Estimation of the underground economy. Opportunity and Methods.

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Abstract. *The underground economy is an extensive, complex and omnipresent phenomenon. This is why one of the main goals of the scientists studying the area of the underground economy is to find the best methods to quantify this phenomenon. The article treats the issue of quantifying underground economy, examining the main methods of its estimation, and also looks at a number of researcher opinions related to this subject.*

Keywords: *underground economy methods of estimation, qualitative and quantitative research, non-observed economy*

Introduction

Measuring the underground economy and identifying ways of reducing it are two of the most common actions to take into consideration when it comes to the underground economy. To investigate, understand and reduce underground economy, it is necessary to quantify it. Any measures to be subsequently taken will depend on this quantification.

Researchers' opinions related to measuring the underground economy are still different, some saying that one cannot *precisely measure* the underground economy, only *approximate* it. Regardless of the term used, it is important that the research of the phenomenon is accompanied by more or less precise estimations of its size.

The main findings

Because the underground economy is hidden and comprises a great diversity of economic activities, it is almost impossible to estimate or measure it; most often, the given figures are approximated and cannot be proved. However, we still need to estimate the size of the underground economy in order to analyse the economic development of the state and for the purposes of developing the economic policy as well as for obtaining a more objective view on the state of the national or global economy.

Firstly, we would like to mention that some of the researchers, like the Romanian researcher Cristina Covaci Voicu, claim that it is impossible to "measure" underground economy by setting out the exact size of the variable. However, it is possible to "approximate" it, allowing for some uncertainty [1, p. 65] In our opinion, this approach is relevant as long as the data on the size of the underground economy varies greatly from one source to another and from one estimation method to another. Both qualitative and quantitative research methods are used when analysing underground economy. Quantitative research involves a macroeconomic approach, which is based on testing the existing theories, while qualitative research is based on the microeconomic approach, which involves knowledge investigation. In Table 1, we can note the attributes of the two research methods, identified by Cristina Covaci Voicu: However, nowadays, the worldwide trend in measuring the underground economy is using *macroeconomic modelling*. The *monetary approach* and the *method* of *implicit labour supply* are considered to be the most important macroeconomic methods in estimating the size and the growth of the underground economy. Both methods are based on the information provided by the National Accounts Statistics, as well as on the energy consumption methods, which we will refer to later in this article. Speciality literature groups the methods used for estimating underground economy under several clusters, such as *direct* and *indirect* methods, *macroeconomic* and *microeconomic* approaches, *monetarist* methods, *accounting* methods, *statistical* methods, etc. [1, p. 67]. Most researchers in this field are trying to estimate the size of the underground economy against the GDP.

Table 1. The quantitative – qualitative dichotomy in the research methodology used in the estimation of the underground economy.

***Source**: COVACI VOICU, Cristina. Economia subterană din România. Contextualitate și analiză. București:*

The features of:	
Quantitative research	**Qualitative research**
• Represents the *macroeconomic* approach • Involves deductive research strategy • It is originated in the positivistic tradition • It is based on testing theories and providing forecasts • Its role is to identify general concepts and make connections between them	• Represents the *microeconomic* approach • Involves inductive research strategy • It is originated in the interpretative tradition • It generates theories • Its role is to interpret events with time signification

The method of *difference* between revenues and expenses incurred assumes that even if a part of the revenue received by an individual can be hidden or declared as being smaller than it actually is, this hidden money appears later in time as an expense. The difference between revenues (lower) and expenses (larger) is an evidence of the size of the underground economy. Analysing the dynamics of this divergence, year by year, we can observe the general evolution of the underground economy. The first approach relates to the macroeconomic level (national revenue / GDP). The second approach relates to the micro level or to the group of individuals. This method is believed to be one of the most accurate methods of measuring the size of the underground economy. [1, p. 72] One variant of this method implies comparing different ways of estimating the income, which is: comparing the income recorded in the national accounts with revenue from the income tax statements. The difference is considered to be *undeclared income*, i.e. "underground revenues." The most comprehensive study based on this method was carried out in the USA. [2, p. 85]. The figures obtained for different countries vary from 10% of the GDP in the Anglo-Saxon and Scandinavian countries to 20% of the GDP in the South European countries. Another variant of this method is the *survey and sampling method*, which calculates the "unexplained difference" arising from the examination of the household costs and incomes. If the survey is conducted on a representative sample, the results are extrapolated to the entire national economy and we can, therefore, obtain an estimate of the underground economy. Such research studies were conducted in the US, but the surveys were not large enough to estimate the underground economy. [2, p. 86] This method would be difficult to apply in the case of the developing countries.

Measuring underground economy method based on data from tax checks relies on the data obtained from the tax authorities following the inspections aiming to detect hidden income, thus ignoring the answers given voluntarily, based on questionnaires. The results of the tax audits are extrapolated to the entire body of the taxable population, thereby allowing one to obtain data on the size of the underground economy. [2, p. 87] The method is also called *the control sample method* or *the tax compliance method*. [1, p. 72]. This method is used, with different frequency, even in OECD countries. There had been some attempts to evaluate the underground economy by this method at the end of the 1980's in Sweden and the USA. In Sweden, researchers showed that between 8% and 17% of the declared income in 1978 had been hidden.

The method of measuring underground economy based on the indicators of the labour market, also known as the *Italian method*, assumes that the official labour turnout is constant, any change in its size being due to underground activities in the field. [2, p. 88]. The *Italian method* was developed and is used by the Italian Institute of Statistics, which

is currently considered to be the most efficient in measuring the size of the underground economy. One variant of the method is based on questionnaires and interviews. This variant involves interviewing the households and companies regarding the number of hours worked by respondents in a particular sector. The advantage is that interviewees are not asked about income, but about hours worked – information that does not make sense to hide or modify. Based on available data, one extrapolates and determines the average amount of days worked by a person. [2, p. 89] It is almost impossible to use this method in the Republic of Moldova because the official labour turnout is impossible to calculate precisely at the moment, due to the uncertain size of the country's current population. The last population and housing census in Moldova, from 12 to 25 May 2014, has not been made public yet and, because of the lack of funds, nobody knows when the data collected will be processed.

The method of estimating underground economy based on indicators of the monetary sphere has three variants. Leaving from the premise that the increasing release of quantities banknotes of a high denomination with the purpose of facilitating payments is an evidence of the expansion of „black business", this method attempts to show that it is possible to estimate the size of the underground economy based on the quantitative data involved in the above-mentioned processes. The *transaction method* or the *Feige method* assumes that there is a constant relationship in time between the volume of cash transactions and the total GDP, official and illegal transactions. The transaction method described by Feige (1979) is based on the following reasoning. The starting point is Fischer's equation:

$$M*V=P*T$$

This equation states that the total stock of money (M) multiplied by the velocity of circulation (V) equals the total number of transactions paid by that money (T) multiplied by the Price of these transactions [6, p.188]. Taking note of the total money supply, which includes both currency (cash) and deposits, one can infer the size of the total GDP. Therefore, by deducting it from the official GDP we obtain the illegal GDP. This calculation assumes that the money circulates with the same velocity both in the "official" and in the underground sectors. Andrei Rotaru – a researcher who has applied this method to the case of the Republic of Moldova, has estimated that between 1995-1998, the average value of the underground GPD against the official GDP was around 60 percent. [4, p. 71-72]. Using the same method to estimate the underground economy from 2009 to 2014, we have obtained an average value of the underground GDP amounting to approximately 40% of the official GPD. In calculating the values mentioned above, we have used the following data: the minimum and the maximum monetary mass, GDP, inflation and velocity of money circulation from 2008 to 2014. The increase in the monetary mass has been calculated as follows - maximum monetary mass in the year under review was reported to the minimal monetary mass for the previous year. In Table 2 one can see the obtained results.

The data in the table shows that in the recent years, underground economy has tended to increase, with a slight diminution during the year of 2014. The statistics show that underground economy has tended to increase all around the world following the crisis of 2008, which suggests that the data we have obtained is close to reality. The World Bank report "Shadow Economies All Over the World: New Estimates for 162 Countries from 1999 to 2007", published in 2010, shows that underground economy in Moldova constituted an average of 44,5% of its annual GDP between 1999-2007 [7, p. 23]. This data is comparable to data from Table 2, which was obtained by the author. Determining the size of the underground economy based on the currency demand is one of the most frequently used methods in the OECD countries. This method is called the "liquidity demand method" and was first used by Phillip Cagan in 1958, who identified the link between the currency demand and the fiscal charges, explaining the underground economy between 1919-1955. Subsequently, the method was developed by Vito Tanzi in the 1980s, who had econometrically estimated the demand for liquidity function in the US during the period of 1930-1980 [1, p.74].

Table 2. Estimating underground economy using monetary aggregates and rising prices

Source: *elaborated by the author.*

Indicators	2008	2009	2010	2011	2012	2013	2014	Average
Max. Monetary mass (mill MDL)*		13.705.2	14.085.8	17.154.0	20.531.1	26.077.7	27.722.2	
Min. Monetary mass (mill MDL)*	11.165.8	11.783.8	12.335.6	13.521.2	15.952.2	19.713.1	24.766.2	
Monetary mass growth (%)*		22.7	19.5	39.1	51.8	63.5	40.6	
Prices growth (%)**		0.4	8.1	7.8	4.1	5.2	4.7	
Official GDP (mill MDL)**		60.429.8	71.885.5	82.348.7	88.227.8	100.510.5	112.049.6	85.908.6
GDP growth (%)**		-6.0	7.1	6.8	-0.7	9.4	4.8	
Increase the uncoated (%)		28.3	4.3	24.5	48.4	48.9	31.1	
Monetary mass used in the underground economy (mill MDL)		3.884.4	610.7	4.195.9	9.938.0	12.745.1	8.629.3	
Velocity of circulation *		5.1	5.8	6.1	5.5	5.1	4.5	
GDP underground (mill MDL)		19.920.0	3.558.9	25.554.6	54.964.5	64.983.2	39.041.6	34.670.5
Share of underground GDP in official GDP (%)		**33.0%**	**5.0%**	**31.0%**	**62.3%**	**64.7%**	**34.8%**	38.5%

* *National Bank of Moldova*

** *National Bureau of Statistics of the Republic of Moldova*

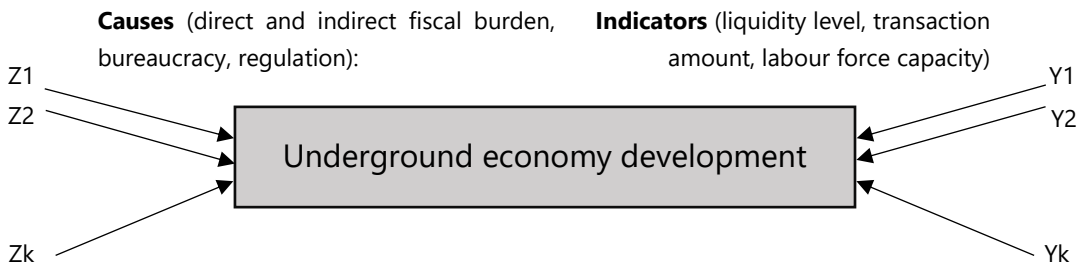
According to this method, any increase in the value of the underground economy will lead to an increase in the currency demand. Excessive currency demand is determined by an econometric equation. The advantage of the monetary method resides in the fact that much of the savings and payments in the underground economy are made in *cash*. Cash transactions have the "advantage" of being difficult to control and record – an "advantage" not characteristic to the bank transactions. [2, p. 90-93]

The "Complex" modelling method, also called the **Frey-Weck Hanemann method** or the **Multiple Indicators Multiple Causes (MIMIC) method**, is one of the most complex approaches available because it takes into account the multiple causes and effects of the underground economy (Figure 1).

This method has been used by the researchers Friedrich Schneider, Andreas Buehn and Claudio E. Montenegro in the previously mentioned World Bank report [7, p. 5] The method is difficult to apply to the case of the developing countries and countries with transitioning economies because it requires a large amount of data, this being the main drawback of this method.

Figure 1. General Structure of a MIMIC model

Source: *SCHNEIDER, Friedrich, BUEHN, Andreas, MONTENEGRO, Claudio E. Shadow [7, p.12]*



The physical inputs method or the **electricity consumption method**, known as the **Kaufman method** is among the latest methods identified by the researchers and is used in many European countries. It claims that part of a family's electricity consumption (in households) is used in the underground economy (unofficially) in every country. The amount of electricity consumed by households differs from country to country and is determined not only by the obvious causes, such as the size of the population, the living standards, the geographical location of the country, which determines the specifics of the climate, the relative price of electricity or the availability of access to alternative of energy, but also by the expansions of the *underground economy*. On the other hand, a significant number of unregistered economic agents activate within private households or benefit from such economic activity. [3, p. 17] The Moldovan researcher Andrei Rotaru has also estimated the underground economy in Moldova using the electricity consumption method. He estimated that the size of the financial resources engaged in underground economy compared to the size of the GDP used to represent up to 65.7%. [4, p. 72] between 1995-1998. Using the same method of calculation, we have estimated that the average percentage of underground industrial production against the official one used to represent 56.3% between the years of 2010 – 2014, which allows us to conclude that the share of the underground economy in the GDP is situated in the same range. The data can be found in Table 3.

We would like to note that results we have obtained for the size of Moldova's underground economy using both the *monetary* and the *electricity consumption* methods are comparable. Also, according to the Moldovan researchers Galina Ulian and Iulia Caprian [5, p. 26] the method of recording the consumption of water, gas, electricity, the volume of residual substances and the pollution of all kinds related to a certain economic entity is the most suitable method for estimating the size of the underground economy in the Republic of Moldova.

The analytical method is based on identifying, one by one, the components of the underground economy and classifying them according to their causes. Such an approach allowed writers Heertje and Barthelemy in 1984, Barthe in 1988, Prestieau in 1989, Debar in 1992 and many others, to analyse the amplitude of various activities part of the phenomenon of the underground economy, to discuss their causes and implications, as well as their global assessments. [1, p. 75]

Table 3. The estimation of the underground economy using the electricity consumption method.

Source: *elaborated by the author.*

Indicators	**2010**	**2011**	**2012**	**2013**	**2014**	**Average**
1	2	3	4	5	6	7
The produced electricity (mill. MDL)*	2.572.7	2.906.8	3.142.8	3.041.9	3.130.9	
Electricity consumed by population (final consumption) (mill. MDL)*	1.184.6	1.330.4	1.427.4	1.344.1	1.423.8	
The rest of the electrical energy (mill. MDL)*	1.388.1	1.576.4	1.715.4	1.697.8	1.707.1	
The share of expenditures for electricity in total expenses (%)	0.03	0.03	0.03	0.03	0.03	
Total production volume (mill. MDL)	44.911.1	52.110.9	56.253.8	63.164.8	67.258.2	**56739.8**
Official production volume (mill. MDL)*	28.140.1	34.194.4	36.362.2	39.403.3	43.548.0	
Underground production volume (mill. lei)	16.771.0	17.916.5	19.891.6	23.761.5	23.710.2	**20410.2**
The share of the underground industrial production inside the official one (%)	**59.6%**	**52.4%**	**54.7%**	**60.3%**	**54.4%**	**56.3%**

** National Bureau of Statistics of the Republic of Moldova*

The expert method used by the Russian researcher L. Timofeev represents the idea of an expert from a particular field producing an estimation of the underground economy in that field based on analysing a large set of data related to that specific area. The main drawbacks of this method are the difficulty of finding such an expert as well as accounting for his subjectivity and the fact that the obtained estimations can be verified only after a certain time. To account for this, we often rely on estimates made by several specialists, verifying their findings through other parallel methods of estimation. [8 p.46-47]

As we can note from the above-mentioned, it seems that there is no single method to be used for obtaining a precise estimation of the size of the underground economy. Each method has its own positive and negative aspects. Perhaps, one should use several methods to obtain a more accurate estimation.

There are several national and international organisations that attempt to measure the size of underground economy in the Republic of Moldova. Some attempts of fragmented research are made in relation to this phenomenon. For example, Lilia Caraşciuc, doctor in economics at the Centre for Strategic Studies and Reforms, in her research work "Corruption in Moldova: the macroeconomic impact", approaches the most pressing issues related to the phenomena of corruption, bribery as well as other phenomena that have a negative impact on Moldova's economy and society. In the Republic of Moldova, the size of the underground economy is currently not being estimated; there is no methodology for data collection or estimation. However, the National Bureau of Statistics of the Republic of Moldova does estimate the size of the so-called "non-observed economy". These estimations are carried out according to the methodology developed by the NBS, which has been described in "Measuring the Elements of Non-Observed Economy in the Republic of Moldova" (2003). The essence of this methodology is not related to the size of the illegal economy or the so-called "black" economy. In fact, the components of the "non-observed economy" are already known and the estimation methodology is highly approximate [3, p. 18-19].

The data on the evolution of the non-observed economy from 2000 to 2013, according to the National Bureau of Statistics of the Republic of Moldova is presented in Figure 2. This data shows that the non-observed economy exhibited a tendency to decrease until 2007 and started to increase again since 2008. We must note that according to statistical data, starting with the global crisis in 2008, the tendency of the underground economy to increase became a characteristic of most countries. According to the calculations of the NBS, the *non-observed economy* is part of the national GDP (Figure 2). By this we mean that the size of the non-observed economy *cannot be compared* to the GDP, representing only a share of it. Estimations are made only with the purpose of learning the size of its share within the GDP. By contrast, *illegal economy* is neither included in the GDP nor is its added value included in the Gross Added Value indicator. Thus, illegal economy generates added value that remains unknown to the Moldovan authorities [3, p. 19]. According to the World Bank Report, Moldova was among the countries with the largest share of the underground economy against the GDP, alongside Georgia and Ukraine (Figure 3). Thus, for the period of 1999-2007, the Republic of Moldova had a yearly average of 44.5% of GDP, Ukraine - 49.7% and Georgia - 65.8% [7, p. 23].

Figure 2. The share of non-observed economy in the GDP of the Republic of Moldova.

Source: *The National Bureau of Statistics of the Republic of Moldova,* http://www.statistica.md/

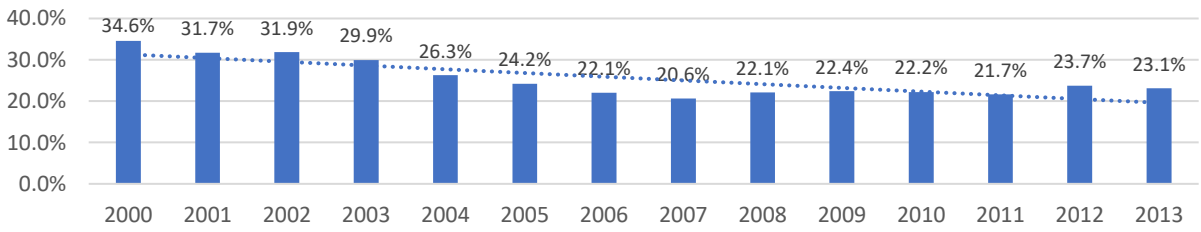
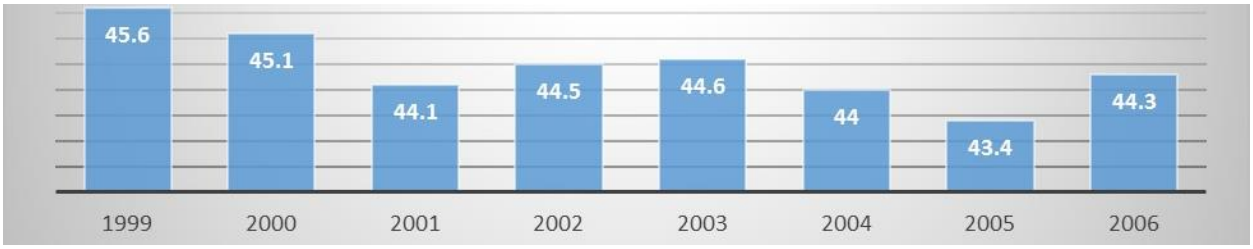


Figure 3. The share of underground economy against the GDP (%) in the Republic of Moldova.

Source: *The World Bank Report [7, p.23]*



Conclusions

We conclude that the complexity and the various hidden aspects of the phenomenon of the underground economy make it very difficult to estimate its size. At the same time, knowing even the approximate amplitude of this phenomenon is an essential condition for a further research. We have attempted to show that there is no single method that would allow one to obtain a precise estimation of the phenomenon of the underground economy. Each method has its own positive and negative aspects. In order to obtain a better result, it seems that the optimal solution is to use several methods and compare the results.

According to a ranking elaborated by Enste and Schneider, the highest degree of relevance is attributed to the following methods: a) Feige's transactions method; b) Gutman's econometric modelling method based on the ratio of currency in circulation and deposits demand and c) the labour turnout census or the "Italian method".

The National Bureau of Statistics of the Republic of Moldova estimates the *non-observed economy*, which is included in the GDP, so the *non-observed economy* cannot be compared to the GDP, but only presented as a share of the latter. By contrast, *illegal economy* is not estimated even though it operates *alongside* the formal economy. Thus, *illegal economy* generates added value that is largely unknown to the Moldovan authorities. Accordingly, different sources present different estimations of the size of Moldova's underground economy. Some of them show a share of the underground economy of up to 40% -50% against the GDP, so we can certainly conclude that, indeed, in the Republic of Moldova, there is an *illegal economy* that operates alongside the *official* one.

References

[1] COVACI VOICU, Cristina. *Îndreptar de economie subterană. Abordare multidimensională a eșecului raționalității economice.* București: Editura ASE, 2015. p.139. ISBN 978-606-505-882-8

[2] CRAIU, Nicolae. *Economia subterană între „da" și „nu"*. București: Editura Economică, 2004. p.262. ISBN 973-590-921-9

[3] COSTANDACHI, Gheorghe. *Moldova pradă a economiei subterane și evaziunilor fiscale*. Chișinău, Institutul pentru Dezvoltare și Inițiative Sociale (IDIS) „Viitorul", 2012. [Accessed 23.04.2015] Available on Internet: http://viitorul.org/doc.php?l=ro&idc=294&id=3985&t=/STUDII-IDIS/Economie/Moldovaprada-a-economiei-subterane-si-a-evaziunilor-fiscale

[4] ROTARU, Andrei. *Cererea și oferta de bani în țările în tranziție cu economie tenebră dezvoltată*/Thesis in economics, Chișinău, 2000

[5] ULIAN, Galina, CAPRIAN, Iulia. Problema cuantificării economiei tenebre: Metoda resurselor contorizabile. În: *Economie și Sociologie*. 2013, nr.4. p. 25-30. ISSN 0236-3070

[6] OECD, *Measuring the Non-Observed Economy. A handbook.* Paris, 2002. ISBN 92-64-19745-1 [Accessed 08.09.2016] Available on Internet: https://www.oecd.org/std/na/1963116.pdf

[7] SCHNEIDER, Friedrich, BUEHN, Andreas, MONTENEGRO, Claudio E. *Shadow Economies All Over the World: New Estimates for 162 Countries from 1999 to 2007*, The World Bank, July, 2010, [Accessed 08.04.2015] Available on Internet: https://openknowledge.worldbank.org/bitstream/handle/10986/3928/WPS5356.pdf?sequence=1

[8] ТИМОФЕЕВ, Л. *Теневые экономические системы современной России: теория-анализ-модели*. Москва: Российский государственный гуманитарный университет, 2008. p.322. ISBN 978-5-7281-1005-7