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# **Empirical Models for Analysis of the Black Economy**

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## **Abstract**

Despite the high number of paper analyzing the Black Economy, this is a difficult field to study. This paper analyzes several models used to evaluate the size of the black economy.

Unlike the direct model approaches, as the currency demand approach, that are used to evaluate the black economy, empirical models offer an opportunity to analyze the black economy and corruption, as well as their interconnection. Empirical models study a wide range of causes and results of these two phenomena observed in the macroeconomic level. These models build structural equation model for corruption and shadow economy<sup>1</sup>. The equation is based on the hypothesis that reducing corruption enhances the quality of the economy which is reflected immediately in the shadow economy and makes us understand that economic policies would be ineffective if the relationship between corruption and the shadow economy is they are not addressed.

The structural equation model (SEM) gives us the necessary empirical equation to follow the connection between the two phenomena by presenting them as two latent variables and examines their interrelationship with co - variation structures. The structural equation model consists of two parts: a Structural equation model and Measurement model.

MIMIC model is a variation of SEM and is used to evaluate the size of the Black Economy.

Keywords: Black economy, SEM, MIMC-model.

# 1. Introduction

The black economy is a broad concept. It has different names in the economic literature; underground, shadow, hidden, informal, unofficial, unreported, or unrecorded economy. The “underground economy” — defined as economic activities which are not registered, reported, taxed or regulated but which produce for legal markets — has been mainly explained, on the basis of standard economic arguments, as engendered by excessive taxation and regulations.

As (Tanzi, 1998) remarks, exist at least two definitions and thus two measures of the black economy. The first, is connected to the production (or income) missed in the official statistics; the other, refers to “...*revenue not reported to, and not discovered by, the tax authorities*”. Consequently, “...*the first measure implies that the country is richer than the official statistics show*”<sup>ii</sup>, the second (namely, tax evasion) indicates that the tax administration draws less revenue than it should.

Increasing attention has been paid by many developed and developing countries in recent years to the black economy and its consequences. A recent study by (Schneider, Buehn, & Montenegro, 2010), for 162 developed and developing countries overall the world for the period between 1999 and 2006/2007, found that the black economy has reached remarkable proportions, with an average value of 34.5% of official GDP of those countries. Almost all studies of the shadow economy phenomena came to the conclusion that the main cause of the black economy (informal economy) is a high tax and social security burden.

The existence of the black economy creates a distortion in the market competition as a result of the unequal production situations between the producers in the formal economy compared to the producers in the black economy. This leads to significant distortions in official economic and social indicators. Most economists agree that there is a strong bidirectional causal relationship between the tax system and the size of shadow economy. The shadow economy reduces government revenues due to tax evasion, which, in turn, reduces the quality and quantity of public goods and services provided by governments. In order to cover its overall need for tax revenue, the government may raise tax rates. The result is often an increase in the size of the shadow economy and more tax evasion.

Measuring the size of the shadow economy in the countries and territories of Southeastern Europe (SEE) with the help of traditional methods can be a difficult task, especially because there is still a lack of uniform and full data coverage. In this article we apply a basic method using fiscal data that are available for all Balkan countries and territories. In the second part of this article, data from national accounts is used to provide further estimates. The study is done for Albania.

Since 1997 Albania has made considerable efforts to introduce a modern tax regime, structured on standard EU modeled VAT systems for indirect taxation and corporate and personal income tax for direct taxation. It is implementing a number of programs to upgrade the customs and tax administrations. Over the last five years the country has built a stable and open macro-economic framework, completed economic liberalization and enjoyed a sustained economic expansion, albeit from low levels, supported by a growing private enterprise sector.

However, in spite of these positive elements, the share of the black economy in GDP does not appear to have receded. Indeed, the indications are that the black sector has been the most dynamic component of the Albanian economy in recent years. For example, Albania has one of the highest VAT, corporate income tax and social contribution rates among the countries of South East Europe, but at the same time it has close to the lowest ratio of tax and social contribution revenues to GDP.

## 2. Models estimating the Black Economy

There are different models for estimation of the Shadow Economy. Direct model approaches are used to measure the shadow economy. Empirical models offer an opportunity to analyze the shadow economy and corruption, as well as their interconnection.

### 2.1 The indirect models

The indirect or indicator approaches to the estimation of the development of the hidden economy are in general macroeconomic approaches. These include, *inter alia*: the national accounts discrepancy method, using the gap

between the income measure of GDP and the expenditure measure of GDP for the estimation of the shadow economy; the official and actual labour force discrepancy method, where a change in the official participation rate can be a crude estimate for a change in the black sector activities; the transactions approach by (Feige, 1989), where, starting from the quantity equation, assumptions on the velocity of money and the relationship between total transactions and the total nominal GDP (= official + unofficial economy) are made; the currency demand approach by (Tanzi, 1980) and (Tanzi, 1983) assuming that the unofficial economy's transactions are made in cash, an increase of the shadow economy would therefore result in an increase of currency demand; and the physical input method, e.g. by (Kaufmann & Kraay, 2002) using data on electricity consumption for estimating the size of the shadow economy. Several of the indirect approaches need either the assumption of a base year without a shadow economy or an external estimate of the unofficial economy of a base country (e.g. Feige's transaction approach, Tanzi's currency demand approach). The use of base years or base countries is at the same time one of the weaknesses of these approaches and provides, among other things, points of critique.

## 2.2 Empirical Models

Empirical models study the causes and the results, and observe them in the macroeconomic level. With the help of this models we are able to build structural equation model for corruption and shadow economy (Buehn & Schneider, 2012). The equation is based on the hypothesis that reducing corruption enhances the quality of the economy which is reflected immediately in the shadow economy and makes us understand that economic policies would be ineffective if the relationship between corruption and the shadow economy is they are not addressed<sup>iii</sup>. The structural equation model (SEM) gives us the necessary empirical equation to follow the connection between the two phenomena by presenting them as two latent variables and examines their interrelationship with co-variation structures. The structural equation model consists of two parts: (1) Structural equation model and (2) Measurement model.

The model is as follows:

$$\eta = B\eta + \Gamma x + \zeta,$$

where each  $x_i$ ,  $i = 1, K, q$  in vector  $x' = (x_1, x_2, K, x_q)$  is a potential cause of one of the two latent variables contained in vector  $\eta$ . The individual coefficients  $\gamma' = (\gamma_1, \gamma_2, K, \gamma_q)$  in matrix  $\Gamma$  describe the relationship between the latent variables and their causes. Each latent variable is determined by a set of exogenous causes. Vector  $\zeta$  represents the unexplained components, the covariance matrix for which is abbreviated by  $\Psi$ .  $\Phi$  is the covariance matrix of the causes. Matrix  $B$  shows the influence of the two latent variables on each other, i.e. the influence of the shadow economy on corruption and vice versa.

The measurement model links the two latent variables to its multiple observable indicators with the assumption that the latent variable determines its indicators. The model is as follows:

$$y = \Lambda \eta + \varepsilon$$

Where  $y' = (y_1, y_2, K, y_p)$  is the vector of indicators for corruption and shadow economy,  $\Lambda$  is a matrix of regression coefficients,  $\varepsilon$  is a vector of white noise disturbances.

The testing of the hypotheses about the theoretical relationships between the latent variables and their causes and indicators facilitates their practical analysis.

## 2.3 The Definitional and Behavioral Approach

-The Definitional approach, which considers it as simply unrecorded economic activities. (Thomas, 1999) agrees with this approach, and includes in the black economy "...those activities which...are not recorded in the national income accounts; for (Schneider & Enste, 2000) it holds "all economic activities which contribute to the officially calculated (or observed) gross national product"; for (Smith, 1994) this sector is a "...market-based production of goods and services, whether legal or illegal, which escapes detection in the official estimates of GDP".

-The Behavioural approach emphasizes the relevance of institutional rules and of the social environment. It interprets the shadow economy as a change in behaviors by economic agents in reaction to institutional constraints. We could include the definitions of (Feige, 1989) "...economic activities include conscious efforts to avoid official detection", and (Feige, 1990) "The characteristics of each distinct black economy are determined by the particular set of institutional rules that its members circumvent", or (Loayaza, 1997) "Informal economy is unregulated by the institutions of society, in a legal and social environment in which similar activities are regulated".

## 2.4 MIMIC Approach Model

The statistical model MIMIC<sup>1</sup> (multiple indicators, multiple causes) is a form of the Structural Equation Model used in estimating the size of the shadow economy. MIMIC stands for “Multiple Indicators Multiple Causes” and it is a special case of the general LISREL (Linear Independent Structural Relationship) model.

The method has been used for the first time in the literature of factor analysis of psychometrics, while in the economy for the first time was used by (Goldberger, 1972) and (Zellner, 1970).

(Frey & Weck-Hanneman, 1984) are considered the pioneers on the application of the MIMIC model. They based their work on the studies of (Zellner, 1970) and (Goldberger, 1972). They used the MIMIC model to evaluate the relative size of the shadow economy and to check the timing in 17 OECD countries.

The idea was developed by (Giles, 1999a). In the study the MIMIC model was developed by taking in consideration the unit root test and the co-integral analyses in the generation of a historic index of time series of the shadow economy and the fiscal gap in New Zealand, for the period 1968-1994.

The evaluation with MIMIC method it's attractive in this context. The idea is to represent the shadow economy as a latent variable or index that has caused noticeable effects, but that cannot be measured directly.

The MIMIC model is a particular form of the linear structural regression model which consists of observable and unobservable variables and specific causal relationships among the unobservable variables. Simulation is applied to the MIMIC model to trace out the average change of indicators over a period of  $n$  consecutive years and the results are transposed for a future period of  $n$  years so that to calculate various scenarios for the development of the behavioral pattern. Thus the analysis of an emerging or an existing trend becomes specific and reference values are characterized by high precision levels.

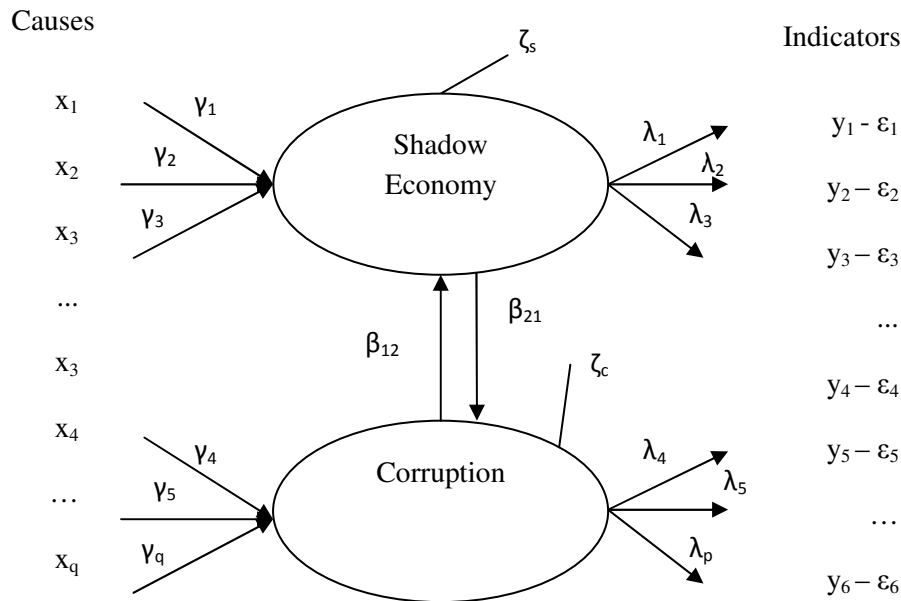
The main component parts of the MIMIC model are as follows:

1. Cash – a major assumption in most studies of the shadow economy is that a considerable portion of black transactions are carried out in cash so that to prevent detection, i.e. the money supply is a potential accurate indicator of the shadow economy. The money in circulation is a variable which is typically calculated through the levels and dynamic patterns of the money aggregates MO, M1, M2 and M39. All money aggregates tended to grow in Bulgaria from 1998 to 2007. Within the framework of the currency board arrangements, the central bank does not have powers to control the money supply and the growth of money aggregates and therefore any increase can be correlated only to the real money demand in the country.
2. Real GDP – a reference variable is needed in estimating the shadow economy so that to set a measurement scale. The real GDP reports the actual volume of economic performance since it represents the nominal GDP adjusted for inflation.
3. Real private consumption – is considered one of the indicators of the shadow economy. Working in the shadow economy generates income for people. Following typical economic theory of the positive relationship between income and consumption, an increase in the size of shadow economy will be reflected in a proportional increase in real consumption.

The graphic representation of the MIMIC model is:

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<sup>1</sup> *The first to apply the model to the estimation of the shadow economy were Frey u Weck-Hannemann (1984)*



### 3. Causes and Consequences of the shadow economy

The causes:

- High intensity of legal and administrative regulations: the greater the intensity of regulations such as business registration, license and permit requirements, labour market restrictions, trade barriers, *etc.*, the greater the incentive for flight into the black economy. Research also suggests that law enforcement, not just the intensity of regulations, may be a key issue
- High overall tax and social security burdens: basically, the higher the difference between the total cost of labour in the official economy and after tax earnings from work, the greater the incentive for flight operation in the black economy.
- Lack of trust in official institutions / administrative corruption: examples of such corruption include the court system, unclear legislation and bureaucracy.
- Lack of access to formal property systems: this refers to the lack of clear property rights and title deeds and the inability to collateralise property assets. This obstructs firms' access to official financial institutions such as credit lines, insurance, *etc.*
- Long -term decline in civic virtue and loyalty towards public institutions, combined with a decline in tax morale.
- Broad acceptance of illicit work often sanctioned or tolerated by the state In a comprehensive literature review, (Schneider, 2002) argues that since taxes affect labour-leisure choices and stimulate labour supply in the black economy, the distorting effect of this choice is a major concern, leading to the conclusion that the bigger the difference between the total costs of labour in the official economy and the after-tax earnings from work, the greater the incentive to avoid the difference and work in the black economy. This difference depends largely on the social security system and the tax burden, which is the main focus of this report since it has the merit of allowing it to be measured and including activities which could be harnessed by the formal sector.

The consequences of the black economy are real GDP, private consumption, tax evasion.

Tax evasion is a secret and illegal activity. It is therefore very difficult to precisely estimate its size in the economy. Although estimating tax evasion needs separate research, many economists, for example (Tanzi, 1983), (Giles, 1999b), and (Faal, 2003), conduct some estimates for the size of tax evasion in various countries based on their estimates of the size of the shadow economy in those countries. They do this by assuming that shadow economic activities would have been taxed at the same rates as the official economic activities.

#### 4. Main features of the black economy in Albania: a review of previous research

Private sector development has been fairly vigorous in the recent past in Albania. GDP growth has been fairly steady at 6% per annum ("IMF (2003): 'Albania: Selected Issues and Statistical Appendix,' IMF Country Report No. 03/64.," n.d.), fuelled by expansion in sectors such as construction, transportation and services. As a result, the share of private sector activity is among the highest in the SEE region, at 75% of GDP

Despite this performance, recent studies have pointed out that the business environment remains extremely difficult in Albania (OECD-EBRD, 2003; FIAS, 2003; OECD-EBRD-EC/ DG Enterprise and Industry, 2004, *etc.*), especially in the case of small enterprises. The difficulties include significant bureaucratic and administrative barriers (such as entry barriers such as registration procedures and costs, licensing and permits problems, *etc.*), a high tax burden and a cumbersome tax administration, *etc.*

The above represent obstacles to doing business which discourage formality, but in addition, the issue of bribery and corruption is particularly noteworthy in Albania. (Rose-Ackerman, 1997) studied the proportion of firms that frequently bribe public officials to obtain licenses or permits and/or to avoid safety and other inspections) is only exceeded in a few countries in the South East European (SEE) region, such as FYR Macedonia, Bosnia and Herzegovina, and Serbia and Montenegro. The "time tax" (*i.e.* the proportion of senior managements' working time spent dealing with public officials) is also more severe than in any other SEE transition country, thus providing a strong incentive for firms to avoid any form of bureaucracy and taxation possible.

Turning to the nature of the black economy, (Ruli, 2003) points out that private economic activity was banned by law until 1990, which means that the black economy has grown very rapidly to current levels. (Gërzhani, 2003) argues that the economic crisis during the period 1990 – 1992 was crucial in that the "problems of high unemployment, poverty and social insecurity created by economic disaster were extremely severe." This has undoubtedly acted as a strong impulse for people to respond creatively to their difficulties by participating in the black economy.

Ruli argues that although informality runs deep, its nature varies according to certain main forms (2003):

- The activity of rural farmers, which accounts for 50% of GDP but does not contribute to tax and social security since this is legally exempted by Government.
- The micro businesses owned by individuals or families, which are mainly temporary and generally unregistered. Registered SMEs, operating at various levels of formality.
- Illegal and criminal activities, sometimes disguised as legal businesses. Of all these, Ruli argues: "The most worrying occurrence of informality in the fiscal area lies in the zone of small, medium or large businesses which are duly registered, but hide their turnover, profits, number of employees and real wages. It is precisely these kinds of businesses, which account for the largest part of the country's economic activities." (2003, p.245), with the trade (especially retail), transportation (goods and passengers), services (such as bars and restaurants), construction and production activities highlighted as being particularly important in terms of black economy.

A survey undertaken in Albania by ACER (1999) illustrates the nature of fiscal evasion, from a company perspective:

- 75% of firms stated that fiscal evasion occurs "very frequently".
- 73% stated that they hide their real profits (20% on average before taxes).
- 94% of the evasion is caused by the existing tax system and policies.

The structural nature of enterprises in Albania also plays a role in relation to the black economy. (Muço, Sanfey, Luçi, & Hashorva, 2004), analyzing data from the Administrative Register (activities registered with the fiscal and legal authorities) and the Statistical Data (business surveys), note that the typical Albanian enterprise may be characterized as being very small, reflecting the predominance of agricultural activities in the economy and the decline in importance of large, state owned enterprises. 94.7% of firms employ 33% of employees in firms of 1-4 employees. In other words, one-third of employees work in family businesses. They also note that the bigger the firm, the fewer the number of registered employees and that, between 1998 and 2002, total employment shrunk at the same time as the number of firms was expanding.

These trends are rapidly changing the socio-economic profile of the country. In the short term, emigration continues to have positive effects, such as the continuing high levels of remittances from those living and working abroad, which play a significant role in macro-economic stability as well as investment (including in enterprises), injection of know-how, support to the standards of living and alleviation of poverty. At the same time, remittances fuel the black economy since they are typically channeled outside of the commercial banking system, which complicates detection of size and impact.

## 5. Measuring the Black economy in Albania by MIMIC approach.

The MIMIC approach we use the black economy as a latent variable which is caused by multiple variables and simultaneously has multiple indicators. Using the MIMIC model, as a particular form of a structural equation model (SEM) we can estimate an overtime index the black economy of a particular country. Then, the black economy index is transferred, by using a benchmarking procedure and an external value of the black economy for that country for some point in the time series, to a time series of black economy in that country as percents of official GDP.

In this study, we calculate the size of the black economy in Albania for the period 1993-2013 using the MIMIC approach. The MIMIC estimation process requires conducting more than one specification of the model to reach the best fitting one. Each specification includes a different number of variables. We selected the total number of causes and variables to start with in the first specification depends on the total sample size and the number of parameters in the model; the number of parameters to be estimated should be less than the total sample size.

To estimate the black economy in Albania, we start with a (6-1-3) (six causes, one latent variable, and three indicators). The variables which are not significant are gradually omitted until the best fitting model is reached. The black economy is considered the latent variable in this model. The six causal variables are: (1) the effective VAT (Value added tax that is applied on sales of goods and services) (2) the effective income tax rate; (3) the effective tax rate on import; (4) inflation rate; (5) unemployment rate; (6) government intervention in the economy.

The indication variables are: (1) Growth rate of real GDP; (2) growth rate of real currency in circulation; (3) Growth rate of real private consumption.

The structural equation to be estimated, presents the relationship between the latent variable (black economy) and its causes, includes six causes of the black economy and is given by:

$$SE_t = y_1x_{1t} + y_2x_{2t} + y_3x_{3t} + y_4x_{4t} + y_5x_{5t} + y_6x_{6t} + \zeta$$

Where  $SE$  is the scale of the black economy and  $x_i$  is different combinations of the causes of the black economy presented above.

Many specifications were estimated to get the best fitting model by the maximum likelihood estimator (MLE) via the program LISREL 8.80, which is specialized in estimating the structural equations models. In each specification we gradually omitted the statistically insignificant variables. It is worth noting that when the three types of taxes (income tax, sales tax, and custom duties) are used as separate causes in the model, the model either does not converge or the variables are not significant. Therefore, we follow (Brambila-Macias J., 2010) in considering all taxes as one variable as the effective tax rate (total tax revenues/GDP). After conducting many specifications, we came to the result of four cause's one latent variable and two indicators that gave us the best fitting model.

The MIMIC approach estimates show that the average black economy in Albania for the period 1993-2013 was 31.3 percent of GDP.

## 6. Conclusion

The black economy affects the state budget adversely and it is in a position to distort some major indicators like growth and unemployment rates or the real GDP. This entails important policy decisions in the public sector, which produce an immediate impact on the social environment and then backfire to the source. Globally, countries can recover their lost revenues from the black economy by concentrating payments into integrated electronic systems which provide opportunities for millions of transactions effected at millions of points all over the world at any point of time. The analysis of the prerequisites and indicators of the black economy and of its main tool, i.e. cash in circulation, gives grounds to many experts to believe that a major way to fight it is the broader use of electronic payments and the development of electronic technologies.

This paper illustrated the significance black economy in the Albanian economy; its absolute value has increased overtime and it represents a significant percent of official GDP based on the results MIMIC approach method. In 2013, the estimated black economy in Albania, according this approaches was 31.3 percent of the official GDP.



An informal sector above 30% of GDP implies major negative consequences for the level of tax revenues, public services, unfair competition (for businesses complying with the tax requirements) and generally for the development of a transparent and functioning market economy, which is essential if Albania is to achieve accession to the European Union and sustainable economic development more generally.

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<sup>i</sup> Andreas Buehn and Friedrich Georg Schneider, Institute for the Study of Labor (IZA), <http://ftp.iza.org/dp4182.pdf>

<sup>ii</sup> Tanzi V., (1999), pp. 344

<sup>iii</sup> Many international organizations such as the World Bank require from developing countries to have active anti-corruption practices, building on this hypothesis