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CAUSES AND CONSEQUENCES OF SHADOW ECONOMY AND ITS IMPACT ON ECONOMIC DEVELOPMENT

***Abstract.** This research examines the shadow economy's impact and implications on the economic development at the level of the European Union, from 2009 to 2020, employing the MIMIC Model. The statistical analysis has revealed two contradictory outcomes, which also reflect the suppositions that were found in the literature. Namely, the shadow economy and economic development are at the same time strongly correlated, whilst also being weakly correlated, strictly depending on the chosen variables. Therefore, from a statistical point of view, we conclude that the shadow economy directly impacts economic development, but there is a lack of transparency on behalf of the European Union member states when providing data related to the informal sector. However, by employing the MIMIC Model, we discovered that the causes leading most to work in the informal sector are the lack of quality in public administration institutions and reduced government efficiency, which at least theoretically, affects the economic development of any country. The paper contends that, with a strong framework of public policies, the size of the shadow economy can be diminished.*

***Keywords:** Shadow economy, economic development, MIMIC Model, causality, regression*

JEL Classification: O17, O52, D78

1. Introduction

The shadow economy is a complex and difficult issue, difficult to describe and quantify but has far-reaching implications for a country's economic and social life. Various approaches have been proposed for estimating the size of the informal economy; most methodologies, on the other hand, look at only one indicator to account for all of the effects of the informal economy. Studies attempting to measure the shadow economy's extent have failed to establish a consensus on how to characterise this complicated economic trend. Moreover, the ways of computing and overall assessing the informal sector are so different that we do not know for sure how big exactly is the underground economy compared to the formal one. However, current worldwide events (such as trade disputes, climate change, or migration waves) have raised interest once again in assessing the size of shadow economic activities within economies. Additionally, its size is difficult to determine, as the players who take part in these activities want to remain unnoticed.

In recent years, the literature relied mostly on the Multiple Causes Multiple Indicators (MIMIC) Model, when computing the size of the shadow economy, which considers that the informal sector is affected and affects different economic indicators while being treated as an unobserved component. Therefore, in our paper, we have also computed our own MIMIC model, based on the indicators used by Schneider in his most recent research.

The political and economic significance of the shadow economy has prompted a demand for information on its size and evolution over time. Furthermore, total economic activity, which includes both official and unofficial production of goods and services, is critical in the establishment of fiscal policies that adapt to changes in the economy over time and space. Moreover, the size of the shadow economy is an important factor in determining the level of tax evasion and, as a result, making decisions about how to effectively manage it. The core of the informal sector is both corruption and tax evasion, which are a permanent problem for any country of the European Union, especially the ones from the ex-soviet bloc, which are a direct determinant of the shadow economy. Furthermore, corruption and informal activities have always coexisted in all economies of all sizes and forms, even though many policies were adopted in the hope of reducing it. The increasing burden of taxation and social security payments, together with increasingly extensive government regulatory operations, appear to be the primary driving causes behind the shadow economy's size and expansion. The findings suggest the importance of the rule of law in limiting both corruption and associated shadow economic activity. Therefore, the weak and arbitrary administration of laws and regulations increases shadow economic activity. The development of the shadow economy can be reduced if institutions are strengthened and fiscal policy moves closer to the regular voter's preferences. The informal sector developed as a result of political institutions' failure to promote an efficient market economy, which drove entrepreneurs to go

underground due to the inefficiency of financial institutions and the lack of motivation to respect the government and its policy frameworks.

Our research initially presents the concept and various definitions surrounding the informal sector that can be found in the literature, followed by an attempt in measuring the size of the shadow economy of the European Union (EU) member states. However, our intention is to showcase the impact and relationship between the shadow economy and economic development. Our paper contributes to the literature related to two aspects: first, we measure the size of the informal sector in a rather recent time period of 12 years (from 2009 until 2020) by computing a MIMIC Model based on the indicators presented in Schneider (2006, 2012, 2018); nonetheless, we adjusted the initial indicators of Schneider, as the data was limited for this period. Secondly, with the help of the correlation and regression analysis, we observed the relationship between the shadow economy and economic development. The reason for this empirical evidence is that we found a gap in the literature in terms of this supplementary analysis. We have discovered that the literature does not present the impact of the informal sector on economic development, but often focuses on the repercussions at an individual level. Most studies are inconclusive in explaining how the informal sector affects economic growth. Some argue that the shadow economy has a negative impact on GDP growth. They claim that reducing the shadow economy will raise income tax, causing an increase in government expenditures, particularly on infrastructure and services that promote production expansion, and hence a rise in the overall economic growth rate.

2. Literature Review

This section will present the main shadow economic activities as well as the main reasons an individual may want to perform its activity in the informal economy. We observed that the literature does not offer a proper analysis of the repercussions brought by shadow economic activities in terms of economic development, but more of a presentation of the different opinions and views of the researchers in regard to the informal economy. As a more general definition, the informal sector is the process that generates income based on activities that are not regulated by governmental authorities; moreover, it is the outcome of avoiding taxation and regulations, which are imposed by the state.

A rise in the informal sector could result in lower state income, reducing the quality and quantity of goods and services offered by the government. In the end, this can lead to higher tax rates for businesses and individuals in the official sector, which is frequently accompanied by a decline in the quality of public goods (such as public infrastructure) and administration, creating even stronger incentives to participate in the shadow economy. As a result, the availability, and, more importantly, the quality of public sector services, are critical causative variables in people's decisions to work or not in the shadow economy.

Faced with financial constraints, authorities are likely to look for effective tools to regulate the informal sector in order to expand their tax base and alleviate their fiscal constraints. Reforming the tax and social security systems, as well as lowering the regulatory load, are well-known and commonly utilised policy instruments for improving the formal economy's dynamics. However, in most countries, failing to register or pay taxes is a criminal violation, and governments attempt to track down unregistered agents.

Previous research indicated that the quality of the financial institutions is another factor that triggers the growth of the shadow economy (Schneider and Buehn, 2012; Schneider and Williams, 2013). Even more essential than the real burden of taxes and regulations, the government's efficient and discretionary administration of the tax code and rules plays a critical impact in the decision to work underground. A bureaucracy with highly corrupt government personnel is related to more unofficial activities, but an excellent rule of law improves the benefits of being formal by protecting property rights and contract enforcement. Efficient policies are defined by a specific amount of taxation, the majority of which is spent on productive public services. In reality, the formal economy gains from an increased supply of productive public services and is severely impacted by taxation, but the shadow economy has the reverse effect. The development of the shadow economy can be reduced if institutions can be strengthened, and fiscal policy moves closer to the regular voter's preferences. The informal sector developed as a result of political institutions' failure to promote an efficient market economy which drove entrepreneurs to go underground due to the inefficiency of financial institutions and the lack of motivation to respect the government and its policy frameworks. This concluded in undefined and unsafe workplaces, irregular incomes and unhealthy working conditions, such as long working hours, medium to low productivity, and the deficiency to develop as an employee. In other words, the shadow economy is the effect of a system that does not work or does not promote decent work. In this regard, it fires back at the government, as the informal sector has a negative influence on public revenues, companies, policies, fair competition among the market players, and the face of financial and political institutions.

Because it influences tax morale, the efficiency of the public sector has an indirect effect on the degree of the shadow economy. Tax compliance is governed by a "tax contract" that comprises rights and duties on the part of taxpayers and citizens, as well as the state and its tax agencies. If they receive good public services in return, taxpayers are more likely to pay their taxes honestly. Taxpayers, on the other hand, are honest even when the benefit principle of taxation does not apply, such as in the case of wealth redistribution, if such political decisions are made in a fair manner. The way the tax authority treats taxpayers is also important. Taxpayers will be more likely to adhere to the psychological tax contract's responsibilities if they are treated as partners in a (tax) contract rather than as subordinates in a hierarchical relationship (Feld and Fray, 2007, Feld and Schneider, 2010).

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Schneider and Buehn (2012) drew a comparison between tax evasion and the shadow economy, the conclusion being that the two concepts are not necessarily similar, but most cases referring to the underground economy point towards tax evasion (either direct or indirect) – more than that, the same authors recognised that the aspects that affect tax evasion have similar but more prominent effects when speaking about informal sector. They developed a model using the following seven causal factors to describe the shadow economy based on this rationalisation: obligations of tax and social security contributions, institutional quality, rules, public sector services, tax morale, and discouragement. This method allowed the authors to use a variety of possible metrics of shadow economic activities at the same time. Official working hours or labour force participation, official GDP, and currency demand are all good indications of shadow economic activity.

Tax evasion is a crime regarded by most countries because it includes the misappropriation of government funds, whereas tax avoidance is the adoption of all techniques by a taxpayer to guarantee the payment of taxes if the law requires it. The literature presents several reasons that might justify the act of tax avoidance in the present times. For instance, Folayan and Adeniyi (2018) indicated that regulatory quality, which is emphasised by the corruption of public authorities and the disinterest of tax officials, is the key factor regarding tax evasion. Moreover, Obafemi (2014) pinpoints social factors, such as illiteracy and the inability to understand the overall tax systems, as the basis for tax avoidance. Schneider (2016) describes that the higher the discrepancy between the cost of labour and the income generated by labour hours, the higher the enticement for tax evasion will be or the desire to work in an environment created by the shadow economy. The discrepancy is caused by the existence of the tax burden and the mandatory social security contributions, the main determinant being the tax burden. As presented in their study, Schneider and Buehn (2012) state that it is rather difficult to measure the tax burden in relationship with social contributions, as the two are different among nations. In addition, the ageing population, differences in the labour market productivity or corruption cause gaps in the socioeconomic development of countries (Pirtea et al., 2019; Cristea et al., 2022), also reflecting differently in the level of the shadow economy.

From a moral point of view, certain types of lawful tax evasion are just as unethical as fraudulent evasion and should therefore be treated in the same way. In practice, there is often no rupture between legal and illegal, but rather a continuation, successive attempts to take advantage of the loopholes of the law by leading the taxpayer from legal to illegal. It is human nature to oppose to the concept of taxation. We observed that the most recent literature continuously stressed the importance of taxpayers' attitudes and beliefs towards tax evasion in regard to their fiscal decisions. According to Frey and Torgler (2017), tax evasion-related activities are not influenced by rational cost-benefit analysis, but more by social pressures, generated by taxpayers' compliance with fiscal obligations. It seems that society regards tax evasion as one of the less severe offences, becoming an entirely common practice.

According to the latest paper of the International Monetary Fund regarding the shadow economy (2019) in most European Union member states, this counts for a large proportion of GDP, fluctuating from less than 10% to more than 40%. In developed countries, the informal sector inclines to be reduced, averaging roughly from 10 to 20% of GDP; however, developing countries have larger levels of the shadow economy, accounting for 30-35% of GDP. Whereas the median size of EU's shadow economy has been relatively stable since the mid-2000s, the dynamics vary greatly between nations. Since the early 2000s, the shadow economy has grown in several countries (e.g., Croatia, Cyprus, Greece), while it has dropped in others (e.g., the Czech Republic). In most nations, the shadow economy grew from 2008 to 2010, then reverted to the pre-crisis levels.

In most developed countries, both as a percentage of GDP and as a percentage of employment, the underground economy is much less. Across multiple nation samples and historical periods, the percentage of the shadow economy is substantially inversely linked with per capita income. Tax evasion and undeclared labour in registered enterprises dominate the informal sector in more industrialised nations, as according to Schneider and Buehn (2012). The main idea that is persistent in the literature is that the shadow economy is higher in emerging countries as there is a shortage of opportunities in the formal economy. Informal businesses are more likely to be replaced by new or existing registered businesses as the economy grows, rather than transitioning to the official sector.

3. Data and Methodology

The MIMIC model, which is a type of structural equation model with latent variables, was created as a measurement method for shadow economy (Fray and Week-Hannemann, 1984). It looks at the correlation structuring identifiable causes and criterion variables in order to figure out how they relate to a non-observable concealed variable. The MIMIC model is a good complement to the existing direct and indirect methodologies, since it is widely acknowledged that the shadow economy may be regarded as a latent variable. In contrast to the latter, its main benefit is that it distinguishes between causes and indicators, and, most importantly, it analyses the numerous causes of the shadow economy when measuring it. MIMIC models are frequently used to assess the size and evolution of the shadow economy over time, reflecting time series data. The problem with false regressions may develop because most macroeconomic variables do not meet the underlying assumption of time series analysis. Researchers commonly solve this challenge by using a different operator to turn the temporal series into stationary ones. If the variables were cointegrated and there was a fixed long-run connection between them, an error correction model (ECM) may be estimated instead. In recent years, this technique has gained popularity in applied economics. However, in MIMIC model examinations of the shadow economy, the previous technique is still applied.

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Our research focuses on assessing the size of the shadow economy by utilising the Multiple Indicators Multiple Causes - MIMIC Model, to pinpoint the predictors and indicators of the model. Second, we determine the relationship between the informal economy (expressed as a % of GDP and as the total amount, in million euros) and the economic development (expressed as the growth of GDP based on year-over-year – YoY – analysis, and the total amount of GDP, in million euros). Therefore, the hypothesis we test is that the economic development is impacted by shadow economic activities. And if we confirm it, in which manner and how is the shadow economy at the level of the European Union? How large would the discrepancies between developed and developing countries be?

In our research, we study the shadow economy in the EU, taking into consideration all 27 member states at the moment of the study (Austria, Belgium, Bulgaria, Croatia, Republic of Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden). The research was performed over a period of 12 years, from 2009 to 2020, and shadow economy data was based on the latest research available from Schneider (2021) and from the Eurostat and World Bank databases (data presented in Table 1).

Table 1. Description of indicators (causes and predictors) of shadow economy

Indicator	Definition	Unit of measure	Source
Direct Taxes	The percentage of direct taxes from the overall gross domestic product.	% of GDP	Eurostat
Indirect Taxes	The percentage of indirect taxes from the overall gross domestic product.	% of GDP	Eurostat
Social Security Contribution	The percentage of social security contributions from the overall gross domestic product.	% of GDP	Eurostat
Regulatory quality	An index that measures public opinions of the government's capacity to develop proper policies.	Estimate of governance (ranges from -2.5 to 2.5)	World Bank Data
Control of Corruption	An index that measures people's opinions of how much authorities uses its power for personal gain.		World Bank Data
GDP per capita	An indicator that estimates a country's economic development per person.	Annual, % in million Euros	Eurostat
Employment	The percentage of employment from the overall labour force.	% of Labour Force	Eurostat
Unemployment	The percentage of unemployment from the overall labour force.	% of Labour Force	Eurostat
Average Working Hours	The total number of average working hours calculated per week.	Total, per Week	Eurostat

Indicator	Definition	Unit of measure	Source
GDP per capita at Purchasing Power Parity (PPP)	The GDP divided by population and transformed to US\$ by purchasing power parity rates.	GDP per capita, PPP (\$)	World Bank Data

Before defining the MIMIC model for the most recent data available and test causality and regression analysis to observe the most influential indicators for the economy, we visually analyse the hierarchy of EU countries. Figure 1 depicts the level of shadow economy in Europe, from 2009 until 2020, based on a weighted average. The results revealed that the highest levels of shadow economy calculated as a percentage of GDP (Figure 1a) arise in developing countries from Central and Eastern Europe (such as Bulgaria, Czech Republic, Latvia, Poland, and Romania); however, we observed some highly developed countries with high values of shadow economy, such as France or Germany, which can easily be observed in Figure 1b. The countries that kept an overall low level of shadow economy throughout the years are Austria, Belgium, Denmark, Finland, Lithuania, and Malta. This proves that shadow economy is present in all EU member states, fluctuating its levels with economic development and, moreover, affecting smaller countries in development.

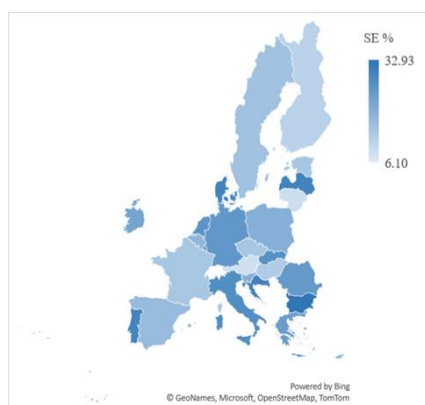


Figure 1(a). SE: % of GDP

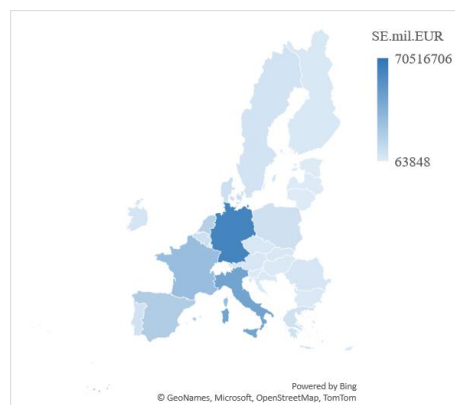


Figure 1(b). SE: total, in million Euros

Figure 1. Shadow Economy in EU, 2009-2020 (weighted average)

Source: authors' computation in Excel

Regarding the economic development indicators presented in Figure 2, we can observe that the growth in GDP based on a year-on-year (YoY) analysis (Figure 2a), is not as significant as anticipated. Our research period revealed that the EU member states did not have large discrepancies when looking from the perspective of developed and emerging countries. Most countries have maintained a growing trend during the period analysed, with negative values in 2012 and 2015. Greece is

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the country with most negative values in regard with the GDP growing trend, followed by Italy. As expected, the most developed countries of the European Union registered the highest amount of GDP expressed in million Euros (Figure 2b), i.e. Germany and France, followed by Italy and Spain. On the other side of the spectrum, most countries that have a lower GDP are from the Eastern European region (e.g., Romania, Bulgaria, Greece, Hungary).

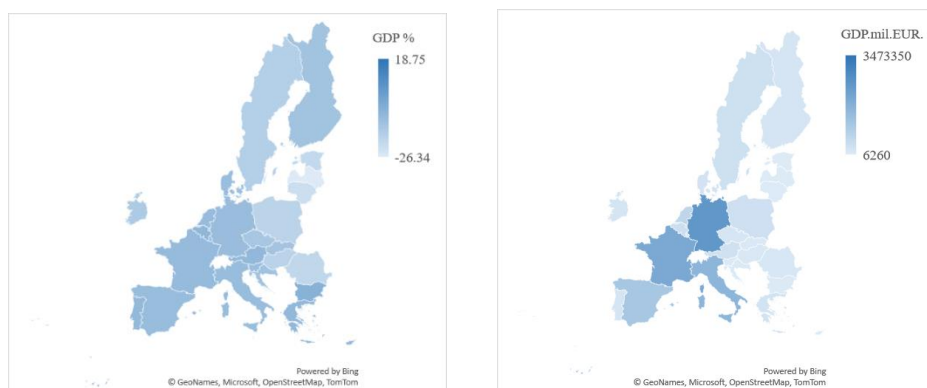


Figure 2(a). GDP: % growth YoY Figure 2(b). GDP: total, in million Euros

Figure 2. Gross Domestic Product in EU, 2009-2020 (weighted average)

Source: authors' computation in Excel

Overall, we observe that if the European Union consistently demonstrated economic differences among its member states, it is primarily due to the admission of new member states, with much lower levels of income than the EU average.

4. Results and Discussions

Informal activity is difficult to precisely assess because of its concealed nature, and hence the scale of the shadow economy has been measured using a variety of approaches. Tax auditing, surveys, and other regulatory procedures are used as direct approaches. Such techniques enable for the collection of extensive information on the underground economy's structure. However, the information collected may not be representative or consistent between nations. Indirect approaches, such as the difference between income and spending (in terms of the GDP) or the inconsistency between the money demand and actual money circulating are rather perceptive of underlying conjectures (i.e., money velocity, elasticity, etc.).

The MIMIC model approach conducted by the pioneers Frey and Week-Hannemann (1984) and further developed by Schneider in his research showcases the informal sector as an index with the causes and indicators presented briefly

above, which are also measured. The index is employed in two equivalences: firstly, as a variable in which the causes represent the explanatory variables, and secondly, as a descriptive variable for the indicators. These two equivalences are assessed together, and the final values of the index are utilised in order to calculate an approximation of the size of the underground economy, as a proportion of GDP. We also need to take into account that this approach has its flaws, such as the vulnerability to variations in data, sample, and preliminary values. The MIMIC model has been frequently utilised in the literature. However, its flaw is related to the combination of GDP and GDP per capita, as a cause variable, as Schneider (2016) presented in his research, and therefore we assumed one as a predictor and one as an indicator.

The target objective is to pinpoint the differences in shadow economy for developed and developing countries, as the hope is to foreshadow the large variance between the two. With this in mind, the estimators used were the ones from Schneider, with a few changes, more precisely for causes we substituted “Tax morale” with the “Control of Corruption” and the “Burden of state regulation” with Regulatory Quality; as for indicators the change was rather minor as we used “GDP at Purchasing Power Parity per capita” instead of “Change of local currency per capita”. Driven by literature and previous models conducted by Schneider, we have chosen taxation, social security contribution, regulatory quality, control of corruption, unemployment rate and GDP per capita as causes, and average working hours, employment rate and GDP at PPP per capita as indicator variables. We may compare shadow economy estimates across nations and undertake panel data analysis using the MIMIC technique. While the MIMIC model has limitations and has received considerable criticism, its value lies in the dataset's large coverage and concurrent validity.

The results estimation for the MIMIC Model can be observed in Table 2 and Figure 3, both evidencing the influence of the causes over the shadow economy (Y in Figure 3), and the level of implications of the shadow economy over the indicators. They contain the estimates for all EU member countries. Moreover, all variables have the expected signs, similar to Schneider's model, only a few of them being insignificant from the statistical point of view (social contribution and control of corruption) as the p was higher than 0.1. The most important outcome is that all indicator variables (meaning average working hours, employment, unemployment, and GDP per capita at purchasing power parity) have high statistical significance. The indicator that is most affected by the informal activities is employment. We can say, with a 95% confidence level, that the employment as a share of GDP is decreasing with an estimate of -4.094. Another significant outcome of shadow economic activities is the increasing unemployment, with 2.387 for all European Union member states. It is worth mentioning that these estimates may be impacted by the discrepancies between developed and developing countries among EU member states.

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Table 2. Predictor and Indicator Coefficients: MIMIC Model

Predictor	Estimate	Std. Error	z-value	p	95% Confidence Interval	
					Lower	Upper
Direct.Tx.	0.045	0.017	2.659	0.008	0.012	0.078
Indirect.Tx.	-0.073	0.027	-2.749	0.006	-0.126	-0.021
Soc. Contrib.	-0.012	0.018	-0.63	0.529	-0.047	0.024
Reg.Qual.	-2.519	0.267	-9.439	< .001	-3.043	-1.996
Ctrl.Corrup.	-0.04	0.101	-0.398	0.691	-0.238	0.158
GDP.capita	-0.027	0.008	-3.44	< .001	-0.042	-0.012
Indicator	Estimate	Std. Error	z-value	p	Lower	Upper
Avr.Wrk.H.	0.724	0.073	9.903	< .001	0.581	0.868
Empl.	-4.094	0.28	-14.643	< .001	-4.643	-3.546
Unempl.	2.387	0.169	14.104	< .001	2.055	2.718
GDP.capita.PPP	-0.277	0.16	-1.725	0.085	-0.591	0.038

Source: authors' computations in JASP software

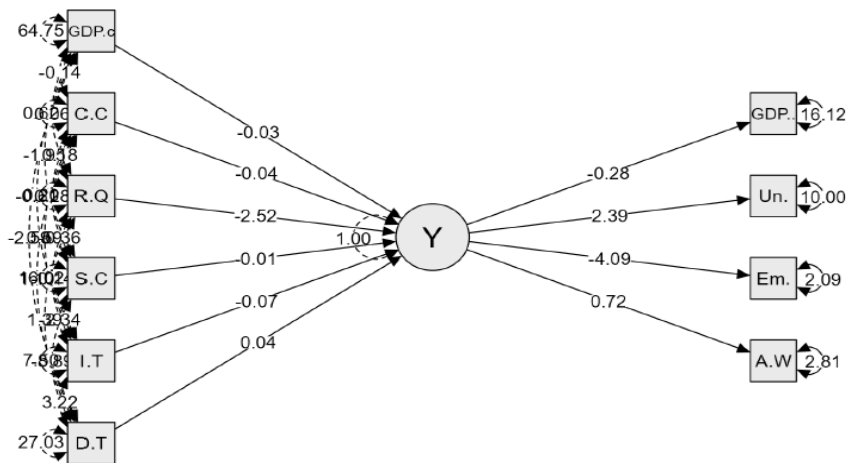


Figure 3. MIMIC Model for Shadow Economy in the EU

Source: authors' computations in JASP software

Nonetheless, our MIMIC approach needs to have further correction as the model is uncertain; the literature suggests that different models must be computed until a proper one is conducted and can be used further. Therefore, in order to move forward with our statistical analysis regarding the impact of shadow economy on

economic development, we have chosen the most recent data regarding the level of shadow economy provided by Schneider in his most recent 2021 paper. Based on Schneider's data, if we concentrate strictly on the European Union, the size of the informal sector from the GDP is approximately 19%, with the highest percentage in Bulgaria (38.5%) and the lowest one in Austria (with 7.55% of GDP on average).

Even though the size of the shadow economy is bigger than initially anticipated, the researchers of the IMF observed a falling trend until the COVID-19 pandemic's first stroke, especially in less developed countries. The initial decrease is not as significant per ensemble (from 17% to 16% as the average of the European Union), but was followed by an increase in 2020; however, taking into consideration the economic challenges that were upon us after the Financial Crisis in 2008, we can confidently say that the informal sector will slowly diminish in the following years. Going further with our empirical analysis, we assess the relationship between the shadow economy and economic development through causality and regression analysis. The granger causality results presented in Table 3 prove that the shadow economy is a strong cause of economic development. We tested both indicators as expressed in million Euros and also as a percentage (% of GDP for shadow economy and % change from the previous year for GDP). In addition, the causality is reflected as stronger when we consider the indicators measured in millions of euros.

Table 3. Granger causality tests between shadow economy (SE) and economic development (GDP)

	measures in mil. euros		measures in %	
W-bar	6.3723	2.9676	1.0436	0.3216
Z-bar (p-value)	19.7390 (0.0000)	7.2293 (0.0000)	0.1602 (0.8727)	-2.4926 (0.0127)
Z-bar tilde (p-value)	10.4966 (0.0000)	3.4043 (0.0007)	-0.6035 (0.5462)	-2.1075 (0.0351)
	H0: GDP does not Granger-cause SE.	H0: SE does not Granger-cause GDP.	H0: GDP does not Granger-cause SE.	H0: SE does not Granger-cause GDP.
	H1: GDP does Granger-cause SE for at least one panel.	H1: SE does Granger-cause GDP for at least one panel.	H1: GDP does Granger-cause SE for at least one panel.	H1: SE does Granger-cause GDP for at least one panel.

For regression analysis, we tested the influence of shadow economy on GDP, considering all the EU countries and also two smaller datasets, one consisting of the most developed countries (Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, Netherlands, and Sweden) and another one for emerging countries (with the rest of the EU member states). The regression results are presented in parallel in Table 4.

Table 4. Linear regression analysis for the influence of shadow economy (SE) on economic development (GDP)

	measures in mil. euros			measures in %		
	all EU	EU - developed countries	EU - emerging countries	all EU	EU - developed countries	EU - emerging countries
SE	0.0468***	0.046***	0.0445***	-0.0010	0.0003	-0.0016**
t-stat.	52.97	28.67	52.47	-1.64	0.27	-1.99
Const.	59689***	143271.9***	28814.72	0.0239*	0.002	0.0337**
t-stat.	4.04	3.78	3.16	1.87	0.1	2.02
F-test	2805.36***	822.2***	2753.03***	2.68	0.08	3.96*
Adj. R-sq.	0.8967	0.8734	0.9313	0.0052	0.0078	0.0144
N	324	120	204	324	120	204

* p<0.05, ** p<0.01, *** p<0.001

The R-squared evidences a significant model for describing the relationship between the shadow economy and economic development when both are expressed in million euros. Its value is 0.89, confirming a direct relationship between these indicators. In addition, the regression coefficient of the shadow economy is statistically significant at 1% level for the EU and also for the two datasets consisting of developed versus emerging EU member states, with small differences across the coefficient values. In terms of the adjusted R-squared, we observe that the changes in the level of the shadow economy can explain a little bit more of the changes in GDP when compared to the developed countries. Based on these significant relationships, at the European level, we assume that when the GDP is growing, the level of the shadow economy is growing as well, but also increasing informal activities within an economy, which might lead to better economic development.

5. Conclusions and Policy Implications

The first objective was to offer a clearer view of the implications of the shadow economy and how to measure it at the level of the European Union, through the MIMIC Model, considering the shadow economy as a latent variable. The analysis emphasised several causes, such as the tax system, corruption, the quality of public authorities, and economic growth. The research met some limitations in the literature, especially regarding the usage of the MIMIC Model when estimating the size of the shadow economy at a smaller level, i.e. the European Union. As observed from previous statistics obtained by Schneider (2016, 2018, 2019, 2021), the informal sector has its peaks in emerging economies, such as Bulgaria (which has the highest level of the shadow economy, i.e. 32.93% of the GDP, registered for

2020), followed by most Eastern European Countries. Our results may be seen as complementary to the studies realised by Schneider and Buehn (2012), Schneider (2016), or Medina and Schneider (2018). Although these adopted a similar approach to the MIMIC Model, their data sample and research period were larger and therefore needed more correction coefficients.

The size of the informal sector has decreased across the European Union in recent years, but is still considerable, with an average of 19% of GDP over the 2009-2020 period. Since the 2008 Financial Crisis, when shadow economies have peaked in most countries, there has been a decline in most member states. Nonetheless, in developed economies, the level of the shadow economy accounts for 10 to 20% on average, whereas in developing countries (such as East-European countries), it accounts for almost 30% of the GDP. The second objective was to present the direct relationship between the shadow economy and economic development, whilst trying to determine whether or not there is a clear connection between these two. We observed that this relationship is rather uncertain and fairly sensible to the time span and the size of the study conducted. When taking into account the shadow economy and economic development expressed in million euros, we obtained a strong connection between the two, with a direct influence. Accordingly, we could state on a 95% confidence level that when the GDP is growing, the level of the shadow economy is growing as well, but also increasing informal activities within an economy, might lead to increased economic development. However, the analysis with shadow economy as % of GDP and economic development as % change from the previous year returned a Pearson correlation that was not statistically significant.

Our analysis contributed to the literature by emphasising the fact that the shadow economy in the EU is still significant, but its implications and repercussions are uncertain. By highlighting the importance of shadow activities inside the formal economy, we provide the starting point for the policymakers to consider informal activities further when designing and developing policy regulations. As a result, our findings may be used to improve the efficiency of authorities when judging the complexity of the shadow economy sector. A variety of policies should focus on the most important variables in each country. Income per capita is highly and inversely connected to the size of the informal sector, and more effective institutions would play a major role in accomplishing development goals. Better tax administration, reduced regulatory burdens, and increased openness would lessen the incentives for illegal activities.

It is widely acknowledged that more qualitative regulators create more equitable and long-term prosperity and seek economic development. To address blockages in the business climate, promote the rule of law, improve government performance, and combat corruption, regulatory and institutional changes are necessary. Measures intended to increase revenues may also aid in the reduction of the shadow economy. Implementing initiatives in order to strengthen fiscal transparency and public management can improve citizens' perceptions of regulatory quality and the link between revenues and expenditures, resulting in increased compliance behaviour. Tax avoiders might be publicly identified, with direct

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participation of trade associations, advisory programs, clear information on areas of noncompliance, follow-up audit programs, and conviction of the worst offenders are all examples of industry-based measures that might be beneficial. In terms of the quality of their legal systems and private property, most developing countries still fall behind developed EU member states, and institutional quality progression has been inconsistent among countries. Although baseline circumstances (such as resource allocation) and external variables (such as EU membership) are significant, policies aimed at increasing public administration quality, openness, and accountability contribute to establishing positive feedback among EU citizens.

Optimising the collection, audit, and registration process might also increase the level of tax compliance. The process of registration can be improved by simplifying the informational framework among governmental authorities. Another policy that could curtail informality within an economy would be the automatization of fiscal procedures. By simplifying the tax system and the social security system, the tax compliance costs will be reduced without reducing tax rates, hence economic growth will also follow. It is possible to enhance collections and decrease VAT fraud by advocating online payments. Several governments have recently made it mandatory for firms to record payments and money transfers using fiscal instruments.

Although the possibility of development in tax administration differs throughout Europe, most nations are focusing on issues such as poor automation of procedures, organisational structure, and operational effectiveness. An efficient policy framework should address those working in the underground economy, in order to determine them to shift to the formal sector, particularly in the member states where informal and shadow activities act as an incentive for the “social safety net”. Lowering the administrative and regulatory costs, encouraging transparency and enhancing government performance, as well as strengthening tax compliance, automating activities, and encouraging online payments, are among the most important policies to improve economic development as well as to reduce shadow economy activities. Additionally, public policies which focus on the private sector and human capital development would assist both employers and employees out of the informal sector by encouraging inclusive growth.

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REFERENCES

- [1] Cristea, M.S., Pirtea, M.G., Suciu, M.C., Noja, G.G. (2022), *Workforce Participation, Ageing, and Economic Welfare: New Empirical Evidence on Complex Patterns across the European Union*. *Complexity*, 2022, Article ID 7313452;
- [2] Feld, L., Frey, B. (2007), *Tax Compliance as the Result of a Psychological Tax Contract: The Role of Incentives and Responsive Regulation*. *Law & Policy*, 29(1), 102–120;
- [3] Feld, L.P., Schneider, F. (2010), *Survey on the Shadow Economy and Undeclared Earnings in OECD Countries*. *German Economic Review*, 11(2), 109–149;
- [4] Folayan, D.O., Adeniyi, A.G. (2018), *Effects of tax evasion on government revenue generation in Oyo state, Nigeria*. *European Journal of Accounting, Auditing and Finance Research*, 6(1), 76-89;
- [5] Frey, B.S., Weck-Hanneman, H. (1984), *The hidden economy as an “unobserved” variable*. *European Economic Review*, 26(1-2), 33–53;
- [6] Frey, B.S., Torgler, B. (2007), *Tax morale and conditional cooperation*. *Journal of Comparative Economics*, 35(1), 136–159;
- [7] Obafemi, F.J. (2014), *An Empirical Study of Tax Evasion and Tax Avoidance*. *Journal of Economics and Sustainable Development*, 5(18), 22-27;
- [8] Pirtea M.G., Sipos G.L., Ionescu A. (2019), *Does corruption affects business innovation? Insights from emerging markets*. *Journal of Business Economics and Management*, 20(4), 715–733;
- [9] Schneider, F.G. (2006), *Shadow Economies and Corruption All Over the World: What Do We Really Know?* SSRN Electronic Journal - IZA Discussion Paper No. 2315;
- [10] Schneider, F.G., Buehn, A. (2012), *Shadow Economies in Highly Developed OECD Countries: What are the Driving Forces?* IZA Discussion Papers, No. 6891;
- [11] Schneider, F., Williams, C.C. (2013), *The Shadow Economy*. *The Institute of Economic Affairs*, available online at <https://iea.org.uk/publications/research/the-shadow-economy>;
- [12] Schneider, F. G. (2016), *Estimating the Size of the Shadow Economies of Highly Developed Countries: Selected New Results*. *Research report*, available online at <https://www.ifo.de/DocDL/dice-report-2016-4-schneider-december.pdf>, Selected New Results;
- [13] Schneider, F., Buehn, A. (2018), *Shadow Economy: Estimation Methods, Problems, Results and Open questions*. *Open Economics*, 1(1), 1–29;
- [14] Schneider, F. (2021), *Development of the Shadow Economy of 36 OECD Countries over 2003-2021: Due to the Corona Pandemic a Strong Increase in 2020 and a Modest Decline in 2021*. *African Journal of Political Science*, 15(2).