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INSTITUTIONAL DRIVERS OF SHADOW ECONOMY.  
EMPIRICAL EVIDENCE FROM CEE COUNTRIES

*INCENTIVOS INSTITUCIONALES PARA LA ECONOMIA INFORMAL.  
EVIDENCIA EMPIRICA DE PAÍSES CEE*

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ABSTRACT

Crises, such as the current pandemic, and the measures meant to tackle with them tend to increase the presence of the informal sector in the official economy, affecting mostly the emerging and developing economies. This situation is characteristic for the eleven CEE countries. These also display certain weaknesses at the economic and institutional level, which increase their vulnerability in times of crisis, with a real danger for the informal economy to grow. This paper aims to investigate the role of the institutional framework in explaining shadow economy in the mentioned countries. The methodological approach consists in a panel analysis using data from the 1996-2017 period and a principal component analysis meant to identify the specificities of each country. Our results demonstrate the influence of both formal and informal institutions on the shadow economy while country-level particularities show that institutional factors act differently in different socio-economic and political environments; consequently, the measures aimed to limit shadow economy should be adapted to each country's specific context.

*Keywords:* Institutions, shadow economy, panel data analysis, principal component analysis, central and eastern EU countries.

## RESUMEN

Las crisis, como la pandemia actual, y las medidas para combatir estas tienden a incrementar el peso del sector informal en la economía oficial, afectando especialmente a las economías emergentes y en desarrollo. Una situación característica para los países del Centro y Este de Europa. Estos países presentan ciertas debilidades a nivel económico e institucional que hacen más vulnerables en tiempos de crisis, incrementando el riesgo para el crecimiento de la economía informal. Este trabajo se propone investigar el papel del marco institucional para explicar fenómeno de la economía informal los países mencionados. Empleando análisis de datos de panel con datos anuales para el período 1996-2017; y análisis de componentes principales para identificar los rasgos específicos de cada país. Los resultados obtenidos demuestran la influencia del marco institucional formal e informal sobre la economía informal; y las particularidades identificadas a nivel de país muestran que los factores institucionales se comportan de manera diferente en ámbitos socio-económicos y políticos diferentes; por lo tanto, las medidas que se centran en la lucha contra la economía informal tienen que ser adaptadas a cada contexto nacional.

*Palabras clave:* instituciones, economía informal, análisis de datos de panel, análisis de componentes principales, países del Centro y Este de Europa miembros de la Unión Europea.

*JEL Classification / Clasificación:* C33, C38, D02, E26, O17, P37.

## 1. INTRODUCTION

In the last three decades, informal economy has not only raised interest among researchers all over the world but has become a hot topic of debate in public policies, as well.

From the multiple definitions and facets of informality presented in literature, within this paper, the shadow economy concept has been adopted, with the definition provided in Medina and Schneider's study (2019, p. 6), according to which the shadow economy refers to "all economic activities which are hidden from official authorities for monetary, regulatory, and institutional reasons". In such context, it "reflects mostly legal economic and productive activities that, if recorded, would contribute to national GDP", avoiding "illegal or criminal activities, do-it-yourself, or other household activities" (*Idem*).

Although there are studies which highlight a potential positive impact of shadow economy on a country's economic development, in terms of entrepreneurship, flexibility and resilience (Popescu et al, 2018), we can clearly assume and it is widely accepted that most shadow economy effects are negative (Feige and Urban 2008; Mikulić and Nagyszombaty, 2013; Tudose and Clipa, 2016).

The shadow economy analyses are currently determined by the way the Covid-19 pandemic affects those particular countries where the informal sector's presence is significant. The OECD report (2020) points to the high vulnerability of certain social groups such as informal workers who are compelled to go through the pandemic without any support from the social protection system. The World Bank report, edited by Ohnsorge and Shu (2021), stresses on the fact that the informal sector is particularly highly significant in emerging markets and developing economies and draws attention to the situation of informal workers and businesses in the context of the pandemic in these countries.

In European countries, the tendency of the informal sector over the years rather reflects a decrease of its share in GDP. The latest estimates (Schneider, 2019) emphasized a reduction of the average level of informal economy from 22.6 % of GDP in 2003 to 16.8% in 2018 at European level while possible future dynamics points out that, for most EU countries, the share of informal economy in GDP is likely to diminish while in countries like Bulgaria, Croatia, Hungary, Romania, an increase is to be expected.

These possibly divergent trends are explained by the socio-economic and institutional disparities existing at the EU countries' level. The literature clearly outlines the importance of institutional factors in explaining cross-country differences regarding the shadow economy (Feige, 1997; Mikulić and Nagyszombaty, 2013; Iacobuta et al., 2014; Williams et al., 2015; Medina and Schneider, 2019). Moreover, given the current crisis that humanity undergoes, the role of institutions becomes even more relevant particularly if we consider the fact that crises generate an unfavourable institutional climate, with citizens' trust in governments shrinking, limited transparency, poor access to information, accountability and anti-corruption, participation and engagement (Montero and Le Blanc, 2020), which can all further easily lead to falling underground. We are considering both formal institutions, represented by laws and written political, economic and social regulations, and the informal rules reflected in culture, traditions, codes of conduct, norms of behaviour, mentality, religion, morals (ethics), trust.

Therefore, the aim of this paper is to analyse the role of institutional framework (both formal and informal) in explaining the shadow economy phenomenon and to identify the key institutional drivers of shadow economy for the 11 Central and Eastern European countries members of the European Union - CEECs (Poland, Romania, Bulgaria, Hungary, Latvia, Lithuania, Estonia, Croatia, Czechia, Slovenia and Slovakia). We consider this sample highly relevant for the researched topic since these countries share certain institutional weaknesses compared to other EU member states and, at the same time, there are significant gaps determined by the specificity of each country within this group.

The data for assessing Shadow economy are the estimates calculated by Medina and Schneider (2019). The other variables we use capture several aspects presented in the literature as potential causes of shadow economy, as described in Data and Methodology section.

Our analysis has two parts. *In the first part*, we aim to analyse the role of formal institutional framework in explaining shadow economy. This analysis covers the 1996-2017 period and the methodological approach implies a cross-country time-series panel regression and, in order to capture the country specificities, a principal component analysis. *In the second part*, to study the importance of the informal institutions and of the formal-informal interplay for shadow economy, we perform another principal component analysis, using only data for 2017, because of the lack of time series data.

The paper is structured as follows: in Section 2 we provide a survey of the literature on the drivers of shadow economy, in general and in CEECs countries, in particular. Section 3 introduces the data and the methodology. In Section 4 we present the empirical analysis for the eleven CEECs and discuss the results. The last section concludes.

## 2. LITERATURE REVIEW

The causes underlying the participation in shadow economy have been the focus of various studies which reveal one or more triggering factors. Nevertheless, numerous studies have reached consensus regarding the determinants of informal economy as being economic, political and institutional factors (La Porta and Shleifer, 2014; Medina and Schneider, 2018; Chen et al., 2020).

According to Williams et al. (2015) and Kelmanson et al. (2019), there are two broad approaches meant to explain the participation in the informal economy: (1) the involuntary participation perceived as the exclusion of individuals from state benefits and the formal labour market and (2) the voluntary decision of people to leave or exit the formal economy, in response to a burdensome state. While the *exit* approach is rather observed in developed countries, the *exclusion* perspective is a particularity of developing economies (Gërkhani, 2004; Oviedo et al., 2009). Questioning the difference between the two approaches, some researchers (Williams et al., 2011) claimed that the participation of individuals in informal work can be explained by both exit and exclusion motives.

Chen et al. (2020) highlighted a series of political, economic and institutional factors which determine individuals' decision to participate in the shadow economy: tax burden, tax structure, intensity of government regulation, institutional quality, government decentralization, unemployment, official income, globalization and openness.

A higher overall tax burden motivates individuals to totally or partially avoid the declaration of their income, to commit tax fraud and thus further expand the extent of the shadow economy (Schneider and Williams, 2013).

One of the most powerful determinants of the shadow economy is the regulatory burden (Kelmanson et al., 2019). A high level of regulation limits the freedom to participate in economic activities and is perceived as a barrier against market access as well as an incentive for tax fraud, and vice versa. The high costs induced by the regulatory burden tend to be transferred by entrepreneurs towards the informal economy mostly by employing shadow labour and by only partially declaring revenues (Igudia et al., 2016).

Institutional quality is recognized in the literature as a key factor of the informal sector dimension (Chen et al., 2020), being also connected with governmental debt. Poor institutional quality increases governmental debt, reduces the quality of public goods and services, leading to lower tax morale and lower trust in the government, which, in turn, determines the increase of shadow economy. Torgler and Schneider (2009) found that higher tax morale and higher institutional quality lead to the diminishing of governmental debt and, consequently, to a smaller shadow economy.

Tanzi (1999) found a weak correlation between unemployment and underground economy. Moreover, the relationship between the two variables is strongly influenced by institutional quality. In countries with a strong institutional quality, unemployment is not linked with the growth of the

informal sector. On the contrary, in states with a weak institutional quality, as post-communist economies, unemployment causes the spread of the shadow economy. Labour regulations play an important role in the participation in illicit economic activity, being a key incentive associated with informal work (Blanton and Peksen, 2019). This, once more, emphasizes the contribution of institutional strength to lowering the shadow economy.

The informal economy dimension has been analysed in relation with economic growth but the results were rather controversial: some studies revealed a positive relation between the two variables (Enste 2018; Giles et al., 2002; Schneider et al., 2003) while others identified a negative causality between growth and shadow economy (Dell'Anno et al., 2007). A more complex analysis (Wu and Schneider, 2019) concluded that, on the long term, the relation between the shadow economy and growth is not linear and that it takes the form of a U-shaped curve, meaning that the shadow economy narrows with GDP growth but tends to expand when economic growth exceeds a given turning point. This may be explained by the fact that while economies with a reduced or extensive shadow economy register weak growth, those with an average informal sector register high economic growth.

Globalization and openness to foreign trade is negatively correlated with shadow economy (Torgler and Schneider, 2007), which is explained by the fact that international trade relations are generally transparent and payments are performed by banking operations which are easy to report and tax.

All of the above demonstrate that most studies explain the shadow economy by using institutional economy as a starting point (Feige, 1997; Iacobuta et al., 2014; Williams et al., 2015; Horodnic and Williams, 2019). According to North's paradigm (1990), by providing a stable structure to daily life, institutions represent the means by which uncertainty is reduced. While *formal institutions* are represented by laws and regulations, the *informal* ones are related to culture, traditions, religion, ethics, and trust. The literature review points to both formal institutions variables, such as quality of public institutions, regulation, peculiarities of local governance, fiscal pressure, and to aspects deriving from informal institutions, such as social and cultural system, fiscal morals, trust in government, corruption, as causes underlying the shadow economy.

The institutional variables that most studies take into consideration in order to explain participation in the informal sector of the economy are related to the formal institutions. Some researchers have demonstrated that the shadow economy is lower in countries with higher government effectiveness, regulatory quality, business freedom, fiscal freedom and labour freedom (Iacobuta et al., 2014). Another study (Williams and Kosta, 2019) describes the role of institutional factors in the participation of entrepreneurs in the informal economy by highlighting the role of the lack of trust in formal institutions as an incentive for the informal entrepreneurship. When formal institutions are inefficient or fail, the informal ones will be perceived as *second best*, thus encouraging anachronistic attitudes and opportunistic behaviour within the

socio-economic relations between individuals and organizations (Bostan et al., 2016).

Informal institutions were perpetuated from one generation to another through some specific mechanisms, i.e. imitation and learning, under the form of faith and ideals guiding individuals' social and economic behaviour. The informal institutions such as culture, traditions, religion, ethics and trust have an important role in economic performance (Tamilina and Tamilina, 2014; Banović, 2015; Bostan et al., 2016; Williams and Martinez-Perez, 2016). Tax fraud and corruption are informal institutions – related behaviours. At the same time, they may be derived from the informal economy (Chen et al., 2020) and affect the effectiveness of economic policies and of formal institutions.

Informal economy participation is directly proportional with the asymmetry (inconsistency) between formal and informal institutions and, consequently, the focus of policies on reducing the gap between the two types of institutions (Williams et al., 2015) could be a means to limit the extent of the informal economy. This study also shows that, in the countries with a high economic performance, the inconsistency between formal and informal institutions is lower. In other words, if informal institutional elements are convergent with the formal ones, individuals' and communities' level of trust in formal institutions improves, which further supports those factors which favour economic development: the rule of law and the compliance with property rights.

Numerous studies are carried out on the former communist countries in Central and Eastern Europe since, through their specificity, they provide eloquent examples for the role of institutional quality in the variation of shadow economy.

In former centralized economy states, price control, regulations and bureaucracy went hand in hand with the scarcity of goods in the official economy (Ledeneva, 2009); this led to the black market's general perception as a social pressure relief valve. However, even after 1989, the black market continued to play an important role in these economies even though the reasons behind this phenomenon were quite different: corruption and a reduced confidence in the political class, low incomes, low tax morale, poor quality of institutions, poor public services (Mursa et al., 2014). Moreover, at different times, in various societies, the rather opposite visions of some groups regarding certain topics (alcohol consumption, smoking, immigration, the minimum wage, price control etc.) led to a gap between legal and what was acknowledged as legitimate activities (Webb et. al., 2009). Informal economy is thus generated by the inconsistency between rules (formal institutions) and social acceptability (informal institutions). As North warned in 1990, the transition process from planned to market economy in CEE countries was marked by the different evolution of formal and informal institutions. While formal institutions were adapted to the new rules of the game at a rather fast pace, the informal ones remained trapped within the realms of the cultural heritage of the old system for a longer period of time. In these countries, the higher levels of the shadow economy and of the participation in informal economic activities (Schneider

and Williams, 2013; Kelmanson et al., 2019) can be explained by starting from the gap between the social acceptance of some practices beyond the constraints imposed by laws and regulations (Williams et al., 2015; Littlewood et al., 2020). Therefore, shadow economy occurs as the economic actors' reaction to institutional constraint (Fleming et al., 2000).

Several studies highlight the relation between the poor quality of institutions and the shadow economy dimension (Dreher et al., 2009; Schneider, 2010). Participation in the informal economy activities in CEE countries are associated with a loss of trust in public institutions and corruption (Wallace and Latcheva, 2006). The lack of trust in the government, the poor quality of institutions and the absence of the so-called "guilty conscience" determine the population of some Eastern Europe states to perceive shadow economy as a normal phenomenon (Schneider, 2013).

Tax morale and institutional quality (reflected in low corruption, the rule of law, government effectiveness and its regulatory quality) are associated with reduced shadow economy (Torgler and Schneider, 2009) and a low tax morale is the result of the institutional crisis generated by the transition process from the centralized planning system (Frey and Torgler, 2007).

### 3. DATA AND METHODOLOGY

#### 3.1. DATA

In this paper, we aim to analyse the role of institutional framework (both formal and informal) in explaining shadow economy and to identify the key institutional drivers of shadow economy for the eleven CEECs.

The time period concerns the years 1996-2017, for assessing the role of formal institutional framework, and the year 2017, for assessing the role of the informal ones. Some missing values were replaced by simple imputation methods. For four indicators (*Regulatory quality, Rule of law, Government effectiveness and Control of Corruption*) for which the data were not available for all the years, namely for 1997, 1999 and 2001, we replaced these values by the average of the previous and next year.

We have used data assessing Shadow economy and several variables capturing potential causes of shadow economy. We controlled for Government effectiveness and Control of corruption.

The definitions of variables and data sources are presented in Table 1.

#### 3.2. METHODOLOGY

The empirical study has two parts. *In the first part* – focused on analysing the relationship between the formal institutional framework and shadow economy - due to the short time period of data, we have used the panel data analysis and, in order to identify the country specific characteristics, we have applied the principal component analysis. *The second part* – focused on the role of informal institutions and of the formal-informal interplay in driving



TABLE 1. DEFINITION OF VARIABLES AND DATA SOURCES

Variable	Definition (from data source)	Data source	Time period
Shadow economy (% of GDP)	All economic activities which are hidden from official authorities for monetary, regulatory, and institutional reasons.	Medina and Schneider, 2019	1996-2017
Government integrity	It captures the systemic corruption of government institutions and decision making by such practices as bribery, extortion, nepotism, cronyism, patronage, embezzlement, and graft.	Heritage Foundation	1996-2017
Business freedom	It measures the extent to which the regulatory and infrastructure environments constrain the efficient operation of businesses.	Heritage Foundation	1996-2017
Open markets	The average score of Trade Freedom, Investment Freedom and Financial freedom.	Heritage Foundation	1996-2017
Government spending	This component from the index of economic freedom captures the burden imposed by government expenditures, which includes consumption by the state and all transfer payments related to various entitlement programs.	Heritage Foundation	1996-2017
Regulatory quality	It captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	World Bank Governance Indicators	1996-2017
Rule of law	It captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	World Bank Governance Indicators	1996-2017
Taxes on income, profits and capital gains (% of total taxes)	These taxes are levied on the actual or presumptive net income of individuals, on the profits of corporations and enterprises, and on capital gains, whether realized or not, on land, securities, and other assets. Intragovernmental payments are eliminated in consolidation.	World Bank Development Indicators	1996-2017
GDP per capita (current US\$)	GDP divided by midyear population.	World Bank Development Indicators	1996-2017
Unemployment rate (% of total labour force)	The share of the labour force that is without work but available for and seeking employment.	World Bank Development Indicators	1996-2017
Government effectiveness	It captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	World Bank Governance Indicators	1996-2017
Control of corruption	It captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as „capture“ of the state by elites and private interests.	World Bank Governance Indicators	1996-2017
Trust (%)	% of the respondents agreeing to the statement that “Most people can be trusted”.	World Values Survey	2017
Confidence in Government (%)	% of the respondents manifesting great and quite a lot Confidence in Government.	World Values Survey	2017
Tax morale (%)	% of the respondents appreciating that “cheating on taxes is never justifiable”.	World Values Survey	2017

shadow economy - also consists of a principal component analysis but only by using the data for 2017, because of the lack of time series data on informal institutions.

For panel data estimations, in terms of specification, we have introduced some economic and institutional factors. In order to control for heterogeneity across the countries from our sample, we have estimated a simple pooled OLS model with country fixed effects. To assess the stationarity in panel data, we have performed several unit root tests (Levin et al., 2002; Im et al., 2003). For the variables which were not stationary, the stationarity was assessed by using first order difference calculation.

The econometric specifications used for the panel data is as follows:

$$\text{Shadow\_economy}_{i,t} = \alpha_i + \beta X_{i,t} + \gamma \Delta Z_{i,t} + \delta X'_{i,t} + \varepsilon_{i,t} \quad (1)$$

where  $\text{Shadow\_economy}_{i,t}$  is the size of the shadow economy in GDP (%) are country fixed effects,  $X_{i,t}$  is a vector of stationary variables,  $Z_{i,t}$  is a vector of non-stationary variables, stationary through the first difference calculation,  $X'_{i,t}$  is a vector for the control variables and the term  $\varepsilon$  is the error term,  $i$  indicates the countries and  $t$  the time period.

We have applied the principal component analysis in order to identify the main characteristics of the countries in the sample for the years considered as well as to study the relation between informal institutions and the shadow economy in ten CEECs (there is no data available for Latvia for the three informal institutions indicators). The selection of the principal components is based on Kaiser's criteria which corresponds to eigenvalues greater than 1 and on the percentage of variance explained by each component.

#### 4. EMPIRICAL RESULTS AND DISCUSSION

##### 4.1. EMPIRICAL RESULTS OF THE ANALYSIS FOCUSED ON THE RELATIONSHIP BETWEEN THE FORMAL INSTITUTIONAL FRAMEWORK AND SHADOW ECONOMY

###### 4.1.1. PANEL DATA ESTIMATIONS

In order to control for heterogeneity across the countries from our sample, through the individual intercept value, we estimated a simple pooled OLS model with country fixed effects, taking into account the shadow economy as % of GDP as dependent variable. We checked the robustness of the results against different estimation methods, by rerunning the regression while eliminating one country at the time from our sample, as suggested by Berti et al. (2016). The estimates are robust to these tests and the signs of the estimated coefficients are in line with expectations. The results of these estimations are presented in Annex 1.

The coefficients for panel data model are presented below.



TABLE 2. COEFFICIENTS FOR THE PANEL DATA ESTIMATIONS USING AS DEPENDENT VARIABLE SHADOW ECONOMY (%) STANDARD ERRORS IN PARENTHESES

Variables	Estimations
Constant	40.295*** (2.543)
Business_freedom	-0.062** (0.020)
GDP/capita	-0.0003*** (0.000)
Govern_integrity	-0.0316 (0.024)
Govern_spending	0.0312** (0.021)
Open_markets	-0.236*** (0.025)
Regulatory_quality	-1.045 (0.930)
Rule_law	-3.390** (1.107)
Taxes_income	0.134*** (0.033)
Unemployment	0.240*** (0.044)
Control_corruption	0.974 (1.358)
Govern_effectiveness	-1.875* (1.079)
R <sup>2</sup>	0.910
Adjusted R <sup>2</sup>	0.900
F-statistic	100.33
Prob(F-statistic)	0.000
Observations	231

\*\*\* $p < 0.01$ ; \*\* $p < 0.05$ ; \* $p < 0.1$ .

The estimations show the statistically significant influence of all the variables, except for government integrity, regulatory quality and control of corruption. On one side, the results show that, the higher the levels of government spending, the level of taxes and the level of unemployment, the higher the level of shadow economy. On the other side, there is a negative influence of business freedom, GDP per capita, open markets, rule of law and government effectiveness on the level of shadow economy.

If considering the positive relationship between government spending and shadow economy in CEECs, we can say that the dimension of the informal economy and individuals' behaviour in response to the incentives determined by economic policies depend, to a great extent, on the institutional quality and on the symmetry/ convergence between formal and informal institutions. While in the countries with a high institutional quality and convergence between the two types of institutions, the increase in governmental expenditure aimed to limit the shadow economy succeeds in keeping this phenomenon under control

and to even decrease informality, this does not happen in countries such as CEECs, which are characterized by asymmetry or lack of convergence and where the quality of institutions is rather poor. In these countries, an increase in public expenditure most often generates governmental deficit and a subsequent downgrade in the quality of public goods and services; moreover, in a corrupt environment, lower tax morale and lower trust in the government lead to increased participation in the informal sector of the economy.

Our results also demonstrate the influence of the formal institutional environment on the shadow economy as well as the fact that a country's level of development affects the dimension of informal activities in its GDP, i.e. a higher development level is equivalent to a lower share of shadow economy in the official economy.

The poor quality of official institutions, the fiscal burden, bureaucracy, and the wide acceptance of shadow labour were all previously identified as factors determining shadow economy in Eastern and Central Europe (Enste, 2018).

Our estimations also confirm the impact of tax burden since a higher level of taxes on income, profits and capital gains is proven to be related to a higher level of shadow economy.

The unemployment rate and shadow economy relation was, also, found positive, higher unemployment favouring the development of shadow economy. Our results are in accordance with some previous studies (Torgler and Schneider, 2009; Tanzi, 1999) which show that a positive relationship between the two variables should be expected, even if the authors of these studies mention that the obtained results are not entirely robust. At the same time, our findings are in line with the opinion expressed by Sahnoun and Abdennadher (2019), according to whom "in countries with a good institutional quality, the unemployment rate is associated with a weak informal economy, whereas in countries with low institutional quality, it strongly drives the informal economy".

Our results confirm the results of previous studies in the literature carried out on CEECs. For instance, in analysing the causes of the unofficial/ shadow economy in new EU member states, Mikulić and Nagyszombaty (2013) also demonstrate that there is a negative relation between development levels and the unofficial economy dimension. Bayar et al. (2018) found a two-way causality between the rule of law and the shadow economy in Bulgaria, Czechia, Poland and Romania and a one-way causality in Croatia, Estonia, Hungary, Slovakia and Slovenia. Kelmanson et al. (2019) point to the fact that, in Eastern European countries, there is a negative association between shadow economy and the quality of government effectiveness and regulations, concluding that, in these countries, the quality of institutional factors is highly relevant in explaining the causes underlying unofficial economy. Dell'Anno and Davidescu's study (2019) also speak about the key role of institutional failure in the shadow economy dimension.

#### 4.1.2. COUNTRY-SPECIFIC CHARACTERISTICS

To identify the country-specific characteristics, we have applied the principal component analysis. We have chosen this method in order to avoid the multicollinearity between variables. We have used the variables which have a significant statistical influence on the shadow economy, according to the results of the previous panel analysis. The selection of factors is based on Kaiser's criteria which corresponds to eigenvalues greater than 1 and on the percentage of variance explained by each factor. The variables that explain these factors were selected according to their factor loadings, higher than 0.7.

The factors extracted, the variance explained by each component and the factor loadings for each variable with the components selected are presented below (Table 3).

Based on the data in Table 3 and on the representations in Annex 2, we notice that the countries display common characteristics as well as significant differences regarding the factors which influenced the shadow economy in the period between 1996 and 2017.

Thus, the GDP per capita is the only variable among the ones taken into account which is negatively correlated with the shadow economy in all CEECs. Also, shadow economy is negatively associated with Regulatory quality (except in the case of Hungary and Slovenia), with Rule of law (except in Poland, Hungary and Slovenia), with Business freedom (except in Slovakia, Poland and Czechia), with Open markets (except in Latvia). Moreover, in some situations, we notice the negative influence of government spending on shadow economy (Bulgaria, Poland, and Slovakia) but also, its positive influence in the case of Slovenia. A higher unemployment is associated with a higher shadow economy in Bulgaria, Czechia, Estonia, Latvia, Lithuania, Slovenia and Poland.

The results of the analysis performed on time subperiods also highlights some similarities and differences at the CEECs level. During 1996 – 1999 all analysed countries display high shadow economy values and low GDP per capita and institutional factors values. Moreover, in this period, Czechia, Estonia and Poland display a high level of business freedom. In the 2014 – 2017 period, we notice a decrease in the shadow economy extent in the GDP in line with an increase in the GDP per capita and an improvement in institutional quality. This progress at the institutional and macroeconomic levels becomes visible before the states' EU accession.

#### 4.2. EMPIRICAL RESULTS OF THE ANALYSIS FOCUSED ON THE RELATIONSHIP BETWEEN INFORMAL INSTITUTIONS AND SHADOW ECONOMY

When rules (formal institutions) prove ineffective, they are substituted by social institutions, by personal networks, by connections with trusted people (Ledeneva and Efendic, 2021).

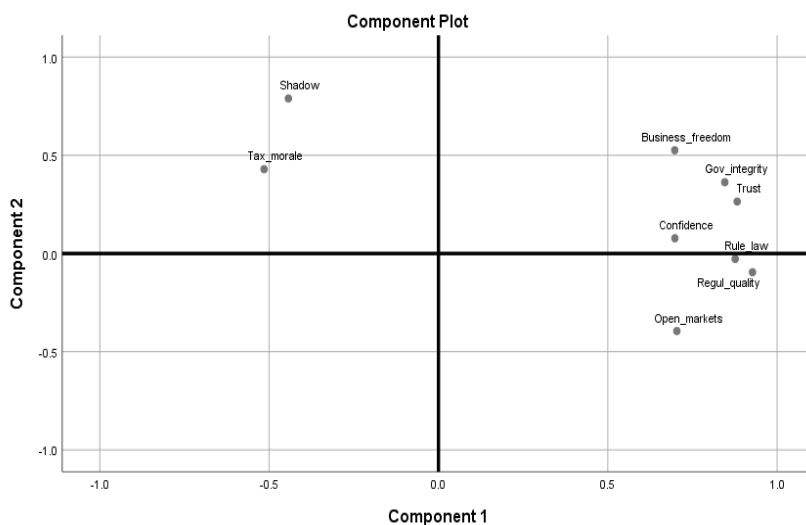
To analyse the relationship between informal institutions and shadow economy and to identify the country-specific characteristics from the formal-

TABLE 3. FACTORS LOADINGS FOR THE VARIABLES EXTRACTED BY APPLYING PCA

Country	Factor extracted and % of variance explained	Shadow econ	Regulatory quality	Rule law	Business freedom	Open markets	GDP/capita	Unemployment	Govern. Spend	Taxes
Bulgaria	Factor 1 (60.04%)	-0.889	0.841	0.768	0.851	0.850	0.956	-0.692	0.620	-0.305
	Factor 2 (21.34%)	0.394	0.362	0.555	0.552	-0.250	-0.209	0.476	0.552	-0.789
Czechia	Factor 1 (46.06%)	-0.936	0.574	0.856	-0.724	0.693	0.930	-0.514	0.100	0.250
	Factor 2 (22.10%)	0.122	0.481	-0.340	-0.574	-0.458	0.139	0.551	-0.251	0.838
Romania	Factor 1 (57.59%)	-0.963	0.943	0.872	0.851	0.846	0.947	-0.291	-0.397	-0.165
	Factor 2 (18.88%)	-0.056	-0.156	0.300	-0.231	0.179	-0.127	-0.843	0.279	0.832
Estonia	Factor 1 (60.71%)	-0.958	0.812	0.982	-0.799	0.653	0.973	-0.476	0.176	-0.809
	Factor 2 (12.12%)	0.040	-0.143	0.044	0.333	0.324	-0.037	-0.360	0.836	0.144
Croatia	Factor 1 (58.37%)	-0.935	0.857	0.937	0.742	0.929	0.895	0.293	-0.019	-0.683
	Factor 2 (20.72%)	0.318	-0.350	0.028	0.292	0.084	-0.337	0.827	0.699	-0.513
Hungary	Factor 1 (45.67%)	-0.900	-0.511	-0.799	0.642	0.886	0.886	0.214	0.431	-0.434
	Factor 2 (22.56%)	-0.293	0.768	0.514	0.106	0.354	0.275	-0.076	0.578	0.734
Latvia	Factor 1 (51.83%)	-0.958	0.920	0.950	0.644	0.532	0.949	-0.593	0.203	-0.084
	Factor 2 (22.80%)	0.183	-0.241	-0.078	-0.222	0.663	-0.137	-0.638	0.442	0.918
Lithuania	Factor 1 (61.11%)	-0.984	0.702	0.961	0.850	0.817	0.978	-0.525	-0.397	-0.580
	Factor 2 (18.97%)	0.010	0.225	-0.016	0.097	0.114	-0.018	-0.784	0.687	0.740
Poland	Factor 1 (56.60%)	-0.973	0.873	-0.061	-0.485	0.845	0.970	-0.644	0.706	-0.761
	Factor 2 (17.28%)	-0.109	0.295	0.931	0.419	0.151	-0.007	-0.393	-0.195	0.446
Slovakia	Factor 1 (58.26%)	-0.969	0.777	0.937	0.033	0.932	0.963	-0.432	0.915	0.041
	Factor 2 (23.84%)	0.111	0.480	0.093	0.578	0.131	-0.146	0.801	0.034	-0.938
Slovenia	Factor 1 (45.14%)	0.800	0.841	0.227	-0.397	-0.802	-0.808	-0.618	0.689	0.596
	Factor 2 (23.25%)	0.377	0.099	0.769	-0.367	0.051	-0.458	0.645	-0.325	-0.693

informal interplay perspective, we have applied a new principal component analysis. As variables we have used: shadow economy, five variables describing the quality of the formal institutional environment (Business freedom, Open markets, Rule of law, Regulatory quality, Government integrity) and the three variables assessing the quality of informal institutions – trust, confidence and tax morale (as described in Section 3.1). Because of the lack of available data (describing informal institutions) for Latvia and only available for 2017 and since time series are not available for the whole period, our sample includes only ten out of the eleven CEECs.

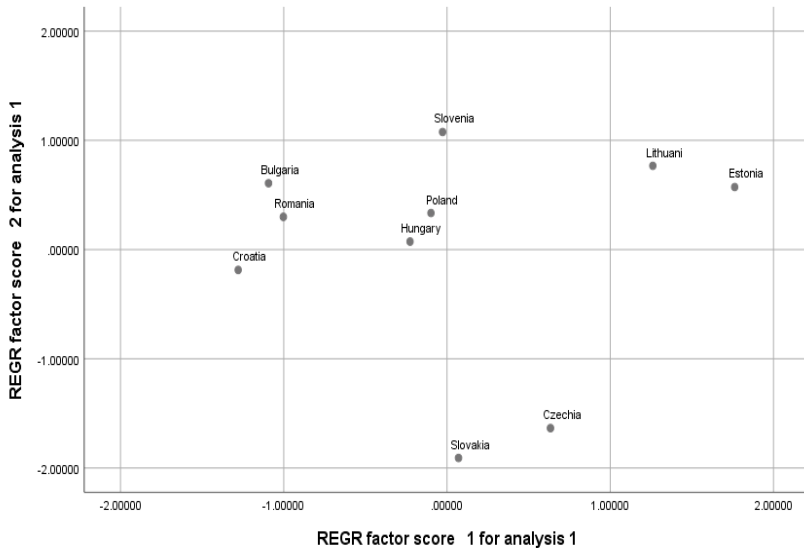
FIGURE 1. POSITION OF VARIABLES IN THE TWO FACTORIAL AXES SYSTEM



The graphic representation of the variables and of the countries in the sample is displayed in Figure 1 and in Figure 2, respectively.

The above diagrams enable the identification of two groups of countries. On the one hand, there is the group of Bulgaria, Croatia and Romania, characterized by high shadow economy, by high tax morale and by low values in terms of business freedom and open markets, quality of regulations, rule of law, governmental integrity, and level of both interpersonal and government trust. On the other hand, the group of Estonia and Lithuania displays a series of characteristics which are opposite to the first group. We also notice the positions of Czechia and Slovakia, which register the lowest shadow economy.

FIGURE 2. POSITION OF COUNTRIES IN THE TWO FACTORIAL AXES SYSTEM



We may, therefore, conclude that there are significant differences regarding the formal and informal institutional environment among CEECs.

The major differences regarding informal institutions and their interplay with the formal ones in CEECs have also been highlighted in the literature. As an indicator of the asymmetry between formal and informal institutions, tax morale is in reverse relation with the shadow economy in the Baltic countries (Williams and Horodnic, 2015).

Vodă et al. (2013) confirm that there is a high level of trust in Czechia, Estonia and Poland associated with legislative discipline, decision-making process transparency and a low level of corruption whereas in Romania, the very low level of trust, rampant corruption, the so-called bribery culture have all led to an uncontrolled burst of unproductive economic behaviour followed by delayed development.

The association between a high level of tax morale and a high level of the shadow economy in the three mentioned countries is quite surprising particularly given the fact that previous studies clearly demonstrate a reverse relation between the two variables (Torgler and Schneider, 2009). At the same time, it should be remembered that shadow economy is a complex concept, which goes well beyond the attitudes expressed in public opinion surveys which do not necessarily predict actual behaviour. Moreover, a more positive attitude towards paying taxes can also be associated with a marked tendency



towards obeying authority (Cadsby et al., 2006) as well as with claiming a faith or a religious identity (Daude et al., 2012).

According to Nikulin and Lechman (2021), institutions and tax morale are among the factors which explain the shadow economy in Poland. Although the “institutional vacuum” in the transition period was identified as the main reason behind unregistered income (Mróz, 2012), the institutional problem as a determinant factor of the shadow economy seems to persist in Poland. An unpredictable, corrupt and hostile institutional environment can be considered responsible for the informal entrepreneurial networking in Bulgaria (Manolova and Yan, 2002).

## 5. CONCLUSIONS

Crises, such as the current pandemic, and the measures meant to tackle with them tend to increase the presence of the informal sector in the official economy, affecting mostly the emerging and developing economies. Besides, crises seriously challenge the idea of governance and the governments' capacity to manage change in highly uncertain conditions (Țiclău et al., 2020).

This paper has investigated the role of the institutional framework (both formal and informal) in explaining the shadow economy phenomenon. On the one hand, we have analysed whether institutional factors influenced the shadow economy and we have identified those particular factors which had a significant influence in the particular case of the eleven CEECs; on the other hand, we have highlighted some of the specificities of each country from the point of view of the factors illustrating the development level and the institutional quality, at both formal and informal levels.

As already shown, our results are in line with the majority of previous researches (Mikulić and Nagyszombaty, 2013; Bayar et al., 2018; Enste, 2018; Kelmanson et al. 2019; Dell'Anno and Davidescu, 2019). They confirm the essential role of good formal and informal institutions in fighting against shadow economy.

Our panel data estimations show that a higher level of business freedom, GDP per capita, open markets, rule of law and government effectiveness are associated with a lower level of shadow economy while, on the contrary, a high level of taxes and a high level of unemployment lead to an increase in the level of shadow economy, as percentage in the GDP.

Consequently, the path towards decreasing the share of the shadow economy assume a higher degree of freedom and openness, a stronger rule of law, effective regulations and a low tax burden. As long as the institutional environment creates incentives for the individuals and businesses to behave in a moral and socially responsible way, the shadow economy could be diminished.

The analysis of country-specific characteristics has enabled us to identify the interdependencies between institutional and several socio-economic factors and shadow economy. The analysis has essentially emphasized several common denominators in explaining the variation in the shadow economy

but also revealed institutional instability and a high heterogeneity of the interdependencies between institutional factors and shadow economy. Each country carries its own specificity, determined by its past, by the chosen development path in transition, by the reforms implemented, by the EU integration moment, etc. However, in many of the countries under analysis, institutional instability, fragility and incongruence between the formal and informal rules are the most significant factors favouring a large share of shadow economy and for the delays in their development.

In terms of the public policies meant to tackle with the challenges generated by the shadow economy, our research points out the need to take institutions seriously and to focus on those factors that are particularly relevant in decreasing shadow economy in the eleven CEECs. However, the measures aimed to limit shadow economy should be adapted to each country's specific context. A standard approach, common to all countries, implies great risks.

We acknowledge that this research carries certain limitations, resulting mostly from data availability. The attitudes towards practices associated with the shadow economy that are expressed in public opinion surveys are not always a true mirror of real individual behavior. More recent estimations for the share of the shadow economy in the GDP and time series data describing the quality of the informal institutional environment could have led to a more in-depth analysis. However, despite these and even though our study was developed in this particular case, it brings a certain contribution by drawing attention to the importance of the institutional framework in fighting shadow economy in emerging and developing economies.

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ANNEX 1. CROSS-COUNTRY ROBUSTNESS CHECKS FOR THE PANEL DATA MODEL  
(DEPENDENT VARIABLE: *SHADOW ECONOMY* AS % OF GDP)

Variables	All 11 in	BG out	CZ out	EE out	HR out	HU out	LT out	LV out	PL out	RO out	SK out	SI out
Business_freedom	-0.062** (0.02)	-0.028 (0.019)	-0.127*** (0.023)	-0.074*** (0.021)	-0.066*** (0.021)	-0.055*** (0.018)	-0.061*** (0.021)	-0.053*** (0.02)	-0.091*** (0.022)	-0.049** (0.021)	-0.056*** (0.02)	-0.056*** (0.021)
ΔGDP	-0.0003*** (0.000)	-0.0003*** (0.000)	-0.0002*** (0.000)	-0.0003*** (0.000)	-0.0002** (0.000)	-0.0002*** (0.000)	-0.0002*** (0.000)	-0.0002*** (0.000)	-0.0002*** (0.000)	-0.0002*** (0.000)	-0.0003*** (0.000)	-0.0002*** (0.000)
ΔGovern_integrity	-0.003 (0.024)	-0.0325 (0.024)	-0.0325 (0.024)	-0.037 (0.024)	-0.035 (0.028)	-0.029 (0.023)	-0.025 (0.025)	-0.029 (0.025)	-0.022 (0.025)	-0.021 (0.026)	-0.038 (0.025)	-0.034 (0.026)
Govern_spending	0.031*** (0.013)	0.0365*** (0.1235)	0.032*** (0.013)	0.032*** (0.014)	0.023 (0.015)	0.038** (0.012)	0.030*** (0.014)	0.032*** (0.013)	0.034*** (0.013)	0.034*** (0.014)	0.023 (0.015)	0.026* (0.015)
Open_markets	-0.236*** (0.025)	-0.186*** (0.024)	-0.219*** (0.025)	-0.250*** (0.026)	-0.240*** (0.027)	-0.174*** (0.024)	-0.240*** (0.027)	-0.259*** (0.026)	-0.230*** (0.026)	-0.261*** (0.028)	-0.268*** (0.027)	-0.222*** (0.029)
Regulatory_quality	-1.045 (0.930)	-1.452 (0.940)	-0.378 (0.954)	-0.721 (0.987)	-0.368 (0.947)	-1.866*** (0.878)	-0.975 (0.988)	-1.310 (0.937)	-0.148 (0.979)	-0.397 (0.923)	-1.873 (0.976)	-1.595 (1.021)
Rule_law	-3.390** (1.106)	-3.634*** (1.079)	-4.231*** (1.388)	-2.394** (1.188)	-3.955** (1.225)	-5.637*** (1.048)	-3.129*** (1.179)	-2.170* (1.191)	-4.402*** (1.206)	-3.404*** (1.176)	-2.880*** (1.131)	-4.483*** (1.183)
Taxes_income	0.134*** (0.033)	0.174*** (0.032)	0.175*** (0.035)	0.119*** (0.035)	0.132*** (0.035)	0.105** (0.032)	0.107*** (0.036)	0.127*** (0.03)	0.079** (0.038)	0.151*** (0.033)	0.137*** (0.033)	0.151*** (0.034)
Unemployment	0.240*** (0.044)	0.205*** (0.045)	0.272*** (0.045)	0.238*** (0.047)	0.225*** (0.048)	0.238*** (0.042)	0.252*** (0.047)	0.267*** (0.045)	0.188*** (0.053)	0.254*** (0.04)	0.211*** (0.047)	0.245*** (0.046)
ΔCtr_corruption	0.974 (1.358)	1.452 (1.299)	0.976 (1.395)	1.121 (1.412)	-0.037 (1.528)	1.193 (1.268)	1.267 (1.484)	0.459 (1.457)	1.958 (1.487)	0.830 (1.385)	0.359 (1.464)	0.985 (1.458)
Govern_effectiv	-1.875* (1.078)	-1.797* (1.044)	-0.350 (1.137)	-2.468** (1.124)	-1.574 (1.153)	-4.050*** (1.036)	-2.294* (1.200)	-1.481 (1.1568)	-2.426** (1.108)	-1.537 (1.197)	-1.893* (1.096)	-0.469 (1.218)
Constant	40.295*** (2.543)	34.784*** (2.512)	41.535*** (2.535)	41.445*** (2.679)	41.005*** (2.893)	37.685*** (2.446)	40.873*** (2.683)	40.386*** (2.463)	44.146*** (2.809)	39.956*** (2.908)	43.733*** (2.689)	38.410*** (2.701)
Observations	231	210	210	210	210	210	210	210	210	210	210	210
Number of id	11	10	10	10	10	10	10	10	10	10	10	10

Standard errors in parentheses.  
\*\*\* p<0.01; \*\* p<0.05; \* p<0.1.

ANNEX 2. THE REPRESENTATION OF THE STATISTICAL VARIABLES ON THE FIRST TWO COMPONENTS FOR CEE COUNTRIES

FIGURE 1. THE GRAPHICAL REPRESENTATION OF THE STATISTICAL VARIABLES REGISTERED IN BULGARIA DURING 1996-2017

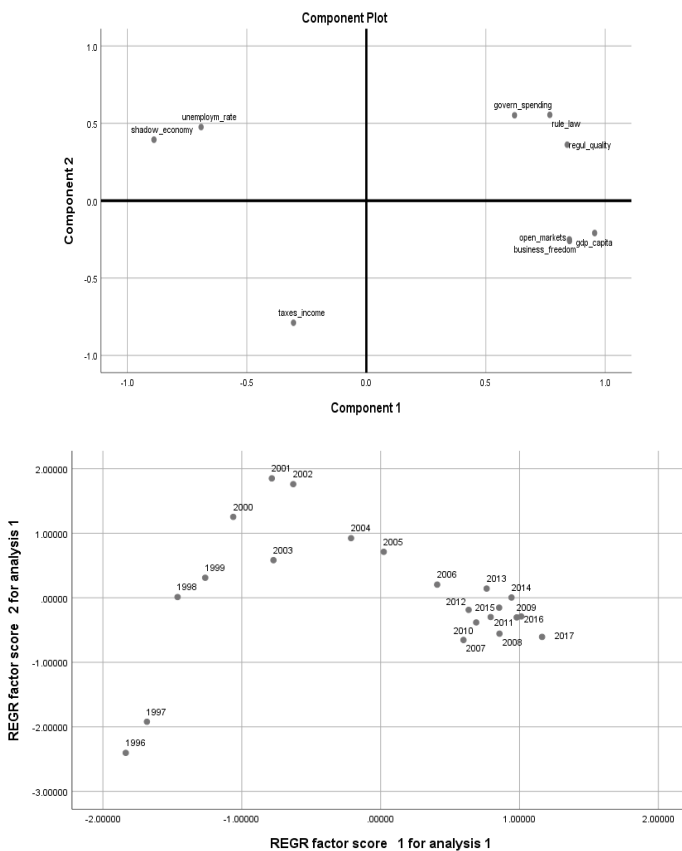




FIGURE 2. THE GRAPHICAL REPRESENTATION OF THE STATISTICAL VARIABLES REGISTERED IN CZECHIA DURING 1996-2017

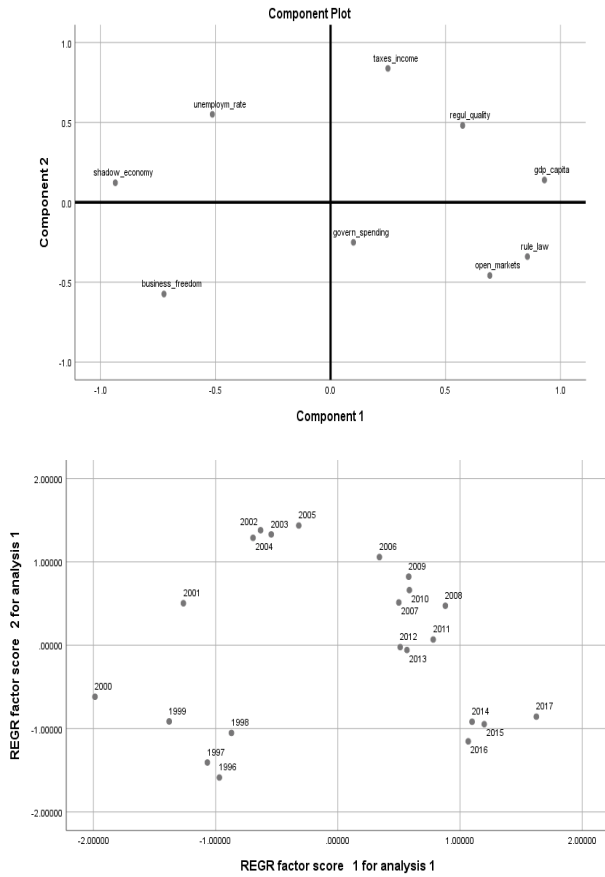


FIGURE 3. THE GRAPHICAL REPRESENTATION OF THE STATISTICAL VARIABLES REGISTERED IN ROMANIA DURING 1996-2017

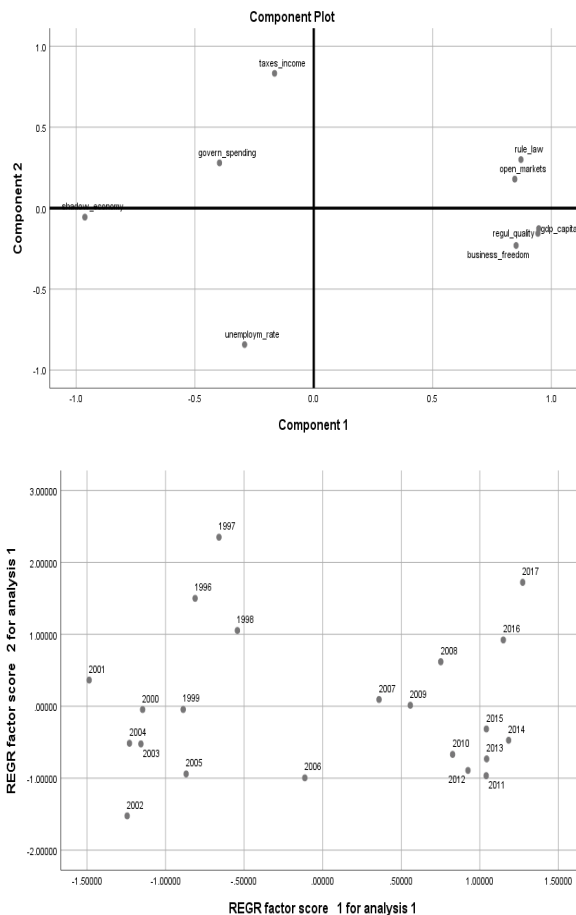


FIGURE 4. THE GRAPHICAL REPRESENTATION OF THE STATISTICAL VARIABLES REGISTERED IN ESTONIA DURING 1996-2017

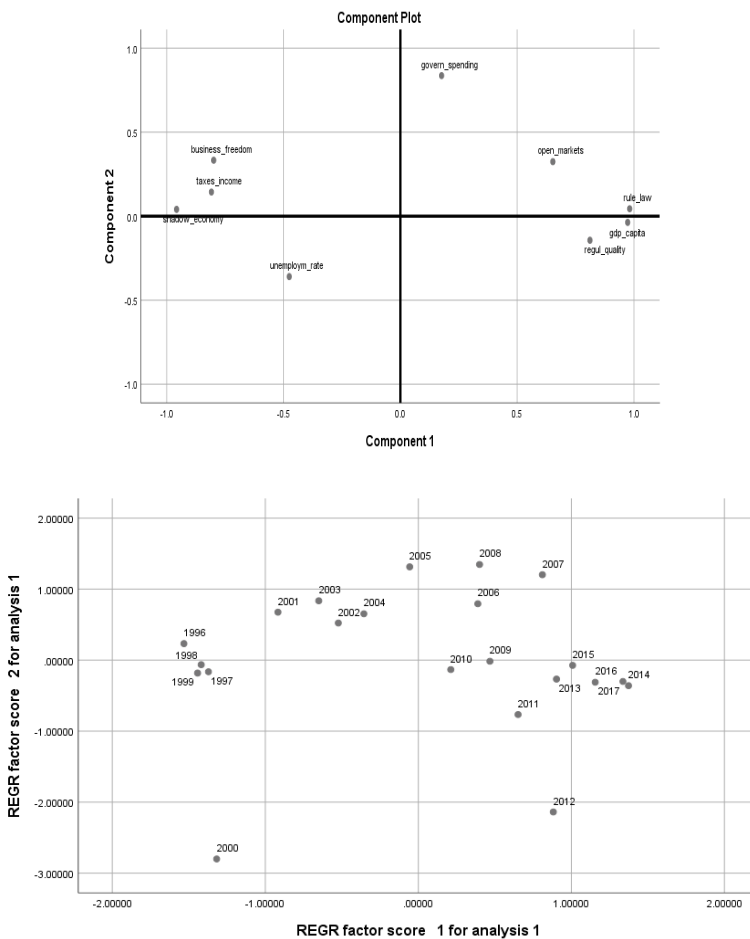


FIGURE 5. THE GRAPHICAL REPRESENTATION OF THE STATISTICAL VARIABLES REGISTERED IN CROATIA DURING 1996-2017

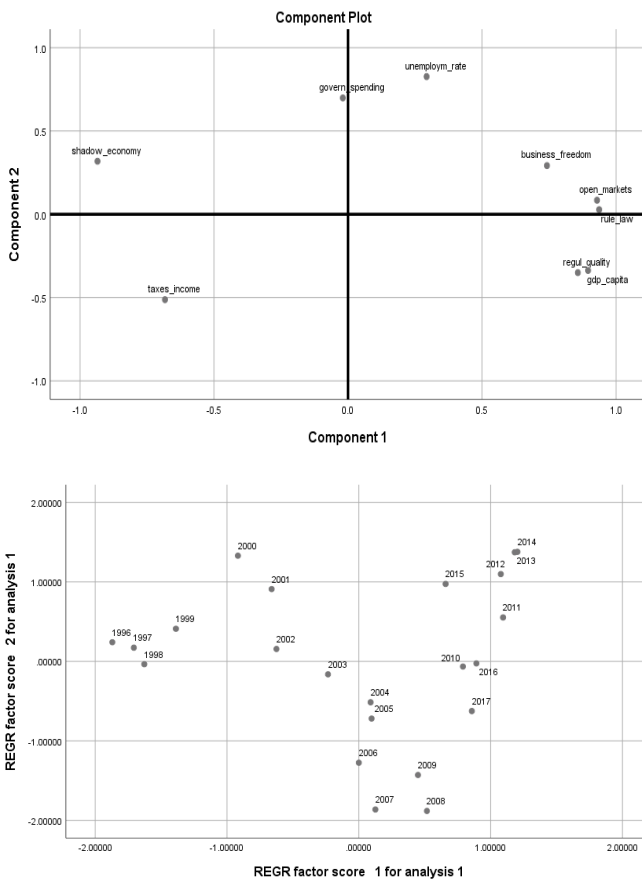


FIGURE 6. THE GRAPHICAL REPRESENTATION OF THE STATISTICAL VARIABLES REGISTERED IN HUNGARY DURING 1996-2017

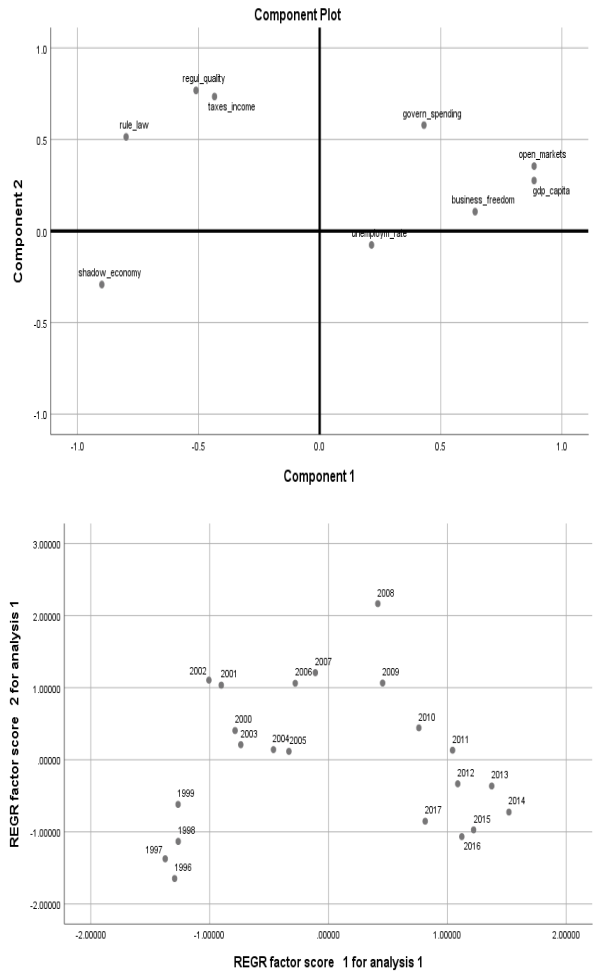


FIGURE 7. THE GRAPHICAL REPRESENTATION OF THE STATISTICAL VARIABLES REGISTERED IN LATVIA DURING 1996-2017

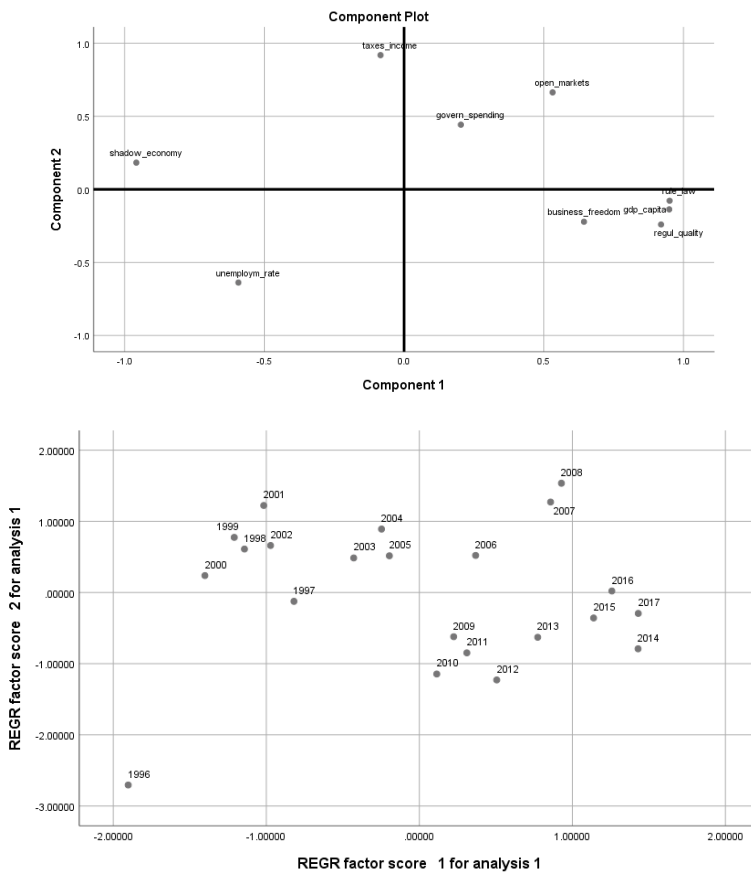


FIGURE 8. THE GRAPHICAL REPRESENTATION OF THE STATISTICAL VARIABLES REGISTERED IN LITHUANIA DURING 1996-2017

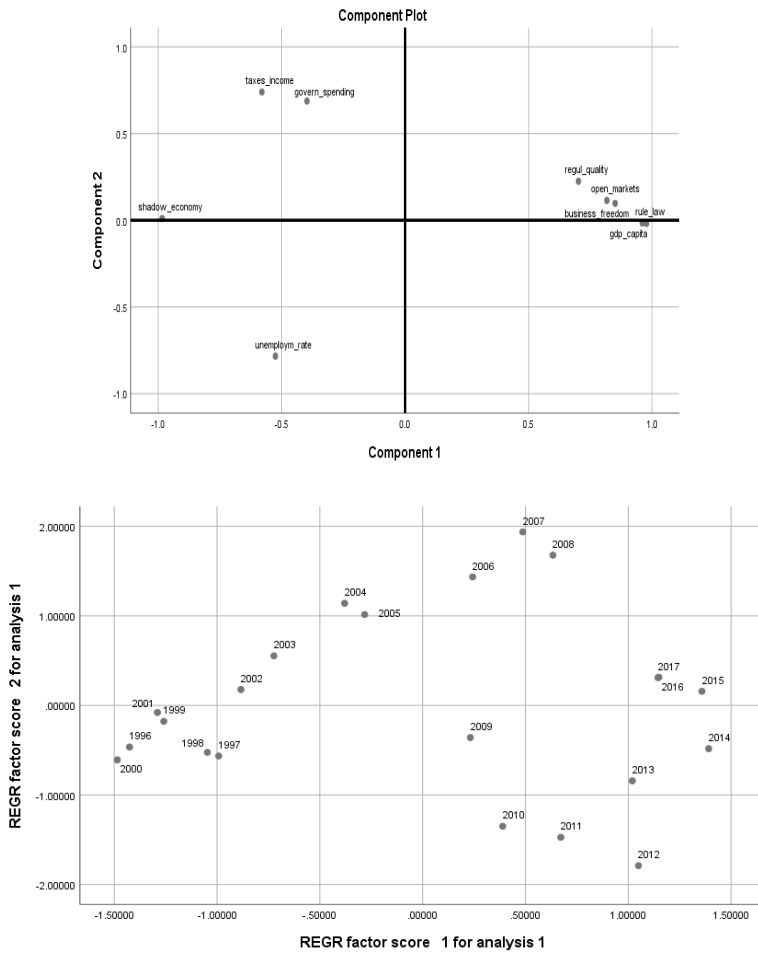


FIGURE 9. THE GRAPHICAL REPRESENTATION OF THE STATISTICAL VARIABLES REGISTERED IN POLAND DURING 1996-2017

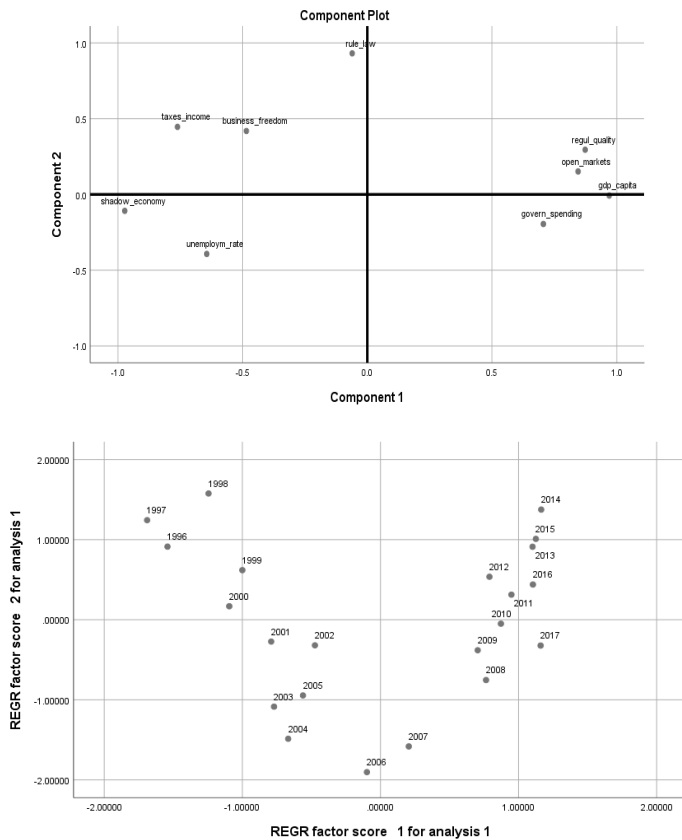




FIGURE 10. THE GRAPHICAL REPRESENTATION OF THE STATISTICAL VARIABLES REGISTERED IN SLOVAKIA DURING 1996-2017

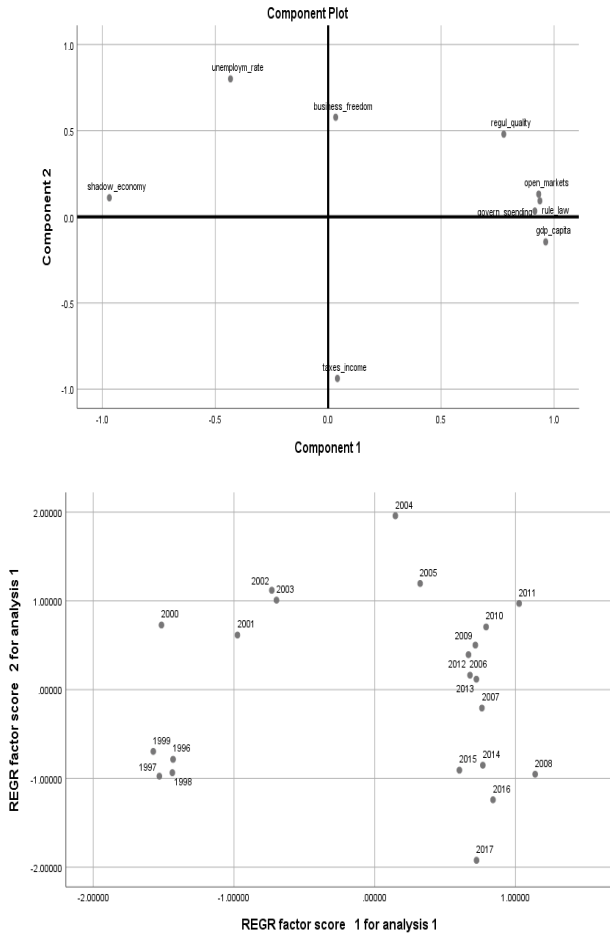


FIGURE 11. THE GRAPHICAL REPRESENTATION OF THE STATISTICAL VARIABLES REGISTERED IN SLOVENIA DURING 1996-2017

