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Interlinkages between public expenditures, non-tax government revenues and corruption in the transition economies

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Abstract

Purpose – This article examines potential impacts of increase in non-tax government revenues and public expenses on corruption for 11 transition economies in the Central and Eastern Europe.
Design/methodology/approach – The empirical analysis uses yearly panel datasets and employs second-generation panel data models which take cross-sectional dependency and slope heterogeneity into account.
Findings – The empirical results reveal the fact that there is a strong linkage between public expenses and corruption and a weak linkage between non-tax revenue collection and corruption in the transition economies. We perform the same analysis by using data sets from G-7 countries but do not notice any linkages between those variables.
Research limitations/implications – The research topic requires further discussion on constitutional political economy to digest the empirical findings. Thus, an extended version combined with political economic approach might be useful.
Practical implications – Through economic transitions, there might be a linkage between public expenditures and corruption index. Thus, public spending might be controlled by using constitutional economics policies.
Originality/value – This paper is the first empirical work in the literature, which examines if there is a linkage between corruption and public expenditures and government tax income structure by using panel data sets. Moreover, it compares the results from transition countries with those of G-7 countries and provides certain policy suggestions in the context of constitutional economics.

Keywords Transition economies, Constitutional economics, Corruption, Tax revenue, Dynamic CCEMG model
Paper type Research paper

1. Introduction

This article empirically discusses impacts of non-tax revenue and public expenditure on potential corruption in the post-Soviet countries (transition countries) by using annual panel data from 1999 to 2016. Structural economic and political changes, new sophistications in

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economic activities, sudden or structural shifts in distribution of wealth in different segments of the society, appearance of new political systems, actors or interest groups and in sum, a transition in political economy of a country may lead to corruption. The transition economies have passed such economic and political stages; thus, it might be academically important to test existence of such cases by using relevant quantitative data.

The post-Soviet economies have experienced a dramatic transition in which most of their economies have passed from planned economies to the European Union (EU) memberships. That transition did not only an economic change but had political economics aspects including managing government expenditures being free from any corruption and allocation of non-tax revenues, mainly, economic grants and supports from other governments. In that respect, that transition era provides an opportunity for academic researchers to test certain constitutional economics discipline.

As it is discussed in more detail in the Literature review section, the current literature on the topic is mostly qualitative or descriptive rather than based on any empirical evidence. In transition economies, applying for non-tax revenue and increasing public expenditure may increase possible corruption cases. However, research in this article does not apply a deterministic approach, arguing that any increases in non-tax government revenues and public expenses lead corruption to emerge or increase. On the contrary, this article is keen to examine the interlinkage between corruption and non-tax revenue collection and corruption and public expenditure based on constitutional economics and public choice theory from an empirical perspective. This research also makes an empirical comparison between the transition economies and G-7 countries. Gokcekus *et al.* (2023) empirically examine the relationship between the shadow economy and corruption in seven Economic Cooperation Organization (ECO) countries using a regression analysis and find a statistically significant relationship between corruption and shadow economy. The researchers stated that Soviet heritage has a meaningful impact on this relationship. They conclude that for post-Soviet economies ECO nations, the relationship is complimentary, though for the other economies, it is substitutive.

Eugen and Tosato (2017) state that corruption has dramatic impacts on socio-economic developments depending on institutional, juristic and economic environments. They provide a detailed survey review including empirical research studies from different economies and time periods. In fact, until recent years, the research on that topic was mainly theoretical rather than empirical. The main limitation was the available quantitative data on corruption and detailed components of public revenues statistics. However, recent data constructions on corruption, political risk, financial stability and transparency have provided fruitful opportunities for researchers to make empirical research on political or economic constitutional topics. For the readers being interested in such comprehensive databases, Crombach and Smith (2024) recently published a valuable article presenting the Subnational Corruption Database, providing data on corruption in 1,473 subnational areas of 178 countries. The database includes a comprehensive overall corruption index, the Subnational Corruption Index and its two components: the Subnational Grand Corruption Index and Subnational Petty Corruption Index.

Using recently available datasets, there exists newly emerging research on literature on the relationships between corruption and certain financial variables. For example, Jetin *et al.* (2024) examine the effect of corruption on foreign direct investment (FDI) at global and regional levels including East, South and Southeast Asia sub-regions by using panel data sets and test to examine the relationship between the stock of FDI and the "control of corruption", published by the World Bank, for 180 countries from 2002 to 2019. The tests results reveal the fact that at the global level, the control of corruption is low and has a positive effect on FDI. On the other hand, in East Asia, Southeast Asia, Australia and New Zealand, corruption exists in the forms of own benefits of officials through taxes, bribes or

nationalising assets. Similarly, Chen and Yang (2024) examine the relationships among bureaucratic corruption, growth and financial crisis in an open economy, using a two-period small open economy model. Their findings reveal the facts that when an economy is in the stage of depreciation, corruption might block the growth and lead to potential financial crises. On the other hand, financial crisis could be sources of corruption, too. For example, Boufounou *et al.* (2024) show that uncertainty causes corruption in Greece where a long period of economic uncertainty since 2010 financial crisis has existed in addition to uncertainty followed by the Covid. They argue that the public has belief that when proper measures are taken, the country can handle with the corruption in the public sector. However, this belief does not exist in the young generation. This study is important to show how corruption is considered as a phenomenon against which even perceptions are hard to change.

Based on the existing literature and constitutional economics discipline framework, this research paper has three main aims and contributions to constitutional economics literature. Firstly, within our knowledge, it is the first empirical work in the literature, which examines if there is a linkage between corruption and public expenditures and government tax income structure by using panel data sets. Secondly, it applies a dynamic panel data analysis based on second-generation panel data models which take cross-sectional dependency and slope heterogeneity into account and adds a dynamic nature into panel data analysis. Thus, the methodological flow of this research can be extended to any similar panel data set to reflect a dynamic nature into any analysis. Finally, it compares the results from transition countries with those of G-7 countries and provides certain policy suggestions in the context of constitutional economics.

The article is constructed as follows. The next section discusses theoretical background on the research question, namely why an increase in public expenses and non-tax government revenue collection may lead to corruption. The roots of the research questions date back to public choice theory; thus, the literature review in that section includes original works in that field. Some recent discussions and findings will be provided with a focus of transition and developing economies. The third section introduces data and methodology. The data subsection introduces the time series indices, representing each variable in empirical tests and how they are received, and describes their main statistical characteristics. The methodology section provides a background on the dynamic common correlated effects group mean model and discusses why it is selected for empirical tests. The fourth section presents the empirical results both for transition economies and G-7 economies in a comparative perspective. The last section is conclusion where the results from constitutional economics discipline point of view are discussed and some policy suggestions are made for the future. The section also includes limitations on our empirical analysis and suggestions for future academic research in that field.

2. Literature review

In this section, a comprehensive literature review including both theoretical and applied perspectives helps discuss why increase in public expenses and non-tax government revenues might lead to corruption. The arguments referred in this section are mainly based on public choice theory and constitutional economics literature.

Public expenditures increase mainly when governments spend more on goods and services. This can be a common practice in a state where state is the key actor in the economic life for the entire economy (democratic socialist economies) or some sectors like health sector in the UK where all doctors are public employees. In most cases, increase in public expenditures is considered solely due to Keynesian government policies. However, governments might also prefer to increase public expenditures in extraordinary

circumstances. This is specifically a common exercise in transition periods such as Keynesian policies after 1929, post-Second World War Germany, 1960s Latin America and post-Soviet era in Central and Eastern Europe. Some theoretical cases where inevitable circumstances lead governments to increase public expenses in total spending are referred as follows.

Inequality in wealth distribution in the society is one of the main indicators triggering structural breaks in economic choices of both governments and society. According to Peltzman (1980), a structural inequality triggers redistribution of wealth via public expenditures. Governments might prefer to increase public expenses to transfer public sources to the wider community to rebalance wealth inequality and strength legitimacy. A typical example is expansion of the EU to Greece, Portugal and Spain in 1980s, where wealth has been distributed from core EU economies to the periphery via mainly free movement of labour in addition to increase in public expenses and initiatives in the agriculture sector. By using data from 64 East Europe and MENA countries, Uberti (2018) examines if corruption in those geographies has cultural roots. He examines Ottoman and socialist eras and finds out that in Eastern Europe, Central Asia and the Balkans are not inherently oriental or socialist. In fact, there is empirical evidence that corruption in Eastern Europe might be due to persistent economic underdevelopment.

Another case where government chooses to increase the share of public expenses in total expenses might be due to some structural changes and specialisation in economic activities (Demsetz, 1979). For instance, government might prefer to increase public expenditures via to compensate unemployment as a result of structural technological changes impacting economy. However, public expenses might increase in those circumstances as a result of adaptation of those changes in the public sector, too. Automation in the reel sector in the 1980s and implementation of cloud and artificial intelligence technologies in the financial sector in recent years are typical examples where the public sector has followed the private sector by spending more resource on structural changes though the intense of expenses varies on the level of government activities in the economy. Goel and Budak (2006) examine if government size has any impact on corruption in the transition economies and state that larger economic activities generate less corruption in those economies, which is contradictory to other countries. However, they find a positive linkage between corruption and large geographical size, leading harder time controlling corruption.

According to Cameron (1978), open economies have higher public expenditures than closed economies as they have to maintain competitiveness and have access to the borrowing opportunities in international markets. This, in fact, might be another case where separate behaviours are observed in different economies depending on the level of economic openness. Recently, Cieslik and Goczek (2018) examine the impacts of corruption and privatisation on economic growth in post-Soviet economies, and they empirically show that per capita income is impacted by privatisation, corruption and economic openness. What is more important, the economies with higher privatisation and openness have higher growth rates. They also noticed negative impacts of corruption on growth.

Finally, tendency of political actors who prefer to maximise their political interests, namely, votes, is a reason for increasing public expenses. This can be specifically the case where constitutional economics rules have not been matured, yet, and can be treated as a typical case of corruption. An interesting paper written by Libman and Obydenkova (2015) empirically discusses the role of communist legacy in Union of Soviet Socialist Republics (USSR) in corruption and shows how the actors in the political area might be associated with corruption rather than economy or economic systems.

Aforementioned cases, namely, inequality in wealth distribution, structural changes and specialisation in economic activities, transition from closed economies to open economies and

using public expenses as a mean of influencing voting behaviours has been completely or partially observed in post-Soviet economies from the 1990s to the current era.

If any increases in public expenses tend to be in a continuous nature, then, a gap between public income and expenditure can be inevitable unless it is captured by collecting corresponding amount of tax revenue. In its worst form, continuous increase in public expenditure might lead to corruption and financial instability, if the expenses do not generate any surplus for overall economy but used for interests of the elected powers.

The Leviathan protects the citizens' lives and properties, and citizens pay income tax and have right to vote to select their governments. This has become a common practice since Magna Carta. As discussed, public expenditures increase where political actors who participate in political decision-making expand their interest in influencing voting behaviours of public. Voters would demand more public services, which are inevitably responded by the governing bodies to ensure re-election. In that case, it is almost inevitable that increasing public expenditures are financed by non-tax revenue collection, if there are not any institutional controls on Leviathan's economic power. In other words, public expenditures in non-institutional economies might lead the government to increase non-tax revenue.

Non-tax revenue for government includes increases in government net worth resulting from transactions other than tax revenues. In other words, they are transfers receivable by any government from other governments or international organisations without receipt of any goods, services or assets in return.

Increase of non-tax revenue as a percentage of total revenue is an important structural driver that causes financial asymmetry and fiscal illusion. Politicians may create gaps in public budget when there is an economic slowdown. On the other hand, this might not be considered if the economic activities turn to normal. In literature, this is called financial asymmetry introduced by public choice theory (Acemoglu and Verdier, 1998).

Under economic crisis, asking further tax is a suicide for governments; thus, the tendency is to finance the budget gap with non-tax revenues including borrowings and international aids. Public might fall into an illusion where they ignore the potential tax burden of public expenditures financed by non-tax revenues. In literature, this is called fiscal illusion (Buchanan, 1987).

The next question is if non-tax revenue is inevitable. When there is a budget imbalance, a gap between public expenditures and income appears as a result of increasing growth in public expenditures, and financial instability is almost inevitable. That gap can be technically closed only by increasing tax revenue, central bank resources, borrowing and, in severe cases, international aids including International Monetary Fund (IMF) interruptions, World Bank loans or in more historical context Marshall aids.

Finally, potential results of fiscal illusion are unemployment, stagflation and uncertainty in economic growth which ironically decrease tax revenue in time. Furthermore, interest burden, decrease in reserves, monetary expansion, financial instability, inflation, inequality in distribution of wealth and sharp devaluation are other dramatic consequences (Stiglitz, 2004).

Based on theoretical arguments discussed so far, this research aims to empirically investigate (i) the interlinkage between increase in public expenditures and corruption; and (ii) interlinkage between increase in non-tax revenue and corruption in post-Soviet economies. This is in line with the observations in post-Soviet economies where there existed structural changes and sophistication in economic activities, inequality in distribution of wealth, new political actors and interest groups seeking optimising their interests and power. In the meantime, those economies were becoming more open economies approaching international borrowing markets and international financial institutions.

3. Data and methodology

This research analyses the impacts of non-tax revenue and public expenditure on potential corruption for ex-Soviet countries (transition countries) and G-7 countries covering 1999–2016 periods. Our dataset includes 11 ex-Soviet countries as transition economies including Hungary, Czech Republic, Croatia, Bulgaria, Latvia, Estonia, Poland, Lithuania, Slovenia, Slovak Republic and Russian Federation and G-7 countries including Germany, France, Japan, Italy, the UK, Canada and the US.

Non-tax revenue represents share of non-tax revenue within total government revenues as percentage. It includes any government revenue except for taxes on income, taxes on profits and capital gains, property taxes, indirect taxes, taxes on goods and services and taxes on international trades. The source of data is United Nations University-WIDER government revenue dataset constructed by McNabb (2017).

Public expenditures represent share of public expenditures within Gross Domestic Product (GDP) as percentage, received from Organisation for Economic Cooperation and Development (OECD) database.

We use the corruption perceptions index calculated by Transparency International, which represents corruption in our empirical tests. The index indicates how the public sector is perceived according to corruption. The corruption perceptions index ranges between 0 (denotes a country perceived "highly corrupt") and 10 (denotes a country perceived "very clean") for the sample covering 1999–2016 periods. The Corruption Perception Index is from Transparency International.

The data and the resources are summarised as follows:

(i) Non-tax revenue

Source: United Nations University-WIDER Government Revenue Dataset
https://www.wider.unu.edu/project/grd-government-revenue-dataset

(ii) Public expenditures

Source: OECD database
https://www.oecd.org/en/data/indicators/general-government-spending-by-destination.html

(iii) The Corruption Perception Index

Source: https://www.transparency.org/en/cpi/2023

The tests apply natural logarithm of all the variables to analyse the elasticity coefficients. In empirical modelling we employed the Corruption Perception Index proxy for corruption denoted as "LCOR", share of public expenditures within GDP denoted as "LPE" and share of non-tax revenue within total government revenues denoted as "LNTR" both for transition economies and G-7 countries.

To investigate the impacts of non-tax revenue and public expenditure on potential corruption for both transition countries and G-7 countries, we used the model denoted in Equation (1):

$$\begin{aligned} LCOR_{it} &= \lambda_i d_t + \alpha_{1i} LPE_{it} + \alpha_{2i} LNTR_{it} + u_{it} \\ u_{it} &= \theta_i f_t + \varepsilon_{it}, \mathrm{t} = 1, 2, \ldots \mathrm{T} \,\mathrm{and}\, \mathrm{i} = 1, 2, \ldots, \mathrm{N} \end{aligned} \tag{1}$$

where LCOR, LPR and LNTR denote natural logarithm of the Corruption Perception Index, public expenditures and non-tax revenue shares, respectively, d_t implies observed common effects, f_t implies unobserved common effects and ε_{it} is the error term. The descriptive statistics of the employed variables are represented in Table 1.

Table 1.
Descriptive statistics

Variable	Obs.	Mean	Std. Dev	Min	Max
Transition economies					
LCOR	198	1.503	0.267	0.742	1.946
LPE	198	3.556	0.201	2.970	4.016
LNTR	198	1.800	0.294	1.064	2.499
G-7 countries					
LCOR	126	1.968	0.198	1.361	2.219
LPE	126	3.333	0.388	2.651	3.906
LNTR	126	1.816	0.297	1.246	2.286

Source(s): The table is created by the authors

In the empirical modelling, we firstly check cross-sectional dependence (CSD hereafter) of the variables. If one does not take into consideration CSD, both the errors are assumed cross-sectionally independent and slopes are assumed homogeneous. Spatial effects, omitted common effects and mutual effects are possible reasons for CSD in the errors (Chudik and Pesaran, 2013).

If we omit CSD in the errors, this could cause some problems in our model results including important size-distorted conventional unit root tests results (O'Connell, 1998) and inconsistent and biased estimators for fixed- or random-effect methodologies (Sarafidis and Robertson, 2009).

In order to analyse CSD properties of the errors, we employ the bias-adjusted Langrange Multiplier (LM) test developed by Pesaran *et al.* (2008) which is superior for the inconsistency issues when time dimension is greater from the cross-sectional dimension (T > N) as in our case (Pesaran *et al.*, 2008).

After CSD is found in the errors, we employed the Cross-sectionally augmented Im-Pesaran-Shin (CIPS) (Pesaran, 2007) panel unit root test which is robust if there is CSD. According to CIPS test results, we found that all the investigated variables are stationary after differencing which means I (1), then we check co-integration relationship. For testing co-integration relationship, we employed second-generation Durbin-Hausman (DH) co-integration test proposed by Westerlund (2008) which takes CSD into account different from the conventional first-generation co-integration tests.

We test the existence of co-integration and then employ Pesaran and Yamagata's (2008) slope heterogeneity test to examine if the slope is homogenous or not. First-generation estimators including fixed and random effects and instrumental-variable estimators assume homogeneity in the slope. We expect that the slope does not have homogeneity unless the panels do not include large cross section and time dimensions (Im *et al.*, 2003; Pesaran and Smith, 1995).

The empirical tests show that both CSD and slope heterogeneity exist. Therefore, we employed the dynamic CCEMG (common correlated effects mean group estimator) model developed by Chudik and Pesaran (2015). The CCEMG provides superior and robust performances for both CSD and slope heterogeneity are valid. Differences between CCEMG and the dynamic CCEMG estimators are both lagged dependent variables, and cross-sectional averages added to the model are an explanatory variable. The CCEMG model also provides robust results if there are structural breaks in the sample.

Lastly, after finding dynamic CCEMG model results, we compare long-term elasticity coefficients of the dynamic CCEMG model with CCEMG model and augmented mean group (AMG) model results as robustness check.

4. Empirical results

In the empirical analysis, we first investigate CSD of the variables by using the bias-adjusted LM tests. The bias-adjusted LM test results are presented in Table 2. According to Table 2, we reject no CSD null hypothesis at 1% significance level for transition economies and 5% significance level for G-7 countries.

As we found CSD, we employ the models that take CSD into account in order to avoid inconsistency. After CSD check, we apply CIPS stationarity test developed by Peseran (2007) which considers CSD. Table 3 presents CIPS tests results.

Table 3 contains CIPS test outcomes showing that the model variables are nonstationary with and without adding a time trend in the analysis. (1).

To perform co-integration analysis, we prefer to use Westerlund's DH test that embedded the CSD into co-integration. The DH test has two stages. The DH panel (DHp) test uses same autoregressive parameters for all cross sections, while the DH group (DHg) test enables the autoregressive parameters to vary for cross sections with alternative hypotheses. Under both DHp and DHg tests, rejection of the null hypothesis statistically proofs co-integration existence. See Table 4.

The DHg and DHp tests reject no co-integration null hypothesis. According to DH tests, we found a co-integration relationship between the variables for both transition economies and G-7 countries.

After co-integration check, we investigate further the slope homogeneity properties of the model. For slope heterogeneity check, we employed Pesaran and Yamagata (2008) tests which consider CSD. The test uses an updated version of Swamy's (1970) test and has robust properties for both power and size (Juhl and Lugovskyy, 2014).

As indicated in Table 5, for transition economies, all statistics reject slope homogeneity null hypothesis and for G-7 countries, only $\widehat{\Delta}_{adj}$ test statistic is less from the critical value and

	Value
Transition economies	
Bias-adjusted LM test	108.4*
G-7 countries	
Bias-adjusted LM test	37.9**

Note(s): * indicates 1% and ** indicates 5% significance. Null hypothesis: There is no CSD
Source(s): The table is created by the authors

Table 2.
CSD results

	Level		First difference	
	Constant	Constant + Trend	Constant	Constant + Trend
Transition economies				
LCOR	−2.049	−2.110	(−3.492)*	(−3.335)*
LPE	−2.060	−2.509	(−4.288)*	(−4.535)*
LNTR	−2.150	−2.347	(−3.970)*	(−3.967)*
G-7 countries				
LCOR	−1.964	−2.022	(−3.599)*	(−3.646)*
LPE	−1.437	−1.458	(−3.891)*	(−4.606)*
LNTR	−2.190	−2.588	(−4.815)*	(−4.651)*

Note(s): * indicates 1% significance level. Null hypothesis: There is unit root
Source(s): The table is created by the authors

Table 3.
CIPS test results

the other 4 test statistics shows rejection of slope homogeneity. Thus, we assumed the slope is not homogenous and used an estimator that considers slope heterogeneity.

The test results show existence of CSD and slope heterogeneity. Therefore, we apply dynamic CCEMG model of Chudik and Pesaran (2015) which is more powerful if slope heterogeneity and CSD exist. The CCEMG estimator representation for the tests is presented in Equation (2).

$$y_{it} = \alpha_{0i} y_{it-1} + \alpha_{1i} + \beta_i x_{it} + \sum_{j=1}^{n} \delta_i \bar{y}_{it-j} + \sum_{j=1}^{n} \theta_i \bar{x}_{it-j} + \varphi_i f_t + \varepsilon_{it} \quad (2)$$

where y_{it} denotes the dependent variable, α_{1i} is fixed group effect coefficients, x_{it} is the vector of independent variables, x_{it-1} and y_{it-1} are cross-sectional average lags, β_i denotes the country-specific slope, f_t is the unobserved common factor and ε_{it} is the error term.

The dynamic CCEMG model results are showed in Table 6.

	Value
Transition economies	
DHg	2.458*
DHp	1.870**
G-7 countries	
DHg	2.258*
DHp	2.696*

Table 4. Westerlund's DH test results

Note(s): * indicates 1% and ** indicates 5% significance level. Null hypothesis: No co-integration relationship
Source(s): The table is created by the authors

Transition economies	Value	G-7 countries	Value
Swamy S	24.391*	Swamy S	73.229*
$\tilde{\Delta}$	901.242*	$\tilde{\Delta}$	86.686*
$\tilde{\Delta}$adj	1049.929*	$\tilde{\Delta}$adj	100.987*
$\hat{\Delta}$	5.360**	$\hat{\Delta}$	11.193*
$\hat{\Delta}$adj	5.011**	$\hat{\Delta}$adj	0.727

Table 5. Slope heterogeneity results

Note(s): *indicates 1% significance level. Null hypothesis slope homogeneity
Source(s): The table is created by the authors

Transition economies		G-7 countries	
Variable	Value	Variable	Value
LCOR (−1)	0.184***	LCOR (−1)	0.337**
LPE	(−0.345)**	LPE	(−0.204)
LNTR	(−0.041)	LNTR	(−0.131)
C	3.759**	C	(−2.748)*

Table 6. Dynamic CCEMG estimator results

Note(s): * denotes 1%, ** denotes 5% and *** denotes 10% significance. Dependent variable: LCOR
Source(s): The table is created by the authors

All three models, CCEMG, dynamic CCEMG and AMG models, are designed to test co-integration and thus are suitable to examine if any long-term relationships exist between the selected variables. In this respect, the coefficients reported on the tables are co-integration coefficients, thus indicating long-term relationships between the variables.

The effect of public expenditure on corruption is found negative and statistically significant for the transition economies according to Table 6. We found statistically significant clear linkage between public expenditures and corruption index (remember index starts at zero as the highest corrupted perception point); however, there is a no linkage between non-tax revenue and corruption index for transition countries. For G-7 countries, the effects of public expenditure and non-tax revenue on corruption are found statistically insignificant.

For robustness check, we estimate long-term elasticity coefficients for the effects of public expenditures and non-tax revenue on corruption by employing dynamic CCEMG, CCEMG and AMG [1] models. Table 7 presents robustness check results.

According to Table 7, dynamic CCEMG, CCEMG and AMG models give parallel results. For transition economies, the effect of public expenditures on corruption is found to be negative and statistically significant for all models. The elasticity coefficients are found between −0.422 and −0.264. Effect of non-tax revenues on corruption is found negative but insignificant according to the dynamic CCEMG model and significant only in 10% significance level in the other models. For G-7 countries, both public expenditures and non-tax revenues are found statistically insignificant according to all alternative models.

5. Conclusion and some suggestions in the context of constitutional economics

This research article tested co-integration among public expenditures, non-tax revenue and corruption in the post-Soviet economies. After state-planned economic regimes about half century, those economies had been suddenly witnessed regime shifts where dramatic non-tax revenue had entered into their systems, in parallel, public expenditures increased to respond any physical or structural constructions to prepare themselves into global economic system. That stage of economic history provides fruitful academic research potentials to examine certain aspects of constitutional economics which argue that uncontrolled spending of non-tax revenue and public expenditures might lead to corruption. To test that arguments require not only proper economic era but also available quantitative data to be used in any empirical tests, this article has explored the aforementioned opportunities to make such an empirical analysis given the fact that recently emerging data on corruption index and non-tax revenue have become available and academically more robust.

Variable	Dynamic CCEMG	CCEMG model	AMG model
Transition economies			
LPE	(−0.422)**	(−0.285)**	(−0.264)**
LNTR	(−0.052)	(−0.106)***	(−0.123)***
C	4.606**	0.358	2.519*
G-7 countries			
LPE	(−0.307)	(−0.028)	(−0.031)
LNTR	(−0.197)	(−0.033)	(−0.001)
C	(−4.144)	(−1.216)**	1.868*

Note(s): * denotes 1%, ** denotes 5% and *** denotes 10% significance
Source(s): The table is created by the authors

Table 7.
Robustness check

As the aim is to test long-term relationships between the selected variables, the empirical part of the research employed certain co-integration models. Due to the nature of the time period, which is a transition inheriting volatility and shifts in the data between the years, the empirical tests include not only static models but also dynamic co-integration tests. In order to make a comparison, the study conducts similar tests employing G-7 countries data.

The findings of empirical tests confirm that in transition economies, there is a statistically significant clear linkage between public expenditures and corruption index. The negative relationship is due to the fact that the index starts at zero as the highest corrupted perception point. The linkage between non-tax revenue and corruption index is only significant at 10% significance level in non-dynamic test results.

On the other hand, in G-7 countries, there is no linkage between corruption index and neither public expenditures nor non-tax revenue. The high level of institutionalisation, constitutional economic rules and controls and balance-power checks in G-7 countries should have a significant impact on effective usage of public expenditures. Certain constitutional economics policy implementation may improve institutionalisation in developing economies which improve optimum usage of non-tax revenues and public expenditures for common public benefit. Some constitutional economic principles limiting non-tax revenue sources, i.e. putting borrowing limits for governments (for example, some states in the United States) or limiting budget deficit as applied under the EU Maastricht criteria can be considered as constructive steps for institutionalisation. Similarly, as introduced by Wicksell in the concept of constitutional asymmetry, the rule that public expenditures can only be financed by corresponding direct or indirect tax revenue can be chosen as an implementation policy. Tax rates can be defined explicitly in the constitution (Aktan, 2017). More radically, tax structure, i.e. components of tax, can be predefined as a percentage of total tax by law.

Despite its new empirical focus in the constitutional economics field, this research paper has a conceptual limitation which is that being a transition economy, high level of public expenditure or non-tax government revenues do not necessarily mean that the economy is open to corruption. The evidence in this paper is mainly an empirical attempt, and the conceptualisation of the research is shaped by using fundamental theoretical academic works that date back to the 1970s to 1980s. The sample used in empirical research belongs to a specific time period and economies where dramatic developments occurred. We control that limitation by using a dynamic model; however, the results should be considered as an academic empirical attempt within the concept of public choice theory.

The strength of this research is its empirical application. Recently cumulating time series data in public economics allows new empirical methods to be used to discuss constitutional economics fundamentals. The future research can extend to apply similar empirical works on any constitutional economics topics where data are available. Some suggestions include potential linkages between the rule of law index and tax revenues and linkages between inequalities in wealth distribution (Gini coefficient) and sophistication of rule of law.

Notes

1. Augmented mean group (AMG) model is proposed by Eberhardt and Bond (2009) and Eberhardt and Teal (2010). The AMG estimator gives superior results when heterogeneity and CSD are valid as CCEMG estimator. Basic difference between AMG and CCEMG estimators is the approximation method of the unobserved common factors.

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