DETERMINANTS OF THE SHADOW ECONOMY. A CROSS-COUNTRY SURVEY ON THE WORLDWIDE COUNTRIES

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Abstract

Purpose: In this paper, we analyze the main determinants of shadow economy and the correlations between them.

Theoretical framework: This paper focuses both on the theoretical and practical aspects regarding the causes of shadow economy and on the policy measures in tackling and investigating these kinds of activities. It is important to know the factors influencing the shadow economy, mainly because they can deliver information concerning the measures policymakers can take to reduce or even tackle the phenomenon.

Design/methodology/approach: For the purpose of our study we used a sample of 135 countries worldwide (from which 44 are developed, while 91 are developing) over cross-sectional data 2018-2020 (depending on availability). As methodology, correlation coefficients, simple and multiply regression are conducted. Then the visual presentation of the correlation between variables is realized with maps created in Tableau software.

Findings: Our results show that GDP per capita, Houman Development Index, tax revenue, Rule of Law, Government efficiency, and Regulation Quality correlate negatively with the shadow economy, while corruption and income inequality correlates positively with the phenomenon studied. However, the results show that Rule of Law and GDP per capita are found to be the main determinants for the slide in the shadow economy

Research, Practical & Social Implications: Knowing the determining factors of shadow economy is of a high importance for the policymakers in order to adopt proper decision to reduce the size of shadow economy.

Originality/value: The originality of this work results in finding clear evidence that among potential determinants on shadow economy, Rule of Law and GDP per capita are found to be the

most important ones. This two factors are responsible for about 56% of the shadow economy size. The adopted policies to reduce shadow economy need to be focused on improving two major fields.

Index Terms—shadow economy, determinants.

I. INTRODUCTION

The shadow economy is a major issue that significantly impacts the official economy, public finance, resource distribution, and social development. It is difficult to estimate precisely the size of the shadow economy because of its hidden nature. However, many studies highlighted its importance in many countries. This paper focuses both on the theoretical and practical aspects regarding the causes of shadow economy and on the policy measures in tackling and investigating these kinds of activities. In this paper, we analyze the main determinants of shadow economy and the correlations between them. For this purpose, we used a sample of 135 countries worldwide (from which 44 are developed, while 91 are developing) over cross-sectional data 2018-2020 (depending on availability). As methodology correlation coefficients, simple and multiply regression is conducted. Our results show that GDP per capita, Houman Development Index, tax revenue, Rule of Law, Government efficiency, and Regulation Quality correlate negatively with the shadow economy, while corruption and income inequality correlates positively with the phenomenon studied. However, the results show that Rule of Law and GDP per capita are found to be the main determinants for the slide in the shadow economyIt is important to know the factors influencing the shadow economy, mainly because they can deliver information concerning the measures policymakers can take to reduce or even tackle the phenomenon.

The paper is structured in three parts. The second part is dedicated to the literature review, the third part describes the methodology used, and then the next fourth part highlights the results and discussion. The last section is dedicated to conclusions and limits.

I. LITERATURE REVIEW
II. The concept of shadow economy
Many studies that focus on estimating the size of the shadow economy face an essential issue: defining the concept. In the literature, various definitions are accepted for defining the phenomenon. According with [1] defines the shadow economy as the production of goods and services, legal or illegal, which circumvent the detection from the official estimations of GDP".
This part of the economy contains illegal activities that include the production of counterfeit goods; the traffic of illegal drugs; unauthorized transactions; prostitution; illegal gambling; hiring of illegal workers; hiding income, and tax evasion. [2].
Other definitions used in various studies are:
-       „all economic activities unregistered and which, if registered, would contribute to the official GNP" [3]-[7].
-       „those economic activities and the income derived from them that circumvent the regulation, taxation or governmental observation [3] [8] and [9].

- „activities that lead to illegal branded goods, illegal drug trafficking, commercial vices and prostitution, loan sharking, illegal gambling, barter, illegal immigrant hiring, activities for own use, hidden income, tax fraud" [10].

III. The estimation methods of the size of the shadow economy

Estimating the size of the shadow economy is a difficult task because of its hidden nature and because it is not officially reported [11],[12].

There are various approaches when referring to the estimation methods, among them the monetary approach is widely used [13]. This approach is based on the assumption that shadow economy activities are settled with cash. These transactions are difficult to follow because they don't leave traces as other assets registered at a financial institution do. If the cash used for hidden transactions can be estimated, then this amount multiplied by the money velocity could lead to the size of the shadow economy.

We will present two of the approaches among the scholars who used this method. The first one was Feige (1989), who used the standard theory of money M*V=P*Q, where M represents the quantity of cash, V is the money velocity, P represents the level of prices, and Q represents the volume of goods and services. The amount of transactions is represented by P*Q. Assuming that the ratio between the value of transactions and the nominal income is constant over time and this aspect is known for the period when there were no hidden transactions, the nominal income can be estimated for any other period of time. The difference between the estimated total nominal income and the observed nominal income represents the size of the shadow economy. Feige assumes that the hidden transactions are settled by cash or checks.

On the other hand, there are [14],[15] that uses econometrical modeling on the monetary aggregate used for financing hidden activities. Introducing econometrical techniques is due to the acknowledgment that the money velocity depends not only on variables that cause the economic agents to engage in hidden activities but also on the income and the opportunity cost of holding cash. The equation for estimating the cash demand is also helpful to obtain the additional cash obtained by the economic agents used to pay for the hidden transactions without assuming that there was a moment when the shadow economy didn't exist beforehand. Although with this method is also assumed that the money velocity for the hidden transactions and the official ones is the same. The size of the shadow economy is obtained by multiplying the additional cash with the v value obtained econometrically.

Another method to estimate the size of the shadow economy is the labor market approach. This method estimates the size of the phenomenon by analyzing the discrepancies on the labor market. It consists of comparing the official data regarding labor force occupation with the real figures regarding this indicator. When making this comparison, one has to consider factors such as,

unregistered employment, undeclared labor, and informal labor. This approach often uses data from surveys, tax audits, and statistical modeling to estimate the size of the hidden economy.

IV. The relationship between the shadow economy and its assumed determinants

V. The relationship between the shadow economy and corruption

Corruption can be defined as „ the abuse of power committed in the exercise of a public function by a government employee, no matter the status, structure, hierarchical position, with the purpose to obtain a personal gain, directly or indirectly, for himself of for another person"

Examples of corruption acts:

-	Handing over goods (money or gifts) to the employees from the public sector, with the purpose of gaining an advantage;
-	Handing over goods (money or gifts) to the employees of the public sector, with the purpose of not paying or paying fewer taxes;
-	Handing over goods (money or gifts) to avoid being audited by the administrative or tax authorities.

In the literature, there were identified only a few studies investigated the relationship between the shadow economy and corruption. Johnson (2018) conducted a study on 49 countries and found a significant relationship between corruption and the shadow economy; an increase in the corruption index with one point (less corruption), ceteris paribus, leads to a decrease in the size of the shadow economy with 8-11%. This index ranges between 1 (highly corrupted) and 6 (zero corruption). The study of [35] made several studies on the relationship between corruption and the shadow economy, all leading to a direct and strong correlation between the two indicators.

From the existing studies identified in the literature, it results that the relationship between the shadow economy and corruption is solid and consistent. All the scholars aforementioned concluded that countries with high corruption levels have, ceteris paribus, a high level of shadow economy.

VI. The relationship between the shadow economy and income inequality

Income inequity generally refers to „ the extent to which the income is unevenly distributed in a group of people" [17]. Specifically, income inequity can be defined as the unequal income distribution between various economic participants. This indicator is measured with the aid of the Gini index. The index ranges between 0 (perfect income equality) and 100 (perfect income inequality). Even though many studies analyzed these variables separately, very few focused on their relationship. The first study that analyzed these indicators in detail is the one of [18]. These scholars concluded that illegal activities also grow as income inequality grows in a country. At the same time, an increase in the size of the shadow economy, income inequality also increases

because of the decrease in fiscal income and the weakening of the redistributive policy. Nevertheless, this relationship remained untested because the aforementioned authors used only graphical representations of the two variables. Other recent studies found a positive correlation between income inequality and the shadow economy. These authors used macroeconometric analyses in determining the relationship. Some of these studies are the ones conducted by [19] and [20]. The latter found that if income inequality increases, the wealthy population invests more, and the poor population invests less. A recent study of [21] conducted on 9 Asian countries in the period 1990–2015 find interesting insights on the relationship between income inequality and the shadow economy. More exactly, they find that the shadow economy significantly increases the income share held by lowest quintile and decreases the income share held by highest quintile. The results are aligned with those stating the positive impact of shadow economy especially for the poor countries.

VII. The relationship between economic development and the shadow economy

From the perspective of the shadow economy, various studies confirmed that a higher level of economic development in a country leads to a better capability to pay and collect taxes and a higher demand for public goods and services [22] [23]; [12] [24] [25]

For instance, [22] found a high correlation between financial satisfaction and fiscal payments. The author concluded that „ if the financial state of a household is defective, the fiscal payments can be seen as a difficult restraint of the set of possibilities, which can reduce the fiscal honesty" and this can lead to the migration towards the shadow economy.

In a study conducted in the EU countries for the period 2007-2013, the study of [23] validates the hypothesis that, as richer a country is, the country's population is less tempted to engage in the shadow economy. The results were differentiated between old member states (EU 15) and new member states (EU 13). The regression coefficient of GDP per capita was higher for EU 13 states. This means that an increase in economic development registered in the new member states has a higher impact on the decrease of the shadow economy (It is worth mentioning that this result it is not statistically significant).

VIII. The relationship between the shadow economy and public governance

The studies conducted by [23] and [12] highlight that the World Governance Indexes have a negative influence on the size of the shadow economy. For the new member states (EU 13), the influence of public governance on the size of the shadow economy is weaker. The study revealed that components such as Voice and Responsability, Political Stability and the Absence of Violence, Government Efficiency, Government Quality, and Rule of Law have a negative and significant correlation with the shadow economy but only for a significance level of 5% and 10%. The Control of Corruption was found to have a negative correlation with the shadow economy but was statistically insignificant. Nevertheless, these results are consistent with the study of [26[. The

studies [27] and [28] proved that tax morale and the quality of services from the public sector are two significant determinants of the size of the shadow economy. Based on an analysis over a period of 9 years on a sample of 80 countries, [29] have found that public institutions influence the size of the shadow economy from the education perspective.Also, more recently, [30] concluded that the relationship between education and the shadow economy is negative. In other words, when the education index increases, the size of the shadow economy decreases.

Some studies analyze the effect of the institutional framework on the size of the shadow economy. [31] and [32] found a negative correlation between indexes that measure Government quality and the size of the shadow economy. Also, [16] highlighted that government efficiency is an important determinant of the shadow economy.

Regarding the fiscal aspect, [34] concluded that fiscal decentralization is also an important determinant of the shadow economy. However, contrary to what is known, that a higher level of taxes leads to a higher level of the shadow economy, [35] has found that the level of informality is the result of over–regulation and corruption, while [36] shows that there is a negative correlation between the Rule of Law and the shadow economy.
In addition, the study of [37] find that institutional quality strongly interacts in relationship between shadow economy and economic development. More exactly, they found that a higher GDP per capita is associated with a larger informal sector size in countries where the institutional quality is low. The opposite results are valid in countries with good institutions.

IX. The relationship between the shadow economy and other possible determinants

- The relationship between the shadow economy and unemployment
The possible relationship between unemployment and the shadow economy was studied by [38]. They used data from four different countries: Greece, Spain, Germany, and Italy. The results showed a significant relationship between the unemployment rate and the shadow economy in the two countries with higher unemployment rates (Greece and Spain) and an insignificant relationship between the two indicators in the countries with a lower level of unemployment (Germany, Italy).
- The relationship between the shadow economy and other factors
Some studies have revealed that aspects of spirituality, like culture [39] - [41], religion [42], education [30], or happiness [23] may influence the decision to engage in shadow economy activities. The study of [23] highlights that decreasing the shadow economy and corruption is a complex phenomenon involving not only fiscal aspects but also business culture, social expectations, and political aspects. The study of [44] investigated the causes of the shadow economy in Letonia, and they concluded culture is a major factor determining the shadow economy. Letonia has a relatively young population, the citizens are not yet used to the culture of paying taxes. Similarly, [45] claims that cultural context influences the relationship between over–taxation and the shadow economy. He explains that „ when individualism is dominant, the society will tend to engage highly in shadow economy activities by underreporting of transactions" [45].

He concludes that culture influences the size of the shadow economy and enumerates as possible reasons for shadow economy expansion, a high level of uncertainty, the group collectivism belief, and the lack of future orientation [45].

X. Methodology

The used sample consists of 135 countries worldwide. Among these countries, 44 are developed, while 91 are developing over cross-sectional data 2018-2020 (depending on availability). We analyzed the shadow economy as a percent of GDP as a dependent variable, and all other variables presented in Table 1 are independent variables. The data for each variable are collected for one year. (The year between 2018-2020 when the data was available)

Table no.1 Variables descriptives

Variable	Name of the variable	Measurement	Mean	Maximum	Minimum	Standard deviation
SE_GDP	Shadow economy (percentage of GDP)	0-100%	27.13	55.80	5.61	11.38
CPI	Corruption Perception Index	0-100 (0-highly corrupted, 100-zero corruption)	44.83	88.00	14.00	18.49
Tax revenues GDP	Tax revenue (percentage of GDP)	0-100%	16.08	34.29	0.97	6.26
Unemployment	Unemployment	0-100%	7.52	27.22	0.42	5.19
GINI	Income inequality (Gini Index)	0-100 (0-perfect equality, 100-perfect inequality)	38.69	73.40	24.60	9.12
HDI	Human Development Index	0-1 (0-low level, 1-high level)	0.73	0.96	0.39	0.16
Gdp_per_capita	GDP per capita		14951.33	115873.60	274.01	20722.09
CC	Control of corruption	Between -2.5 and 2.5	-0.02	2.27	-1.68	1.00
GE	Government efficiency	Between -2.5 and 2.5	0.03	2.34	-2.31	0.96
PSV	Political Stability Index and the Lack of Violence	Between -2.5 and 2.5	-0.16	1.47	-2.50	0.86
RL	Rule of Law	Between -2.5 and 2.5	-0.02	2.08	-2.35	0.97
RQ	Reglementation quality	Between -2.5 and 2.5	0.05	2.21	-2.34	0.95
VA	Voice Index and Responsability	Between-2.5 and 2.5	-0.01	1.73	-2.16	0.94

Source:own composition

Short description of the variables:

- SE_GDP: a higher percentage indicates a higher percentage of the shadow economy in GDP;
- CPI: a higher index indicates a less corrupt country
- Tax revenues GDP: represents the percentage in GDP of revenues from tax collection;
- Unemployment: is an essential indicator of the economic health of a country. A high unemployment rate may indicate an economy that is not developing enough and does not provide opportunities for jobs, while a lower level of unemployment may Sindicate a healthy economy. The indicator is represented by the number of unemployed persons and the total number of active persons ratio.

- GINI: a higher index suggests that there is high inequality between income in that country

- HDI: this index considers three dimensions of human development: life expectancy at birth, education level, and income per capita. These dimensions are all combined in one single index. A higher HDI index suggests a higher level of human development. In this study, this variable is a control variable.

- Gdp_per_capita: GDP per capita is often used to compare the level of economic development between countries or regions. It can be used as an indicator of economic efficiency and production capacity. In this study, this indicator is used as a control variable.

The next indicators represent the six indices of the World Governance Index

- CC: this index is used to offer a comparative analysis of corruption levels in different countries and regions, and it can be useful for political decision-makers, researchers, and investors interested in assessing the governance quality and business environment in different countries;

- GE: this index refers to the capacity of the government to implement policies and efficient programs, to provide qualitative public services, to respect the rule of law, and tackle corruption.

- PSV: this index refers to the extent to which a country can maintain political stability and prevent violence and social disturbances.

- RL: is an index used for evaluating the level of following the law in a country or region

- RQ: is an indicator used for evaluating the level of regulation quality and economic governance in a country or region

- VA: this index is used in analyzing governance and it represents the extent to which the citizens can express their opinions and take part in the process of decision-making.

In Table 2, we present the source of the data collected.

Tabel no. 2 Source of variables

Variable	Source
SE_GDP	Medina and Schneider (2019), Schneider (2022)
CPI	Corruption Perception Index 2021 | Transparency International Romania
GINI	https://data.worldbank.org/indicator/SI.POV.GINI?view=chart
GDP_PER_CAPITA	https://data.worldbank.org/indicator/NY.GDP.PCAP.CD
HDI	UNDP. Human Development Reports.
TAX_REVENUES_GDP	https://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS
UNEMPLOYMENT	Unemployment, total (% of total labor force) (modeled ILO estimate) | Data (worldbank.org)
CC	http://info.worldbank.org/governance/wgi/
GE	http://info.worldbank.org/governance/wgi/
PSV	http://info.worldbank.org/governance/wgi/
RL	http://info.worldbank.org/governance/wgi/
RQ	http://info.worldbank.org/governance/wgi/
VA	http://info.worldbank.org/governance/wgi/

Source: own composition

As a methodology, the correlation coefficients, and simple and multiply regression are conducted. For this purpose, the used program is Eviews 12. Then the visual presentation of the correlation between variables is realized with maps created in Tableau software.

Analyzing the correlation between the variables, we can first observe that the Rule of Law index, the Corruption Perception Index, and the Control of Corruption are highly correlated with the dependent variable (Shadow economy). Secondly, we can notice that the 6 indices used to measure

World Governance Index are highly correlated, which suggests that we use them separately in the regression models and not all at once. Thirdly, the unemployment rate is not correlated with any of the variables, not even with the shadow economy, which suggests that this indicator likely does not influence the size of the shadow economy, therefore this is not included in the further analysis.

XI. RESULTS AND DISCUSSION

XII. Variables analysis

In our study, we conducted simple regressions with each independent variable and designed maps highlighting each variable at the world level.

XIII. Analysing the dependent variable

In Figure no 1, we can notice the variation of the shadow economy as a percentage in GDP in various areas from the world. In countries from the West and North of Europe, USA, Canada, Australia, and China , the shadow economy is lower, while in countries from Africa, Eastern Europe, South America, and a part of Asia, the shadow economy is relatively high. Switzerland has the lowest level of shadow economy, while the country with the highest level is Bolivia.

Figure no.1 Shadow economy as a percentage of GDP

Source: own processing of data and design

In Table no 2 are highlighted the regresion coefficients and the probabilities of accepting the null hypotesis of the predictors after performing the simple regression with the shadow economy being the dependent variable. We can see that unemployment is the only variable not correlated with the shadow economy.

Tabel no.2 The regression coefficient and the probability of accepting the null hypothesis

| Variable	Coefficient	p-value
GINI	0.43	0
GDP_PER_CAPITA	-0.000379	0
HDI	-38.95	0
TAX_REVENUES_GDP	-0.43	0.01
UNEMPLOYMENT	0.11	0.55
CPI	-0.44	0
CC	-7.94	0
GE	-8.1	0
PSNV	-7.22	0
RL	-8.58	0
RQ	-7.78	0
VA	-6.56	0

Source: own processing of data

XIV. Analysing the dependent variable (Shadow econonomy) as a factor of explanatory (independent) variables

1) The relationship between corruption and the shadow economy

From table 2 we find that the relationship between the shadow economy and the Corruption Perception Index is negative. If the index increases by one unit (the country is less corrupt), then, ceteris paribus, the percentage of the shadow economy in GDP decreases by 0.44, the 0 % probability indicates that the significance of the coefficient is high. In Figure no 2, the relationship between the two variables is visually presented.

Figure no 2. The relationship between corruption and the shadow economy
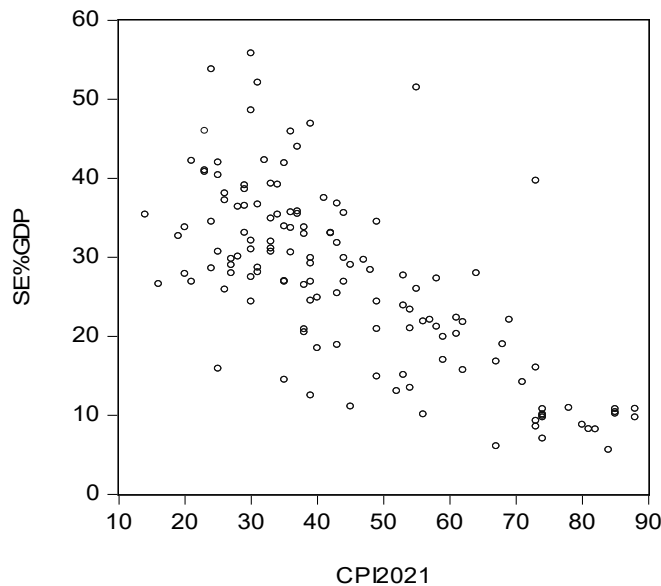
Source: Own processing of data and design

In Figure no 3 we can notice that countries from Western Europe, Scandinavian countries, Japan and North America are the least corrupted. Most of the countries from Africa, South America and Asia are more corrupted, the most corrupted country being Venezuela and the least corrupted country being Finland.
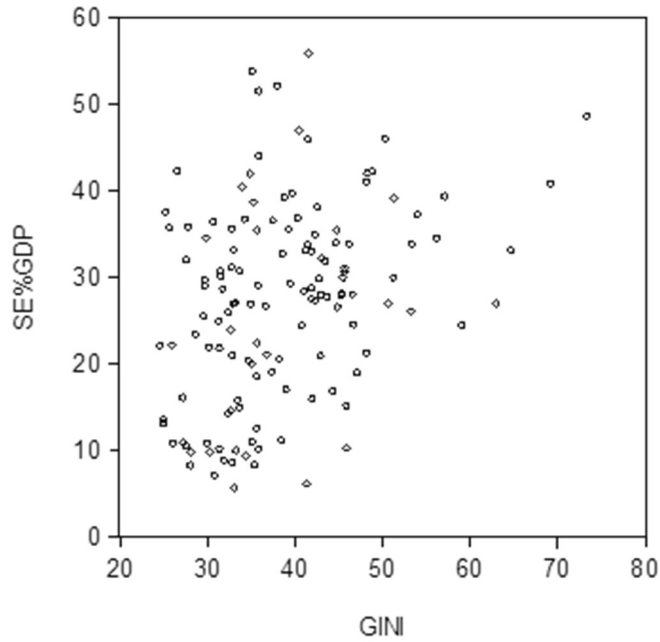
Figure no 3. Corruption Perception Index

Source: Own processing of data and design

2) The relationship between income inequality and the shadow economy

The relationship between shadow economy and income inequalitya positive one. If the Gini index rises with one unit then, ceteris paribus, the percentage of the shadow economy in GDP rises with 0.43 (table 2). In Figure no 4, we can see the correlation between the two variables

Figure no. 4 Correlation between income inequality and the shadow economy

Source: own processing of data and design

In Figure no 5, we can notice that in European countries, the income inequity is not that high, while in South Africa, South America, USA and some countries from the Middle Orient, the income inequality is very high. Slovenia is the country where income inequity is lowest, while Azerbaijan is the country with the highest income inequality.
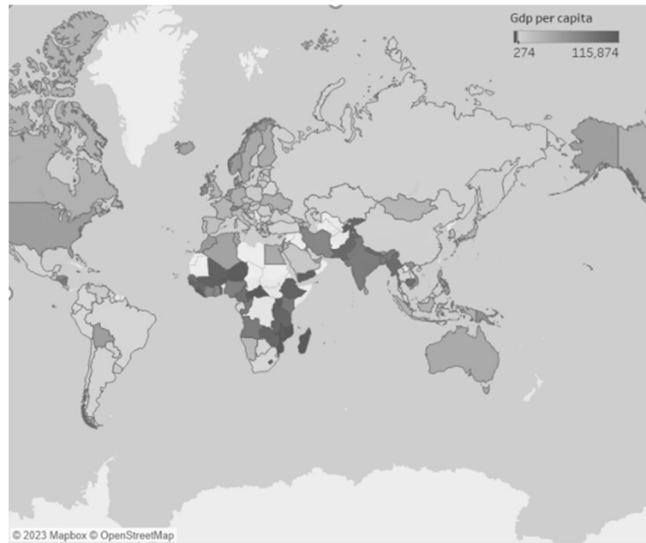
Figure no 5. Income inequality

Source: own processing of data and design

3) The correlation between GDP per capita and the shadow economy

The relationship between the shadow economy and the GDP per capita is negative. If GDP per capita increses with 1000$ then, ceteris paribus, the percentage of shadow economy in GDP decreases by 0.000379 (table 2). In Figure no 6, there can be noticed that most of the countries from Africa and South Asia have a very small GDP per capita, while the countries from Europe, except for Ukraine and Moldova, have a high GDP per capita. Burundi has the lowest value of GDP per capita, while Luxemburg has the highest.
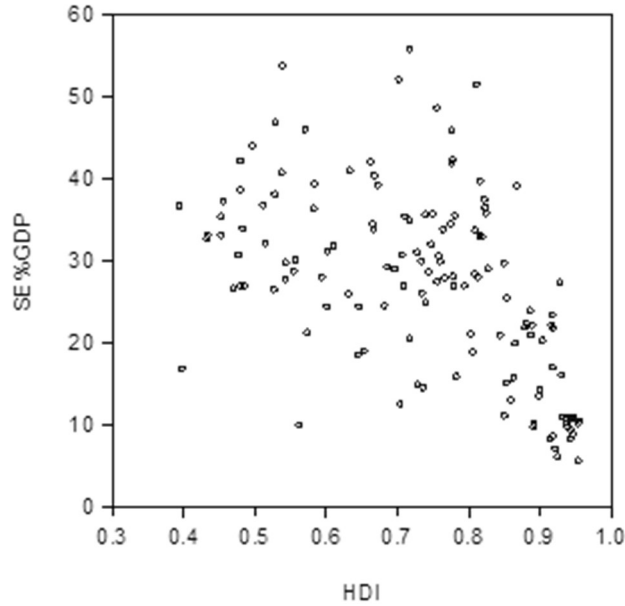
Figure no.6. GDP per capita

Source: own processing of data and design

4) The relationship between Houman Development Index and the shadow economy

Figure no.7 The correlation between HDI and the shadow economy

Source: own processing of data and design

In Figure no 8 reveals that in countries from Europe, USA, Japan and Australia the human development is higher, while in countries from Africa, South Asia, Canada and a part of South America human development is lower, with Niger being the country with the lowest level of human development and Norvegia the highest.

Figure no.8 Human Development Index

Source: own processing of data and design

5) The relationship between tax revenue and the shadow economy

The correlation between the shadow economy and the tax revenue is negative. If tax revenues increase with 1 % then, ceteris paribus, the percentage of the shadow economy in GDP decreases by 0.43. the probability of 0.01% indicates that the correlation coefficient is significant (table 2).

Figure 9 illustrates that Northern and Western European countries have higher percentages of tax revenues. Also, Australia and the Southern part of Africa have higher taxes, while Central Africa, North and South America, and Asia have lower taxes.
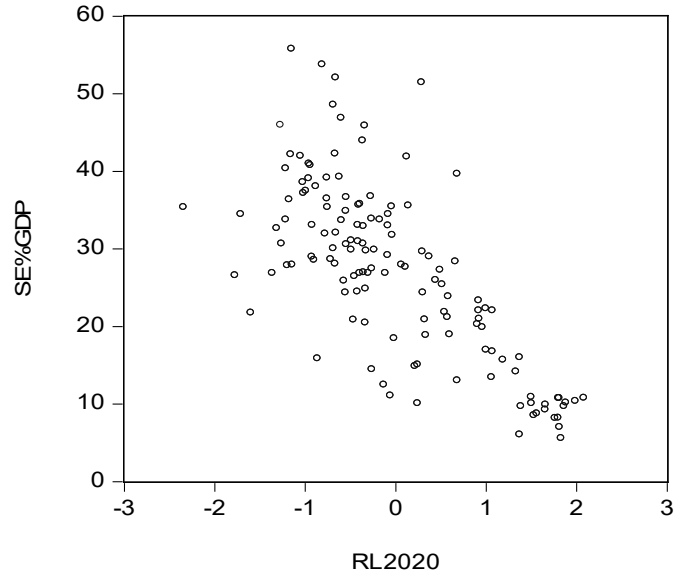
Figure no.9 Tax revenue

Source: own processing of data and design

6) The correlation between the Rule of Law and the shadow economy

The correlation between Rule of Law and the shadow economy is negative. If the Rule of Law increases by 1 unit then, ceteris paribus, the percentage of the shadow economy in GDP decreases by 8.58 (table 2). The 0% probability suggests that the correlation coefficient is significant. Figure no 10 visually illustrates the correlation between the two indicators.

Figure no.10 The correlation between the Rule of Law and the shadow economy

Source: own processing of data and design

Analyzing the variable in the world countries we can notice in Figure no 11 that Western and Northern European countries, Australia, Japan, USA and Canada the Rule of Law is higher, while in the rest of the countries is lower, with Venezuela having the lowest value of the index and Finland the highest (Figure 11).
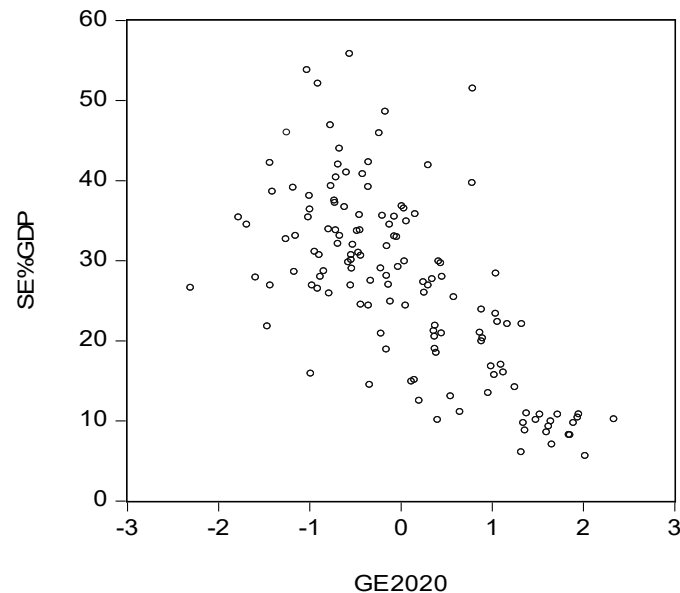
Figure no.11 The Rule of Law

Source: own processing of data and design

7) The relationship between Government Efficiency and the shadow economy

The correlation between the shadow ecoomy and Government Efficiency is negative. If the Government Efficency increases by 1 unit, then, ceteris paribus, the percentage of the shadow economy in GDP decreases by 8.1. (table 2). Figure no 12 visually illustrates the correlation between the two indicators.

Figure no.12 The correlation between Government Efficiency and the shadow economy

Source: own processing of data and design

In Figure no 13 we can notice that in European countries, with few exceptions, USA, Canada, Australia and a big part of Asia, the Government Efficiency is higher, while in the other countries it has lower levels. Yemen is the country with Government Efficiency at the lowest level, while Singapore is the country with the highest level of the indicator

**Figure no.13 Government Efficiency**

Source: own processing of data and design

8) The correlation between Regulation quality and the shadow economy

The correlation between the shadow economy and the Regulation Quality is negative. If the index increases by 1 unit then, ceteris paribus, the percentage of shadow economy in GDP decreases by 7.78 (table 2). Figure no 14 visually illustrates the correlation between the two indicators.

Figure no.14 The correlation between Regulation Quality and the shadow economy
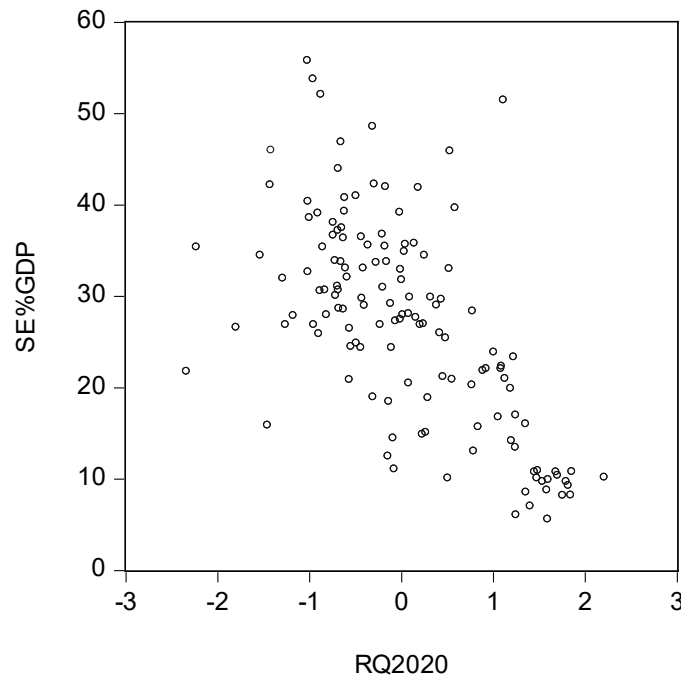
Source: own processing of data and design

On the map below (Figure no 15) we notice that Eastern European countries, most of Asian countries, Southern American countries, and Africa have lower levels of Reglementation Quality. This indicator has higher levels in other countries, with South Korea having the lowest level and Singapore having the highest.

Figure no.15 Regulation quality

Source: own processing of data and design

B. Regression models

This section of the paper focuses on regression modeling, where the shadow economy is described by the independent variables. After analyzing various models we choose two suitable models for our study.

The first regression has the following specification:

$$SE\_GDP = 0.5 * GINI - 5.65 * GE2020 + 0.42 * TAX\_REVENUES\_GDP - 0.0001 * GDP\_PER\_CAPITA \qquad Eq(1)$$

Where,

- ➢ SE_GDP represents the shadow economy as a percentage of GDP,
- ➢ GINI represents the GINI Index
- ➢ GE represents Government efficiency
- ➢ TAX_REVENUES_GDP represents the tax revenue as a percentage of GDP
- ➢ GDP_PER_CAPITA represents GDP per capita.

The R squared is 37%, which means that 37 of the shadow economy's variation is represented by the Gini coefficient, Government Efficiency, Tax revenue, and GDP per capita. We proceeded to test the multicollinearity between the variables using VIF (Variance Inflation Factor). The results are presented in Table no 5. According to the test, there is no multicollinearity between the variables, all the values being under 10.

Tabel no. 5 VIF-test results

Variables	VIF
GINI	7.08
GE	2.68
TAX_REVENUES_GDP	6.99
GDP_PER_CAPITA	3.46

Source: own composition

The second regression specification is presented as follows:
SE_GDP = 29.6 - 5.71 * RL2020 - 0.00017 * GDP_PER_CAPITA   Eq(2)
Where,

➢　　SE_GDP represents the shadow economy as a percentage of GDP
➢　　RL represents the rule of law
➢　　GDP_PER_CAPITA represents GDP per capita

The regression returned an R squared of 56%, which means that the variation of the shadow economy is represented by the Rule of Law Index and GDP per capita in 56%, the rest of the 44% is represented by other factors. All the coefficients were statistically significant.

Our results highlight that Rule of Law and GDP per capita seem to have the highest importance in determining the incentives of people in going to shadow.

Conclusion

The paper focused on investigating the relationship between potential determinants on shadow economy. The literature review suggested that the most important variables that influence the shadow economy are: the level of corruption, income inequity, economic development, unemployment, public governance, and culture. In our study, we analyzed the correlations between the shadow economy and the following variables: corruption, income inequity, GDP per capita, Human Development Index, tax revenue, Rule of Law, government efficiency, and regulation quality. For this purpose, we used a sample of 135 countries worldwide (from which 44 are

developed, while 91 are developing) over cross-sectional data 2018-2020 (depending on thier availability). As methodology, correlation coefficients, simple and multiply regression is conducted together with visual presentation of the correlation between variables.

Our results show that GDP per capita, Houman Development Index, tax revenue, Rule of Law, Government efficiency, and Regulation Quality correlate negatively with the shadow economy, while corruption and income inequality correlates positively with the phenomenon studied. However, the results show that Rule of Law and GDP per capita are found to be the main determinants for the slide in the shadow economy.

The originality of this work results in finding clear evidence that among potential factors on shadow economy, Rule of Law and GDP per capita are found to be the most important ones. This two factors are responsible for about 56% of the shadow economy size. The adopted policies to reduce shadow economy need to be focused on improving two major fields.

The paper also has limits, especially regarding using the methodology for the cross-sectional data. In other to substantiate our results, future studies will be dedicated to developing the methodology by using panel regression analysis. Using together developing and developed countries is considered also another limit of this study, while the specifically patters of each group of countries may alter the results. To counteract this limit, in future studies we intend to conduct the analysis on each separate group of countries (developing and developed ones).

REFERENCES

[1]   P. Smith, . (1994). Assessing the size of the underground economy: The Canadian statistical perspectives. Canadian Economic Observer, Catalogue No. 11-010, 16–33.

[2] F. Schneider & A. Buehn, (2016). Estimating the size of the shadow economy: Methods, problems and open questions. IZA Discussion Paper No. 9820.\

[3] E. L. Feige (Ed.). (1989). The underground economies. Tax evasion and information distortion. Cambridge: Cambridge University Press.

[4] E.L. Feige. (1994). The underground economy and the currency enigma. Public Finance, 49, 119–136.

[5] F. Schneider (2015). Size and development of the shadow economy of 31 European and 5 other OECD Countries from 2003 to 2015: Different developments. Available at http://www.econ.jku.at/members/Schneider/files/publications/2015/ShadEcEurope31.pdf. Accessed at March 2023.

[6] L. Medina & F. Scheineder (2019).Shedding Light on the Shadow Economy: A Global Database and the Interaction with the Official One, available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3502028

[7] B.S. Frey & W. Pommerehne (1984). The hidden economy: State and prospect for measurement. Review of Income and Wealth, 30(1), 1–23.

[8] R. Dell'Anno (2003). Estimating the shadow economy in Italy: A structural equation approach. Working Paper 2003–7. Denmark: Department of Economics, University of Aarhus.

[9] R. Dell'Anno, & F.Schneider, (2004). The shadow economy of Italy and other OECD countries: What do we know? Journal of Public Finance and Public Choice, 21, 223–245.

[10]   B.J..Shelak,. (1997). The impact of the US underground activity. A note relating to the impact on state finances. Journal of Government Information, 24(2), 113–117.

[11]   F. Schneider & D.H. Enste, . (2009). Methods to estimate the size of the shadow economy. Cambridge University Press

[12]   M.V.Achim, & N.S. Borlea. (2020). Economic and financial crime. Corruption, shadow economy and money laundering, Springer Publishing House Switzerland.

[13]   H.Ahumada F.Alvaredo, A.Canavese, (2009). The Monetary Method to Measure the Size of the Shadow Economy. A Critical Examination of its Use. Revue économique, (60), pp 1069 - 1078

[14]   V. Tanzi (1983) The underground economy in the United States: annual estimates, 1930-1980,IMF Staff Papers, vol. 30, no. 2, p. 283-305

[15]   V. Tanzi. (1999) Uses and Abuses of Estimates of the Underground Economy, The Economic Journal, Vol. 109, No. 456, p. F338-F347

[16]   S. Johnson (2018). The global economy loses $3.6 trillion to corruption each year, says U.N. Available at https://bigthink.com/politics-current-affairs/corruption-costs-world-3-6-trillion. Accessed on 28 Feb 2023.

[17]   The Equality Trust (2016). Available at https://equalitytrust.org.uk/, accesed on March 2023.

[18]   J. Rosser, M.V. Rosser. and E. Ahmed (2000). Income Inequality and the Informal Economy in Transition Economies, Journal of Comparative Economics, 2000, vol. 28, issue 1, 156-171

[19]   R. Dell'Anno. (2016). Analyzing the determinants of the shadow economy with a "separate approach". An application of the relationship between inequality and the shadow economy. World Development, 84, 342-356.

[20]   A. Chong and M. Gradstein (2007). Political and economic inequities and shaping of institutions and redistribution, Southern Economic Journalm 83(4), 952-971.

[21]   C.M. Huynh and T.L. Nguyen, (2020). Shadow economy and income inequality: new empirical evidence from Asian developing countries, Journal of the Asia Pacific Economy , 25(1), pp 175-19.

[22]   B. Torgler, (2004). Tax morale in Asian countries. Journal of Asian Economics, 15(2), 237-266.

[23]   M.V.Achim,, N.S. Borlea, L. Găban, and I.Cuceu (2018), Rethinking the shadow economy in terms of happiness: evidence for the European Union member states, Technological and Economic Development of Economy, 24(1), 199-228

[24]   S. Clement, E.R. Mara, M. V. Achim, & M. Postea, (2023). Determinants of Shadow Economy. A Bibliometric Approach: Determinantes da Economia Sombra. Uma Abordagem Bibliométrica. Brazilian Journal of Business, 5 (2), 828-846. https://doi.org/10.34140/bjbv5n2-005

[25]   E.R. Mara , S. Clement, S & M.V. Achim (2023). A Bidirectional Causality Between Shadow Economy and Economic and Sustainable Development, in Mara, E.R., Achim, M.V., Clement, S. (2023). A Bidirectional Causality Between Shadow Economy and Economic and Sustainable Development. In: Dion, M. (eds) Sustainable Finance and Financial Crime. Sustainable Finance. Springer, Cham. https://doi.org/10.1007/978-3-031-28752-7_13

[26]   A. Dreher and F.Schneider, (2010). Corruption and the shadow economy. An empirical analysis. Public Choice, 144, 215–20.

[27]   F. Schneider (2012). The shadow economy and work in the shadow: what do we (not) know?.

[28]   F. Schneider, (2022) New COVID-related results for estimating the shadow economy in the global economy in 2021 and 2022, International Economics and Economic Policy , 19, 299–313 (2022).

[29]   A. Buehn and M.R. Farzanegan, . (2013). Impact of education on the shadow economy: Institutions matter. Economics Bulletin, Vol. 33, pp. 2052-2063.

[30]   S.E. Stefoni, & E. Draghia   (2020). Impact of education and government effectiveness . Theoretical and Applied Economics Volume XXVII (2020), No. 3(624), Autumn, pp. 75-84

[31]   B. Torgler & F. Schneider, (2009). The impact of tax morale and institutional quality on the shadow economy. Journal of Economic Psychology, 30(3), 228–245.

[32]   S.B. Aruoba (2010). Informal Sector, Government Policy and Institutions. 2010 Meeting Papers 324, Society for Economic Dynamics.

[33]   S. Johnson, D. Kaufmann & P. Zoido-Lobaton (1998). Regulatory discretion and the unofficial economy. The American economic review, 88(2), 387-392

[34]   A. Buehn, C.Lessmann, and G. Markwardt (2013). Decentralization and the shadow economy: Oates meets Allingham–Sandmo, Applied Economics, 45(18), 2567-2578.

[35]   E. Friedman, S. Johnson, D. Kaufmann, & P. Zoido-Lobaton, (2000). Dodging the grabbing hand: The determinants of unofficial activities in 69 countries. Journal of Public Economics, 76, 459–493.

[36]   A. Singh, S. Jain-Chandra, & A. Mohommad, (2012). Inclusive Growth, Institutions, and the Shadow Economy. imf Working Paper wp/12/47, International Monetary Fund, Washington, dc.

[37]   C. Elgin, and O. Oztunali, (2014). Institutions, Informal Economy and Economic, Emerging Markets Finance & Trade, 50(4), pp. 145-162

[38]   I. Mauleon, &J. Sarda, (2017). Unemployment and the shadow economy., Applied Economics, 49(37), pp 3729-3740

[39]   M.V.Achim, N.S. Borlea, L.Găban. & A.A.Mihăilă (2019), Eastern European Economics, The Shadow Economy and Culture: Evidence in European Countries, volume 57, issue 5, Pages 352-374

[40]   M.V.Achim. and R. W.McGee (eds.) (2023. Financial Crime in Romania A Community Pulse Survey. Springer Nature Switzerland AG 2023

[41]   R.W. McGee, & J. Shopovski, (Eds.). (2023). The ethics of tax evasion: Country studies. Springer. forthcoming.

[42]   R. W. McGee, & S. R. Smith, (2012). Ethics, tax evasion, and religion: A survey of opinion of members of the Church of Jesus Christ of latter-day saints. In R. W. McGee (Ed.), The ethics of tax evasion: Perspectives in theory and practice (pp. 211–226). Springer. Summarized in McGee (2023d).

[43]   M. Çule,& M. Fulton, (2009). Business culture and tax evasion: Why corruption and the unofficial economy can persist. Journal of Economic Behavior & Organization, 72(3), 811–822.

[44]   S.Austwick, & I. Berga (2016). Foreign investors viewpoint on the shadow economy in Latvia May 2016, KPMG. Available at https://docplayer.net/140175931-Foreign-investors-viewpointon- the-shadow-economy-in-latvia-may-2016.html. Accessed on 18 Feb 2023.

[45]   P.E. Petrakis, (2014). Culture, growth and economic policy. Berlin Heidelberg: Springer-Verlag.

[46]   ***Corruption Perception Index 2021 | Transparency International Romania

[47]   ***https://data.worldbank.org/indicator/SI.POV.GINI?view=chart

[48]   ***https://data.worldbank.org/indicator/NY.GDP.PCAP.CD

[49]   ***UNDP. Human Development Reports.

[50]   ***https://data.worldbank.org/indicator/GC.TAX.TOTL.GD.ZS

[51]   ***Unemployment, total (% of total labor force) (modeled ILO estimate) | Data (worldbank.org)

[52]   ***http://info.worldbank.org/governance/wgi/