of Czecia, Hungary and Slovakia the linear trend for the development of the share of the subsidies, transfers and investment grants in the expenditure (V4_C) should be taken into account, because the estimations for the parameters for time variable are statistically

significant at level p<0.1. The estimations for the intercept have relatively high values in cases of Hungary and Slovakia, for Czechia the estimation for the intercept is the lowest.

Then, in the presented models the variable share of the capital and current taxes in the revenue (V2_C) does not influence significantly on the change of the variable share of the subsidies, transfers and investment grants in the expenditure on the central government level for all V4 countries.

For local government level and analysis of the horizontal relations we used models described below.

In table 4 the results of the econometric model were given for the analysis of the horizontal relations between share of the capital transfers, investment grants and current transfers in the expenditure and the share of the transfers in the in the revenue on the local government level.

Table 4. The results of the econometric model for the analysis of the dependence (W4_L) from (W6_L)

Variable	**Czechia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	15,6242	1,7159	9,1055	0	F(2,13)=39.099 p<0.00000	0.9259
T (time)	-0,6537	0,0776	-8,4207	0		
W6_L	-0,1929	0,0882	-2,1862	0,0477		
Variable	**Hungary**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	8,066	0,9224	8,7445	0	F(2,13)=4.7573 p<0.02816	0.6501
T (time)	0,2864	0,1018	2,8146	0,0146		
W6_L	-0,0098	0,0277	-0,3554	0,728		
Variable	**Poland**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	7,6341	1,1731	6,5075	0	F(2,13)=0.22560 p<0.80109	0.1831
T (time)	-0,0217	0,0851	-0,2547	0,803		
W6_L	**-0,0564**	0,1088	-0,5187	0,6127		
Variable	**Slovakia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	8,0377	2,9399	2,734	0,0171	F(2,13)=4.8570 p<0.02659	0.6539
T (time)	-0,4491	0,1615	-2,781	0,0156		
W6_L	0,0723	0,1175	0,6157	0,5487		

Source: own statistical elaboration in Statistica

From this table it is seen that only for Czechia the econometric models have good values for the basic statistical criteria (Student criterion or t-value and Fisher criterion or F-value), it means that estimations for the parameters are statistically significant at level p<0.05 for each variables and for model at all. R-values are also relatively high and it means that these models are good fitted for the description of the relations between selected indicators. For Hungary and Slovakia, the estimations for the intercept and time variable are statistically significant at level p<0.05, but estimations for variable W6_L are not statistically significant. It means that in presented models share of the transfers in the in the revenue does not influence to share of the capital transfers,

investment grants and current transfers in the expenditure on local level for Hungary and Slovakia. For case of Poland only the estimation for the intercept is statistically significant at level $p<0.05$, but other estimations for variables T (time) and W6_L are not statistically significant. In case of Czechia the estimation of the intercept is relatively high in comparison with cases in Hungary, Poland and Slovakia. Also, only for Czechia the share of the transfers in the in the revenue has the essential impact on the change of share of the capital transfers, investment grants and current transfers in the expenditure.

In table 5 the results of the econometric model were given for the analysis of the horizontal relations between share of the transfers in expenditure and the share of the transfers in the in the revenue on the local government level.

Table 5. The results of the econometric model for the analysis of the dependence (W34_L) from (W56_L)

Variable	**Czechia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
T (time)	-0,8854	0,0934	-9,4797	0	F(2,14)=366.76 p<0.00000	0.9905
W56_L	0,3373	0,0167	20,2357	0		
Variable	**Hungary**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
T (time)	0,1009	0,2143	0,4709	0,645	F(2,14)=131.01 p<0.00000	0.9743
W56_L	0,2233	0,0344	6,4943	0		
Variable	**Poland**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
T (time)	0,3831	0,2086	1,8361	0,0877	F(2,14)=169.48 p<0.00000	0.9799
W56_L	0,3125	0,0494	6,3265	0		
Variable	**Slovakia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
T (time)	-0,0654	0,1037	-0,6313	0,538	F(2,14)=59.372 p<0.0000	0.9457
W56_L	0,2366	0,0307	7,7145	0		

Source: own statistical elaboration in Statistica

For the presented models we can see that the estimations for the parameters for variable W56_L (share of the taxes and transfers in revenue) are statistically significant at level $p<0.05$ for all V4 countries, it means that share of the taxes and transfers in revenue has the essential impact on the change of share of transfers in expenditure on local government level for all V4 countries. In case of Czechia and Poland the estimations for time variable are also statistically significant at level $p<0.1$, but for Czech Republic the linear trend has negative slope (values of the share of transfers in expenditure are reducing over time), and in case of Poland the linear trend has positive slope (values of the share of transfers in expenditure are increasing over time).

For local government level and central government level analysis of the vertical relations we used indicators from central and local government level and analyzed models presented in next tables.

In table 6 the results of the econometric model were given for the analysis of the vertical relations between the share of the taxes and transfers in revenue on local government level and the share of taxes and transfers in revenue on the central government level.

Table 6. The results of the econometric model for the analysis of the dependence of the share of the taxes and transfers in revenue on local government level (W56_L) from the share of taxes and transfers in revenue on the central government level (V12_C)

Variable	Czechia					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	68,9486	12,0664	5,7141	0,0001	F(2,13)=1.4837 p<0.26279	0.4310
T (time)	-0,0284	0,1908	-0,1489	0,8839		
V12_C	-0,5335	0,3977	-1,3415	0,2027		
Variable	**Hungary**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	61,5682	60,9849	1,0096	0,3311	F(2,13)=1.6323 p<0.2331	0.4480
T (time)	1,5653	0,9073	1,7253	0,1081		
V12_C	-0,4557	1,7553	-0,2596	0,7992		
Variable	**Poland**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
Intercept	41,0718	27,7701	1,479	0,163	F(2,13)=2.3569 p<0.13385	0.5158
T (time)	0,5173	0,2973	1,7403	0,1054		
V12_C	-0,1717	1,0372	-0,1655	0,8711		
Variable	**Slovakia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
T (time)	-1,8273	0,3825	-4,7773	0,0003	F(2,14)=190.47 p<0.00000	0.9821
V12_C	1,2506	0,0985	12,6924	0		

Source: own statistical elaboration in Statistica

From this table it is seen that estimation for time variable is statistically significant at level $p<0.5$ for Slovakia, this estimation is positive and it means that the linear trend has negative slope and the values of the share of the taxes and transfers in revenue on local government level are reducing over time.

For Hungary and Poland these estimations are positive and statistically significant only at level $p<0.1$ it means that increasing tendency of the values of the share of the taxes and transfers in revenue on local government should be taken into account. The estimations of the parameters for the variable V12_C (the share of taxes and transfers in revenue on the central government level) is statistically significant at level $p<0.05$ for Slovakia, in the rest models these estimations are not statistically significant. It means that in the presented models only for case of Slovakia the share of taxes and transfers in revenue on the central government level has an essential impact on the change of the share of the taxes and transfers in revenue on local government level.

In table 7 the results of the econometric model were given for the analysis of the vertical relations between the share of the transfers in expenditure on the local government level from the share of the social benefits, subsidies, transfers and investment grants in the expenditure on the central government level.

From this table it is seen that the estimations of the parameters for time variable and variable V45_C (the share of the social benefits, subsidies, transfers and investment grants in the expenditure on the central government level) are statistically significant at level $p<0.05$. It means that for all V4 countries we observed linear tendency of the change of the share of the transfers in ex-

penditure on the local government level over time and the share of the social benefits, subsidies, transfers and investment grants in the expenditure on the central government level had essential impact on the change of the share of the transfers in expenditure on the local government level for Czech Republic, Hungary, Poland and Slovakia.

Table 7. The results of the econometric model for the analysis of the dependence of the share of the transfers in expenditure on the local government level (W34_L) from the share of the social benefits, subsidies, transfers and investment grants in the expenditure on the central government level (V45_C)

Variable	Czechia					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
T (time)	-0,8433	0,0791	-10,6607	0	F(2,14)=490.54 p<0.0000	0.9929
V45_C	0,2755	0,0117	23,4463	0		
Variable	**Hungary**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
T (time)	0,3293	0,1028	3,2047	0,0064	F(2,14)=373.89 p<0.00000	0.9907
V45_C	0,2246	0,0189	11,8756	0		
Variable	**Poland**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
T (time)	0,451	0,154	2,9291	0,011	F(2,14)=262.67 p<0.00000	0.9869
V45_C	0,2255	0,0272	8,2798	0		
Variable	**Slovakia**					
	Estimation for the parameter	Standard deviation for the estimated parameter	t-value	p-level	F-value for the model	R for model
T (time)	-0,3549	0,1653	-2,1467	0,0498	F(2,14)=40.027 p<0.00000	0.9225
V45_C	0,1849	0,03	6,1715	0		

Source: own statistical elaboration in Statistica

For the analysis of horizontal and vertical relations simultaneously on the local and central level we tested other models. But one of the problems in such models is that the multi collinearity between exogenous and endogenous variables exists and the estimations for the parameters are not statistically significant at level $p<0.05$ or $p<0.1$. Nevertheless, the analysis of the correlation matrices presented the coefficient of pair correlation between variables on the central government level and local government level shows that the certain essential relations between mentioned variables exist, but the input-output models may be more complicated than multiple linear models.

4. CONCLUSION

Despite the similarities in the historical background of Visegrad countries, former traditions in the development of self-governance in regions, cultural micro regions and the territories with own ethnical and cultural identification, we revealed some differences in the development of fiscal reforms and processes of financial decentralization. By means of econometric analysis and regression models we showed essentially strong vertical and horizontal relations for some countries of EU between their fiscal indicators on central and local government level. Nevertheless, we had the different estimations of the parameters for factor variables, as well as for trends, which can be explained by important differences in the policy of these V4 countries-neighbors in the policy of fiscal decentralization, social and economic development.

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