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Public governance and shadow economy in Central and Eastern European countries

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Abstract: *Nearly all the countries face to shadow economy with different sizes and try to keep the shadow economy at a minimum level considering its possible negative impacts on their economies. This study researches the relationship among various indicators of public administration and shadow economy in 11 Central and Eastern European economies during 2003-2014 period employing panel regression. We found that improvements in public administration and EU membership affected shadow economy negatively, while crises affected shadow economy positively.*

Keywords: *Institutional development, shadow economy, panel regression, Central and Eastern European Countries.*

JEL**:** *C23, H11, H26, O17.*

Introduction

Shadow economy is an ever present phenomenon in our daily life under different names such as underground economy, unofficial economy, hidden economy, informal economy, irregular economy and black economy. But no consensus about definition and measurement of shadow economy has been established despite its long historical past. However, shadow economy generally includes all the unrecorded transactions which should be in the various forms of national accounts (Schneider and Enste, 2000). The existence of shadow economy enables its participants to keep away from payments of diverse taxes and social security spending and meeting some legal and administrative obligations such as working hours, minimum wage and other standards (Schneider and Williams, 2013). The studies have revealed that constitutional aspects, tax, social security and administrative burden, quality of public administration, economic institutions and justice system, moral aspects and values are major determinants of shadow economy (Thießen, 2010). The invisible characteristic of the shadow economy makes its measurement hard. But size of shadow economy generally is calculated by direct methods using surveys and samples which consist of voluntary replies and tax audits etc. or by indirect methods including multiple indicator multiple cause (MIMIC), dynamic MIMIC (DYMIMIC), transactions approach, currency demand approach and electricity consumption (physical input) approach (Restrepo-Echavarria, 2015).

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The shadow economy, a part of daily life, has significant direct or indirect negative effects on the economies and social life and these costs cause the national governments and international organizations to combat with shadow economy. Major costs of shadow economy are as follows (Schneider and Enste, 2000):

- First a considerable size of shadow economy makes official statistics such as income, unemployment and consumption unreliable and the economic policies based on these statistics in turn misfire.
- Secondly increases in the greatness of shadow economy lead decreases in tax income. The decreases in tax income prevent the governments from making educational and infrastructure investments and social expenditures, cause deteriorations in public sector balance. Also it may trigger further increases in the magnitude of shadow economy if public sector increases tax rates to meet the decreasing tax revenues.
- Thirdly increasing size of shadow economy encourage the economic units to move away from formal economy.

Central and Eastern European (CEE) economies have transited from centrally planned economies to the market economies in 1990s and made structural reforms during this transformation process (Felipe, Oto, 2015). Furthermore, these countries also applied to integrate with European Union (EU) and implemented many structural reforms to reach the existing organizational structure of the EU. In this regard, CEE economies experienced an institutionally transformation. However, there have been very few studies on the interaction between public governance indicators and magnitude of shadow economy in CEE economies in the literature. Therefore, our study will be one of the early empirical studies which investigates the interaction among public governance indicators and magnitude of shadow economy in 11 CEE countries (Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) during the period 2003-2014 using panel regression. The rest of the study is structured as follows: Section 2 gives empirical literature review and Section 3 gives data and econometric methodology. Then empirical analysis and major findings are given in Section 4 and the study is concluded with Section 5.

1.Literature Review

The limited empirical literature has researched the interaction between different parameters of institutional quality and shadow economy by benefiting from panel regression and the literature summary was given in Table 1. The findings showed that government effectiveness, transparency and accountability of public administration and quality of legal system had negative impact on the magnitude of shadow economy. However, the studies investigating the nexus between shadow economy and corruption have reached mixed findings depending their sample. Virta (2007) found that corruption had positive impact on the magnitude of shadow economy, while Manolas et al. (2013) found that corruption

had negative impact on the magnitude of shadow economy. On the other hand Dreher and Schneider (2006), Dreher and Schneider (2010) revealed that there was no statistically significant relationship between shadow economy and corruption (Androniceanu, 2013).

Table 1. Literature summary

Study	Country and study period	Major findings
Dreher and Schneider (2006)	120 countries, 1994-2002	Government effectiveness affected shadow economy negatively and corruption had no significant relationship on shadow economy.
Schneider (2007)	145 countries, 1999-2005	Corruption affected shadow economy negatively in high income group of countries, while corruption affected shadow economy positively in low income group of countries.
Virta (2007)	79 (model 1), 95 (model 2) countries, 2000-2002	Corruption had positive impact on shadow economy, when the bribes were paid to get projects.
Torgler and Schneider (2009)	57 countries, 1996, 1998 and 2000	Rule of law, government effectiveness, voice and accountability and regulatory quality affected shadow economy negatively.
Dreher et al. (2009)	145 countries, 1999-2003	Institutional quality affected shadow economy negatively.
Dreher and Schneider (2010)	98 countries, 1999-2002	Government effectiveness affected shadow economy negatively and corruption had no significant impact on the magnitude of shadow economy.
Thießen (2010)	38 OECD and Eastern Europe countries, 2005-2005	Quality of public administration and legal system had negative impact on shadow economy.
Alm and Embaye (2013)	111 countries, 1984-2006	Institutional development had negative impact on size of shadow economy.
Schneider and Williams (2013)	21 OECD countries, 1990-2007	Quality of public institutions had negative impact on shadow economy.
Manolas et al. (2013)	19 OECD countries, 2003–2008	Control of corruption and government effectiveness had negative impact on shadow economy.
Petreski (2014)	30 transition economies, 2005-2011	Improvements in business-friendly regulations with better institutions decreased the magnitude of shadow economy.
Shahab et al. (2015)	25 high-developed and developing countries, 1999-2007	Regulatory quality had negative impact on shadow economy.

(Source: Author's own elaboration based on literature review)

2.Data and Method

In this study, we investigated the impact of public governance on the size of shadow economy. Therefore, we used the data of shadow economy calculated by Schneider et al. (2015) based on the MIMIC method as a proxy for the shadow economy. The major indicators on the quality of public administration are single indicators (economic freedom index of Heritage and Fraser Institute, World Bank's investment climate survey and doing business survey) and aggregated governance indicators (World Bank's governance indicators, OECD's governance indicators, Transparency International's indicators).

2.1 Data

In this study, we prefer to use Worldwide governance indicators of World Bank considering its better decomposition of public governance and more comprehensive. So we used six Worldwide Governance indicators obtained from World Bank as a proxy for public governance: voice and accountability, government effectiveness, regulatory quality, control of corruption, political stability and the absence of violence/terrorism and rule of law.

These governance indicators are derived from 31 data sources reporting the perceptions of governance by a large number of survey respondents and expert assessments worldwide (see Kaufmann et al. (2010) for detailed information). Each governance indicator varies between -2.5 (weak) and 2.5 (strong). Our sample and study were determined by the data existence. The description of data in the study is given in Table 2. We used Stata 14.0, WinRATS Pro. 8.0 and Gauss 11.0 software packages for the econometric analysis.

Table 2. Data description

Variable	Symbol	Source
Shadow economy (% of GDP)	SHA	Schneider et al. (2015)
Voice and accountability	VAA	World Bank (2016)
Political stability and absence of violence/ terrorism	PS	
Government effectiveness	GE	
Regulatory quality	RQ	
Rule of law	ROL	
Control of corruption	COC	

(Source: Author's own elaboration)

2.2 Method

We investigated the impact of institutional determinants on shadow economy in 11 CEE countries during 2003-2014 period by employing panel regression. First, we tested cross-sectional dependency by CD_{LM1} test of Breusch and Pagan (1980) and homogeneity of the coefficients by delta tilde and adjusted delta tilde tests of Pesaran and Yamagata (2008). Then, we analyzed the

stationarity of the variables by panel LM unit root test of Lee and Strazicich (2003). Finally, we estimated random effects model (REM) model considering the results of pretests.

3. Empirical Analysis

Homogeneity of the coefficients and cross-sectional dependency of the series exhibit importance for the selection of unit root test.

3.1 Cross-Sectional Dependency and Homogeneity Tests

Therefore, we tested the cross-sectional dependency with CD_{LM1} test by Breusch and Pagan (1980), because time dimension of the dataset (T=12) is higher than cross-sectional dimension of the dataset (N=11) and the results were presented in Table 3. We concluded that there was cross-sectional dependency among the variables, because probability values were found to be lower than 0.05. Then we tested the homogeneity with delta tilde and adjusted delta tilde tests by Pesaran and Yamagata (2008) and the results were presented in Table 3. We concluded that the slope coefficients were heterogeneous, because probability values were found to be lower than 0.05.

Table 3. Results of cross-sectional dependence and homogeneity tests

CD_{LM1} cross-sectional dependency test (H_0: There is cross-sectional independency)		
Variable	**T statistic**	**p-value**
SHA	9.532	0.001
VAA	4.923	0.000
PSS	13.887	0.000
GE	12.534	0.000
RQ	9.343	0.018
ROL	11.632	0.000
COC	10.774	0.001
Homogeneity test (H_0: Slope coefficients are homogenous)		
Test	**Statistic**	**p-value**
Delta_tilde	4.997	0.015
Delta_tilde_adj	7.534	0.001

(Source: Author's own elaboration based on cross-sectional dependence and homogeneity tests)

3.2 Lee and Strazicich (2003) Panel Unit Root Test

The conventional panel unit root tests do not regard cross-sectional dependency and possible structural breaks in the variables. Therefore, we tested the existence of unit root in the series with Lee and Strazicich (2003) unit root test considering two structural breaks. We selected Model A which enables structural breaks only at the constant and Model C which enables structural breaks at both

constant and trend and the results were presented in Table 4a and 4b. We concluded that the series were not stationary at the level under structural breaks, but the variables became stationary with their first-differenced values. For this reason, we employed the first differenced values of the variables in the regression analysis.

Table 4a. Results of panel LM unit root test (Model A)

Countries	Individual LM Test Statistics		Dates of Structural Breaks
Bulgaria	-2.253	[6]	2008, 2009
Croatia	-2.176	[4]	2009,2010
Czech Republic	-2.953	[3]	2008.2009
Estonia	-3.092	[4]	2008,2009
Hungary	-3.115	[6]	2009,2010
Latvia	-2.273	[5]	2009,2010
Lithuania	-2.621	[7]	2008,2009
Poland	-3.077	[5]	2008,2009
Romania	-2.362	[7]	2009,2010
Slovakia	-2.665	[8]	2009,2010
Slovenia	-2.423	[5]	2008,2009
Panel LM Test Statistic	-2.376		

(Source: Author's own elaboration based on LM unit root test)

Notes: (1) The values in parentheses show the optimal lag lengths.
(2) Uses 10% trimming
(3) Critical values at 1%, 5% and 10% are respectively 4.389, 3.643 and 4.321

Table 4b. Results of panel LM unit root test (Model C)

Countries	Individual LM Test Statistics		Dates of Structural Breaks
Bulgaria	-2.042	[7]	2008, 2009
Croatia	-2.256	[5]	2009, 2010
Czech Republic	-2.628	[4]	2008, 2009
Estonia	-2.634	[5]	2008, 2009
Hungary	-3.017	[6]	2009, 2010
Latvia	-2.114	[7]	2009, 2010
Lithuania	-2.843	[4]	2008, 2009
Poland	-3.182	[5]	2008, 2009
Romania	-2.076	[6]	2009, 2010
Slovakia	-2.275	[7]	2009, 2010
Slovenia	-2.188	[8]	2008, 2009
Panel LM Test Statistic	-2.279		
Panel LM-CA Test Statistic	-2.346		

(Source: Author's own elaboration based on LM unit root test)

Notes: (1) The values in parentheses show the optimal lag lengths.
(2) Uses 10% trimming
(3) Critical values at 1%, 5% and 10% are respectively 4.573, 3.823 and 4.397
(4) Panel LM-CA test statistic regards the cross-sectional dependency, while panel LM test statistic does not consider the cross-sectional dependency.

3.3 Model Selection

We conduct several econometric tests for determination of estimation method used in the panel regression analysis. Chow (1960) test (null hypothesis: pooled OLS is effective) is employed to reveal the common significance of country-specific and time-specific effects among the panel data units, while Breusch and Pagan (BP) (1980) test (null hypothesis: OLS is effective) is used to determine whether to use pooled OLS or the random effects model (REM). Finally, Hausman (1978) test (null hypothesis: REM is efficient) is used to choose between FEM and REM. We conducted Chow, BP and Hausman tests, and the results are presented in Table 5. The Chow test indicates the use of FEM model, while the BP test dictates the use of REM. Finally, Hausman test showed that REM model would be more effective.

Table 5. Results of model selection tests

Test	**p value**	**Decision**
Chow (F) test	0.004	Accept H_1
BP (χ^2) test	0.015	Accept H_1
Hausman test	0.168	REM model is effective

(Source: Author's own elaboration based on model selection tests)

3.4 Model Estimation

We conducted the estimation with the cross-section SUR algorithm, which yields the minimum sum of the squared errors and the estimation results are given in Table 6. The results denote that all public governance indicators except government effectiveness (GE) affected the magnitude of shadow economy negatively. The independent variables explained 55.4% of the changes in dependent variable and the coefficients indicated that voice and accountability (VAA) and rule of law (ROL) had the largest impact on shadow economy. The findings are compatible with the results of limited empirical literature and verified that institutional development and legal system are important in combatting with shadow economy. Also we found that there was a complementary relationship between shadow economy and corruption. In other words decreases in corruption contribute to the decreases in the magnitude of shadow economy. Finally, we used two dummy variables in the model to see the impact of recent crises and EU membership on the magnitude of shadow economy and we found that EU membership affected shadow economy negatively, while the crises affected shadow economy positively. EU membership contributed to the decreases in the magnitude of shadow economy by forcing the candidate countries to meet the existing institutional requirements and standards. On the other hand crises encouraged the economic units to operate informally.

Table 6. Results of panel regression

Dependent variable: DSHA	**Coefficient**	**Standard Error**	**t statistic**	**P value**
DVAA	-0.777636	0.242962	-3.200651	0.0019*
DPSS	-0.423888	0.164754	-2.572857	0.0117*
DGE	-0.061539	0.225416	-0.273003	0.7855
DRQ	-0.443193	0.086468	-5.125530	0.0000*
DROL	-0.730770	0.147128	-4.966885	0.0000*
DCOC	-0.414096	0.143371	-2.888280	0.0048*
D1 (EU membership)	-0.552094	0.067982	-8.121126	0.0000*
D2 (Crisis)	0.411664	0.125510	3.279942	0.0015*
C	-1.243630	0.133912	-9.286914	0.0000
$R^2 = 0.554$	$\bar{R}^2 = 56.98$	F stat.=56.98	F-stat (p)=0.003	DW test=2.34

(Source: Author's own elaboration based on panel regression estimation)

Shadow economy is a multifaceted problem. In this study we focused on the impact of public administration on the size of shadow economy using panel regression. Our findings verified the theoretical expectations which suggest that countries with higher quality of public administration experience less size of shadow economy. Voice and accountability and rule of law were found to be relatively having higher contractionary impact on the size of shadow economy. In other words, free of will of the public, freedom of expression and free media promote the official economy. On the other hand the quality of legal infrastructure and efficiently functioning of legal system is another important factor which dissuades the economic units from entering shadow economy. Furthermore, improvements in political stability, regulatory quality and control of corruption contribute to the decreases in the shadow economy.

Our dummy variable suggested that integration process with EU contributed to the decreases in the size of shadow economy through improvement in the quality of public administration. The countries improved their institutional quality while trying to meet the following criteria during membership process ((European Commission, 2015):

• stable institutions promoting democracy, the rule of law, human rights and respect for and protection of minorities,

• a functioning market economy and the capacity to cope with competition and market forces in the EU,

• ability to implement the obligations of membership such as taking actions in harmony with the aims of the EU.

Finally the other dummy variable suggested that financial crises increased the size of shadow economy. This may be resulted from that businesses and workers have to operate in shadow economy in order to alleviate the additionally increasing burden together with the financial crises.

3.5 Diagnostic Tests

We test for autocorrelation and heteroskedasticity problems, which are the major assumptions behind the regression for the reliability of our findings. We investigated autocorrelation problem with Wooldridge (2002) autocorrelation test and investigated heteroskedasticity problem with Greene (2003) test and results were presented in Table 7.

Table 7. Results of Woolridge autocorrelation and Greene heteroskedasticity tests

Test	p value
Wooldridge test	0.193
Greene heteroskedasticity test	0.096

(Source: Author's own elaboration based on diagnostic tests)

Given the findings of the test, there are no autocorrelation and heteroskedasticity problems in our model.

Conclusions

Shadow economy is a common serious problem for all income groups of countries and each country employs various policies to combat with the shadow economy. CEE countries experienced an economic and structural transformation during the past 25 years. In this study, we focus on the interaction among six dimensions of public governance and shadow economy in 11 CEE economies during 2003-2014 period using panel regression. We also investigated the impact of EU membership and recent crises on the size of shadow economy by use of dummy variables. Therefore, this study will be one of the early studies which focus on the relationship between public governance and shadow economy considering EU membership process and recent crises and in turn contribute to the existing literature.

Our findings suggest that higher quality of public administration had negative impact on the magnitude of shadow economy. In this context regulatory quality, voice and accountability, rule of law and political stability and absence of violence/terrorism had negative impact on the magnitude of shadow economy. But voice and accountability and rule of law had relatively higher impact on the size of shadow economy. Furthermore, the coefficients of dummy variables showed that EU membership contributed to the decreases in the magnitude of shadow economy through structural reforms, while financial crises encouraged the economic units to work underground. Our findings were consistent with theoretical expectations and the findings of the empirical studies presented in the literature review section

In the light of our findings, policies aiming at the improvements in public administration contribute to the decreases in the magnitude of shadow economy. EU organizational structure also helps the countries to combat with shadow

economy, although there is a no common policy for the combat with shadow economy within the body of EU. Further empirical studies can research optimal structure of public administration considering that tax and regulatory burden are also ones of the main drivers underlying the shadow economy.

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