Determinants of the Informal Economy
in EU Countries

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Abstract
The purpose of the paper is to explore determinants of informal economy for EU countries' economies which contributes to the current literature. The authors used a dynamic panel Generalised Methods of Moments (GMM) technique. The GMM estimation results are preferred, as it is the more advance techniques, which corrects endogeneity by introducing instruments to improve efficiency and to transforms the instruments to make them uncorrelated (exogenous) with the fixed effects. Results are provided and hypothesis are tested that tax burden, regulatory burden and weak legal environment stimulate economic agents to perform activities through informal economy. Comparing with other studies, results show that tax burden has significant and positive effect on informal economy. According to the results of monetary freedom, rule of law, control of corruption and gross national income, they have significant negative effects on informal economy. The direction effect for control of corruption is in line with past literature which is found negative. The key contribution of the paper is that it provides clear results about determinants of informal economy in EU countries which is important for academics, researchers and policy makers.

The views expressed in this study are those of authors and do not represent those of institutions where they are working in.

Introduction

Informal economy is a global problem and has increasingly attracted interest of macroeconomic policy makers. In literature there is a number of definitions for informal economy such as "*grey economy, unofficial economy, and underground economy*". It is important to have in place clear statistical and analytical data for informal economy, because this is an important mechanism to fight this phenomenon and

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help policy makers to take right decision. Hence, it is important to understand economic agents engaging in the informal economy and their frequency and magnitude. In literature there is a number of definitions of the informal economy. A commonly used definition is "*all economic activities that contribute to the officially calculated GDP but currently unregistered in macroeconomic statistics*", (Schneider, 1994). Another definition is market-based production of goods and services, whether legal or illegal, that escapes detection in the official estimates of GDP (Smith, 1997).

Based on the statistical data published by countries, it is noted that this phenomenon increases day by day. As such, macroeconomic experts and policy makers should be focused in this problem, because of its impact in the countries' economy as well as its economic growth. Besides, official indicators such as income, unemployment, and consumption are unreliable when it comes to informal economy in a country, which it return make policies based on these indicators potentially less effective (Schneider and Enste, 2000).

The objective of this paper is to test both factors and test some hypotheses with the following questions: Does tax burden impact in the informal economy and stimulate economic agents to perform their activities through informal economy? Do regulatory burdens, control of corruption, rule of law, quality of regulatory and legal environment influence the size of the informal economy? This study is built based on earlier works (Johnson et al., 1998, Friedman et al. 2000, Krakowski, 2005 and Sevgin, 2009) who found evidence supporting or contradicting both theories.

The paper is organized as follows: Theoretical and empirical literature review is discussed in section 2. Methodology of the study, hypotheses and conceptual framework in section 3. The same section describes the variables used in the study. Section 4 performs various descriptive statistics, different statistics related to the dataset, dynamic GMM estimation and its tests. Section 5 concludes the study.

1. Literature Review

Based on literature review there are theories of the informal economy that sees tax burden as the cause of this economy and another theory that takes into account factors such as regulatory burden, quality of regulatory, corruption as well as legal environment.

When reviewing the existing literature, the notion of the informal economy and its measurement is found in the study of Schneider (1994, 2004, and 2017). Informal economy is usually defined as an economic activity which contributes to the gross national product, but is unregistered (Schneider, 1994). Otherwise in the literature it is known as the underground economy, unofficial economy. If these activities

were registered in the country's statistics, they would contribute in increasing the GDP of a certain country. Also, after examining the literature on the indicators of informal economy, we come across the studies of Friedman (2000), Krakowski (2005), and Sevgin (2009).

A study with a larger scope was conducted by Schneider and Medina (2017), who evaluated 158 countries across the world, by determining the level of informal economy as a percentage of GDP in the respective countries. They used the DYMIMIC method (multiple dynamic causes, multiple causes) and the access to money demand. DIMIMIC access considers many causes which lead to the existence and growth of underground economy, as well as the multiple effects of such economy over time (Schneider, 2004).

Indirect independent methods used to measure the size of informal economy are considered as an indicator (such as discrepancies between national income and expenditure, and discrepancies between official and actual labour force) which should track the whole effects of the hidden economy. However, it is understandable that the effects of informal economy appear simultaneously in the production, labour and money market (Sevgin 2009).

The method of cash-in hand demand takes into consideration the fact that hidden transactions are done through cash with the purpose of keeping traces off record for the relevant authorities. According to this method, the growth of informal economy increases the demand for cash. As a result, it is implied that an increase of any amount, which cannot be properly justified in the economic sense/does not provide economic rationality according to the economic indicators (income, regular payments, interest rates, are attributed to the informal economy (Schneider, 2004). Schneider used this method in combination with DYMIMIC.

Sevgin (2009) studied indicators which cause/influence the informal economy, listed as follows: tax burden, regulatory burden and legal environment. Based on the results, he concluded that tax and regulatory burden have a significantly negative effect on the informal economy. Whereas, the quality of legal environment has a positive significant influence on the informal economy. Therefore, the latter hypothesis has been refused, while the former one on tax and regulatory burden has been accepted.

Hetemi and Gulhan et al (2018) found out that inadequate legal environment impact positively on the shadow economy. Similarly, other studies show that tax burden and government effectiveness have negative impact in shadow economy. They tested the effect of tax burden, government effectiveness and rule of law on the shadow economy.

Goczek and Cieślik (2018) argues that bribes, unlike taxes, involve unpredictable distortion in the discretionary and uncertain use of the government power that is higher than the values of bribes themselves. This provides costs to businesses and

alongside with resources allocated to directly unproductive activities (e.g. military spending) impose an extra burden on the economy.

Goczek and Cieślik (2018) find out that the lack of corruption has a positive and statistically significant effect on the growth rate of real per capital GDP and as result it increased the investment ratio. They concluded that "*richer countries with better access to international financing should be growing faster and be less prone to the adverse effects of corruption than the emerging economies*".

Johnson et al. (1998) has explained the correlation between the informal economy and regulation and bureaucracy, tax burden, corruption and legal environment. They used the measurements on informal economy in 49 states and considered such indicators to find their effect on informal economy. Their study has been based on regulatory, tax burden, and corruption, providing the hypothesis that these factors have a positive correlation with informal economy. Based on their results, it turned out to be very positive and significant at the same time.

Johnson et al. (1998) explored the relationship between the informal economy, regulatory quality and bureaucracy, tax burden, corruption, and rule of law. They used various measures for regulatory quality, bureaucratic process, tax burden, rule of law, and corruption. Their study is drafted by taking into account three theories: regulatory quality, tax burden, and corruption which are all positively correlated with informal economy. Based on their finding, the extent of regulatory and bureaucratic discretion is the main determinant of informal economy.

Johnson et al. (1998) specified that lax regulations in relation with undisciplined bureaucratic processes as well as weak rule of law enable officials to take decisions for individual cases without effective supervision. In such circumstances, conditions exist for corruption and a lot of companies choose to operate their business in informal economy.

A similar study has been conducted by Friedman (Friedman et al., 2000). Their study was conducted in 69 states and the results suggest that poor institutions (overregulated, corrupted and with poor legal environment) are positively correlated with informal economy.

To examine this matter, respectively the role of institutions in an informal economy, La Porta et al. (1999) has used a group of exogenous variables. He found out that these variables were strongly related with institutional development on a wide range of countries. Results suggested a causal link between the poor institutions and informal economy, indicating that the poorer the institutions, the higher the informal economy.

An interesting research was conducted by Krakowski (2005), who analysed the determinants of an informal economy by using regressions between countries. He used two data groups, one of which included evaluations of informal economy

size evaluated by Schneider (2004), by using the DYMIMIC method, and the other considered the perception of business entrepreneurs in 109 countries.

His regressions on a series of indicators which cover the intensity of regulations, taxes and cost of establishing a business, proved that the intensity of regulations (regulatory burden) must be the most important factor in explaining the size of informal economy (Sevgin 2009). A characteristic of the study is that it included a regional analysis, which discovered that the aspects of good governance, which were important in keeping the size of an informal economy, vary in different regions. In transition countries, which are ex-socialist countries entering a market economy, the control of corruption was more important than the government effectiveness. The tax rate variable was important, but it had a negative sign, which indicated that high tax rates were accompanied by a smaller size of informal economy in these countries (Sevgin 2009).

Dreher and Schneider (2006) analysed the influence of informal economy on corruption and the vice-versa. Their hypothesis indicated that corruption and informal economy were substitutes in high income countries, and complementary in countries with smaller incomes on the other hand. According to their regression results, informal economy reduced corruption in higher income countries but increased corruption in countries with lower income. They also discovered a positive influence on regulating hidden economy, while the results concerning taxes were mixed. Their results indicated that higher regulations produce more corruption, whereas a better rule of law and democracy were accompanied with less corruption. The relationship between informal economy and income inequality has been studied less. In this aspect, there is a research conducted by Rosser et al. (2004), who explored this relationship and found a strong correlation, meaningful and strongly positive between income inequality and the size of informal economy. They argued that the relationship between income inequality and the size of informal economy is a mutual causal relationship, linked through breaches of social cohesion and social capital. Income inequality leads to the lack of those two elements, with a higher tendency in avoiding legal economy due to social alienation. Such study tests the hypothesis that higher taxes, regulatory burden, corruption and poor legal environment lead to a higher informal economy.

2.   Methodology research, hypotheses and conceptual framework

The main goal of this study is to identify the determinants of the informal economy. On this regard, several factors and several hypotheses have been considered. In order to achieve this objective, the following hypotheses are tested:

- Increase of tax burden increases informal economy in a country.

- Regulatory burden, control of corruption, legal environment, regulatory quality and governance effectiveness are determining factors of the size of informal economy.

Therefore, through our model we test and measure the determinants of the informal economy and their impact in EU countries.

To achieve this goal 27 EU countries have been analysed during a period of 20 years (1996 - 2015).Countries which have been considered for the analysis are: 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 model is built as below by using dynamic GMM approach:

$$IE_{i,t} = \beta_0 + \beta_1 TB_{i,t} + \beta_2 BF_{i,t} + \beta_3 LF_{i,t} + \beta_4 MF_{i,t} + \beta_5 GE_{i,t} + \beta_6 RQ_{i,t} + \beta_7 RL_{i,t} + \beta_8 C_{i,t} + \beta_9 logGNI_{i,t} + \beta_{10} GI_{i,t} + \varepsilon_{it}$$

(1)

In table 1 are presented the variables used in the model and their source.

Table 1 Variables used in the model, expected effects and their source

Variable	Variable type	Expected effect	Log	Source of data
Informal economy	Dependent		No	Schneider and Medina
Tax burden	Independent	+	Yes	Heritage foundation
Business freedom	Independent	-	Yes	Heritage foundation
Labour Freedom	Independent	-	Yes	Heritage foundation
Monetary Freedom	Independent	-	No	Heritage foundation
Government effectiveness	Independent	-	No	World Bank
Regulatory Quality	Independent	-	No	World Bank
Rule of Law	Independent	-	No	World Bank
Control of Corruption	Independent	-	No	World Bank
GNI per Capita	Independent	-	Yes	World Bank
Income Inequality (Gini)	Independent	+	No	World Bank

Source: Authors' compilation

Tax burden is considered as one of the variables with the largest effect in an informal economy. This implies that the larger the tax burden the larger the informal economy, because market players are given incentives to refuse to declare their income. They are stimulated to operate in an informal economy rather than declare their income and pay financial obligations. Thus, it is logical to say that economic agents want to keep larger profit for themselves. Through this logic, expectations from this model provide that with the increase of tax burden, informal economy increases as well. Therefore, a positive correlation is expected between these two variables.

Overregulation is another factor mentioned as having created the informal economy (according to Friedman, 2000, Krakowski, 2005). This can be interlinked with the freedom of doing business (licenses, business registration process, different bureaucracies etc.), monetary or labour freedom. Overregulation certainly has its own effects on increasing expenses as to not stimulate economic agents to operate in the formal economy, but rather in the informal one. As a result, it is expected from the model that this should be a positive correlation, meaning that overregulation increases informal economy.

Undoubtedly, a crucial factor to a country's economy is the regulatory quality, which refers to the governance of a certain country to offer a safe business environment and based on policies that stimulate economic agents to operate in a formal economy. Therefore, expectations are that regulatory quality and informal economy would have a negative correlation.

The rule of law is also an important factor that has an impact in the economy. For that reason, expectations are that there would be a negative correlation with informal economy. Assessing from the logical aspect, it is understandable that if there is a rule of law and it is equal for everyone, it stimulates the economic agents to stay within the formal economy. This legal rule assures them by providing security in their protection, because their actions are legitimate, transactions are completed and reported properly to the tax authorities. As a result, expectations are that there would be a negative correlation between informal economy and legal rule.

Another variable included in the model is control of corruption, and expectations are that there would be a negative correlation between the informal economy and corruption. The logic is that a higher value of the indicator (which means a less corrupt environment) will decrease informal economy.

Income inequality as an independent variable and informal economy as a dependent variable are expected to have a positive correlation. Unequal income tends to stimulate economic agents to be involved as much as possible in the informal economy.

3. Data structure and results of the model

In this chapter data structure and information about the GMM technique will be presented, and results of the model is discussed.

Annex I show the descriptive statistics of the dataset used in the analyses. According to the results, the average of dependent variable is 20.84 while the maximum value is 34.66. Most of the variables presented in natural logarithm descriptive statistics are close.

Annex 2 presents the correlation between variables. Results shows there is significant negative correlation between the dependent variable (Informal Economy) and independent variables which are Business freedom, Labour Freedom, Monetary Freedom, Government Effectiveness, Regulatory Quality and Rule of Law. On the other hand, Tax Burden - TB has a positive significant correlation with Informal Economy. Correlation between other independent variables are significant but the only exception is Corruption where the correlation is insignificant.

In order to define the determinants of informal economy GMM method is used. The main idea of using GMM estimator is that since the informal economy variables may change in periods, it gives more accurate results compared to static panel. According to Baltagi (2008), dynamic relations exist if there is a delayed independent variable exists between regressions. When the lagged independent variable added to the model, constant or fixed effect models may present biased results because of autocorrelation. Instrumental variables are used for the variables which are correlated with error term.

The advantage of the GMM method is that it gives possibility for estimation in case of autocorrelation, heteroscedasticity, multicollinearity and non-linear cases about parameters or variables. Standard and System GMM are two different forms of GMM estimator. System GMM ((Arellano & Bover (1995)-Blundell & Bond (1998)) is the advanced version of standard GMM which is developed by Arellano ve Bond (1991). Standard GMM estimator (Arellano & Bover (1995)), uses the lagged levels of variables instrumental variables. In addition to that when the variables are close to random walk, lagged variables are weak to explain the concept. Because of this problem in System GMM method, lagged levels and also raw levels of the variables are present in the model. This method concludes with solving two equations. Moreover, this method allows using lagged levels of independent variables and also dependent variable as instrumental variables. Baltagi (2008) asserts that System GMM estimator gives more accurate and reasonable results. The GMM estimation results are preferred, as it is the more advance techniques, which is proposed by Arellano & Bover (1995) and used also by Blundell & Bond (1998), which corrects endogeneity by introducing

instruments to improve efficiency and to transforms the instruments to make them uncorrelated (exogenous) with the fixed effects.

Table 2 shows the results of GMM. According to the results, Tax Burden and Income Inequality Index have significant positive effect on informal economy. This means that an increase in tax burden will be followed with an increase in informal economy. According to the results of Monetary Freedom, Rule of Law, Control of Corruption and GNI per Capita, they have significant negative effects on informal economy which means that an increase in one of these variables will decrease the informal economy. However, the results for tax burden are as expected, but partially in line with the past literature for significant variables because tax burden in literature is found out to have negative impact in informal economy. On the other hand, control of corruption has a negative impact on informal economy. Therefore, the negative sign for corruption shows that there is a negative relationship between the Corruption indicator and Informal economy, which means that a higher value of the indicator (which means a less corrupt environment) will decrease informal economy. Therefore, the result is in line with the literature. Other variables which are Business freedom, Labour Freedom, Government effectiveness and Regulatory Quality are statistically insignificant. From insignificant variables only Labour Freedom has negative impact on informal economy as expected.

Table 2 GMM Results

Dependent Variable: IE				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Informal Economy (-1)	-0.030	0.040	-0.743	0.458
Tax Burden	0.008**	0.003	2.450	0.015
Business Freedom	0.018	0.021	0.815	0.416
Labour Freedom	-0.029	0.019	-1.485	0.139
Monetary Freedom	-0.141***	0.021	-6.546	0.000
Government Effectiveness	0.083	0.056	1.497	0.136
Regulatory Quality	0.006	0.036	0.158	0.875
Rule of Law	-0.112***	0.034	-3.299	0.001
Control of Corruption	-0.142***	0.048	-2.994	0.003
Gross National Income per capita	-3.127***	0.544	-5.751	0.000

Income Inequality Index	0.242**	0.110	2.196	0.029
* Statistically significant at 90% level. ****** Statistically significant at 95% level. ******* Statistically significant at 99% level.				

Source: Authors' compilation

For the relevance of System GMM Arellano-Bond Serial Correlation Test was performed in order to test if the model is appropriate. Table 3 shows the test results.

Table 3 Arellano-Bond Serial Correlation Test

Test order	m-Statistic	rho	SE(rho)	Prob.
AR(1)	-4.278	-51.966	12.149	0.000
AR(2)	-0.633	-21.354	33.731	0.527

Source: Authors' compilation

For the estimators to be relevant first level autocorrelation has to be statistically significant and second level autocorrelation has to be statistically insignificant. Test results show that autocorrelation in first level cannot be rejected. However, hypothesis that there is autocorrelation in second level is rejected.

4.   Conclusion

The interest for informal economy and efforts to understand its causes and effects has grown during the last decades. Informal economy can damage the country's tax base, damaging therefore the government's budget, which has its further impact on unequal distribution of income, influencing even the necessary provision of public services.

Rule of law, legal rule, and regulatory quality must be increased and strengthened further to improve their data in the fight against informal economy.

The paper is mainly based on the studies of Johnson et al. (1998), Friedman et al. (2000), Krakowski (2005) and Sevgin (2009) and retesting findings of their finding by using more updated data, and introducing new explanatory variables. The findings of the study suggest that legal environment is the major factor that is affecting the size of the informal economy.

Regarding informal economy, based on the literature review, there are two groups of studies: studies that measure the size of informal economy and studies that analyse the causes of informal economy. Our study includes determinants of informal economy which are Tax Burden -TB, Business Freedom, Labour

Freedom, Monetary Freedom, Government Effectiveness, Regulatory Quality, Rule of Law, Control of Corruption, GNI per capita and Income Inequality Index.

The main contribution of the paper is that it provides important results about determinants of informal economy in EU countries which is important for researchers, academics, and policy makers.

Findings of the study suggest that tax burden, monetary freedom, rule of law, control of corruption and GNI per capita are the main factors which influence the size of informal economy. Moreover, the income inequality also effects positively the informal economy. Tax rates are the essential factors that also influence the informal economy. Governments were required to lower the tax rates to stimulate economic agents to be formalized and include into the formal economy, which would expand the tax basis.

Findings of this study indicate that enforcement of legal environment, taxation system with lower tax rates and fair income equality as well as increasing control of corruption would be the most effective policy. This policy requires decisive actions, but it takes time to enforce rule of law in a society. If the legal system allows contracts to be stipulated clearly and implemented, it is decisive for businesses to decide to stay formal or operate their activities in an informal economy. The placement of an effective judiciary and keeping it separate from the government, is necessary to have a quality legal environment.

The results for tax burden are as expected, but partially in line with the past literature because tax burden in literature is found out to have negative impact in informal economy. Moreover, corruption has a negative impact on informal economy which was as expected (a higher control of corruption a less corrupt environment). On other hand, variables such as Business Freedom, Labour Freedom, Government Effectiveness and Regulatory Quality are statistically insignificant. From insignificant variables only Labour Freedom has negative impact on informal economy, as expected.

In conclusion, this paper found out that the quality of the legal environment has a positive and substantial effect on the size of the informal economy. Findings of the study supports the theory that tax burden stimulates people to avoid them and stay in the informal economy.

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Annex I - Descriptive Statistics

	IE	TB	BF	LF	MF	GE	RQ	RL	C01	GNI	GINDEX
Mean	20.84	56.21	79.01	60.16	80.15	81.38	84.35	81.69	78.51	10.30	31.09
Median	21.93	58.20	78.00	59.61	80.15	81.78	84.65	83.96	80.58	10.30	31.25
Maximum	34.66	93.60	99.90	100.00	90.80	100.00	100.00	100.00	100.00	11.20	38.10
Minimum	8.69	16.00	53.70	31.00	66.60	44.08	63.94	50.72	48.82	9.31	23.70
Std. Dev.	6.14	19.50	10.31	13.98	3.83	12.85	9.54	13.89	15.18	0.37	3.47
Skewness	-0.04	0.00	-0.07	0.45	-0.28	-0.65	-0.14	-0.50	-0.21	-0.14	-0.02
Kurtosis	2.14	1.91	2.58	2.88	4.08	3.10	1.98	2.14	1.76	2.57	1.92
Observations	270	270	270	270	270	270	270	270	270	270	270

Source: Authors' compilation

Annex II - Correlation Matrix

Probability	IE	TB	BF	LF	MF	GE	RQ	RL	C01	GNI	GINDEX
IE	1.00										
TB	0.14**	1.00									
BF	-0.27***	-0.24***	1.00								
LF	-0.14**	-0.01	0.10	1.00							
MF	-0.24***	-0.22***	0.30	0.06	1.00						
GE	-0.54***	-0.32***	0.60***	0.04	0.56***	1.00					
RQ	-0.59***	-0.16**	0.63***	0.20***	0.45***	0.85***	1.00				
RL	-0.53***	-0.29***	0.62***	0.03	0.50***	0.94***	0.89***	1.00			
C01	-0.53***	-0.28**	0.66***	0.01	0.51***	0.93***	0.88***	0.95***	1.00		
GNI	-0.53***	-0.45***	0.54***	-0.02	0.48***	0.81***	0.74***	0.81***	0.81***	1.00	
GINDEX	0.39***	0.05	-0.18***	-0.19***	-0.16**	-0.32***	-0.32***	-0.33***	-0.31***	-0.25***	1.00
* Statistically significant at 90% level.											
** Statistically significant at 95% level.											
*** Statistically significant at 99% level.											

Source: Authors' compilation

Abbreviations used in Annex I and II are as follows: Informal Economy -IE, Tax Burden -TB, Business Freedom - BF, Labour Freedom-LF, Monetary Freedom -MF, Government Effectiveness - GE, Regulatory Quality- RQ, Rule of Law- RL, Control of Corruption-CC, GNI per capita and Income Inequality Index - GINDEX.