# Classified Characteristics And Econometrical Analysis Of Factors Affecting The Shadow Economy

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Abstract.
One of the current problems in the world is the high level of the underground economy. The process that remains problematic is to determine the level of the hidden economy. By determining the determinants of the hidden economy and formulating a specific policy related to them, it is possible to reduce the level of its growth, but it is impossible to completely exclude it from the economy. In this case will be data from 1991-2015used. In the article, a statistical analysis of the factors affecting the level of the hidden economy of Asian countries was carried out. It includes 12 key determinants such as GDP per capita, tax revenue, unemployment rate, trade openness, GDP per capita growth, Doing Business rating, percentage of people using the Internet, inflation rate, political stability, government efficiency, rule of law, and corruption management.

Key words: tax, hidden economy, regression analysis, fixed effect, economic efficiency, GDP per capita, unemployment, economic growth, government regulation, government expenditures.

**INTRODUCTION.** It is considered difficult to measure the level of the hidden economy, and the entities operating in the hidden economy try to remain undetected. In addition, total economic activity, including formal and informal production of goods and services, is important in developing economic policies that respond to economic development. In addition, the size of the shadow economy is a key factor in assessing the level of tax

evasion and therefore deciding whether to adequately control it.

This study analyzes through regression using Fixed effect model. The results of the data analysis allow the assessment of the main determinants of the underground economy and can then be used as a comparison between countries to obtain an assessment of the performance of each country.

Various approaches and models present inquiries into the scope of the shadow economy. Medina and Schneider - in one of the latest studies on the shadow economy, they used a "multivariate" regression method to determine the average size of the shadow economy in 158 countries from 1991 to 2015[4]. According to their results, the level of the hidden economy is 31.9 percent of GDP. Access to funds, political stability, public service delivery, tax burden, labor market regulations and organizational performance are key factors. It is unclear whether this downward trend in the underground economy is sustainable in the long run. Assuming that every country in the world continues to develop and strengthen its capacity to effectively reduce and regulate its institutional weaknesses, is it possible to predict that the shadow economy will shrink and disappear altogether? Thus, the study uses the percentage growth of GDP per capita as a measure of its importance in the shadow economy. Ruger conducted research on informal economic determinants in 35 countries. His research showed that 93% of the variation in the shadow economy depends on factors such as state-level development, state administrative performance, taxes and social security payments, tax complexity, and labor market regulation [1]. According to Schneider, F., taxes paid, employment rate, unemployment rate and self-employment determine the level of the hidden economy. The number of unemployed and self-employed has a positive effect on the underground economy. It is more convenient for them to increase their income than people working in corporations or employees of the budget sector [2].

**Material and methods.** Information about the hidden economy in Asian countries is taken from the research conducted by Schneider and Friedrich [3]. Their research estimated the extent of the shadow economy for 158 countries from 1991 to 2018 using panel data. This data is used as the primary variable in this analysis.The Global Governance Index reflects a combination of answers to questions about the quality of public governance and is based on several hundred variables from 25 different sources. Each of the elevenindices is scored based on secondary data sources as well as targeted research conducted by risk assessment companies, European universities, higher education institutions, public opinion research agencies, and others. In this article will be used elevenindices.

1.    Political stability and absence of violence (Political stability and absence of violence) - includes a group of indicators measuring the probability of government destabilization and forced resignation as a result. This index reflects the degree to which the quality of public administration requires drastic changes, policy changes, and affects citizens' ability to conduct peaceful elections of governing structures[5].

2.    Government efficiency reflects the quality of public services, the level of bureaucracy, the powers of public authorities, the degree of independence of the public service from political pressure, and the credibility of government policies.

3.    The rule of law measures citizens' level of trust in a society's laws and their commitment to enforcing those laws. This criterion includes measures of citizens' attitudes towards crime, the effectiveness and predictability of the legal system, and commitment to the treaty system.

4.    Corruption control reflects the perception of these processes in society, corruption is understood as the use of state power for private gain. The index takes into account various aspects of this process, from phenomena such as "additional payment for work to be done" to the impact of corruption on business development, as well as the presence of "grand corruption" at a high political level.[6]

5.    Tax revenue (percentage of GDP). Tax revenue is defined as revenue from profit taxes, social security contributions, goods and services taxes, payroll taxes, property taxes, and other taxes[7]. Total tax revenue as a percentage of GDP shows the share of government output through taxes. This article uses data from the World Bank for Asian countries from 1991 to 2015. It assumes that a high tax burden encourages companies to move into the informal economy.

6.    GDP per capita shows the total gross domestic product of a country divided by the population. GDP may not reflect how developed a particular country is [8]. But the increase in GDP per capita shows how high the standard of living of the population is. This paper tries to evaluate the relationship between people's standard of living and level of shadow economy. If the standard of living of people is high, the level of the hidden economy will be lower, which means that there is an inverse relationship between these two indicators.

7.    Unemployment rate. Another macro indicator that affects the shadow economy is the unemployment rate. If a country finds it difficult to attract workers to the formal economy or there are not enough job offers in the formal economy, people move to the informal economy. Therefore, it is assumed that a high level of official unemployment can lead to an increase in the level of the underground economy.

8.    Trade openness. Trade openness is determined by dividing exports and imports by GDP. A high level of trade

openness means that a country is open to foreign trade. It can be seen that foreign trade is mainly carried out through customs. Therefore, it is difficult to implement it in the underground economy. Trade openness is assumed to have a negative effect on the level of the shadow economy.

9.      Individuals using the Internet (in % of the total population). With the help of the internet, people are able to find more jobs that can offer reasonable pay for doing some tasks from home. Income from freelance work, profits from some online stores are not included in income declarations, which means that they are in the shadow economy. The article suggests that there is a positive relationship between the percentage of people who can use the Internet and the extent of the underground economy in a country.

10.      Inflation rate. The rate of inflation is one of the indicators that worries entrepreneurs. A high rate of inflation affects the real level of businessmen's income. As a result, their cost of capital is high and encourages them to switch to their shadow economy. In the article, it is assumed that the level of inflation has a positive effect on the level of the hidden economy.

11.      Doing business's business startup rating. It is an index from 0 to 100 that indicates whether it is easier or more difficult to start a business in a country. This index is published annually by Doing Business. This score is a combination of several points or indicators, such as the cost of starting a business, the minimum capital required to start a business, the number of necessary procedures, the time required to start a business. This score is assumed to have an inverse effect on the scope of the shadow economy.

**Result**.Let's consider the scientific hypotheses of the study. A hypothesis contains a short statement, which is formulated on a theoretical basis and is a provisional (presumed) answer to the problem under study and must be tested for its validity. The main goal of this study is to empirically analyze the determinants of the hidden economy. This study has the following scientific hypotheses:

1) The country's tax burden has a negative impact on the scope of the underground economy

2) GDP per capita is inversely related to the level of the hidden economy.

3) The level of unemployment has a positive effect on the level of the informal economy

4) Trade openness has a negative impact on the level of the informal economy

5) Inflation is positively related to the level of the hidden

economy

6) Doing Business is estimated to have a negative impact on the ranking of business start-ups, the scope of the hidden economy.

7) GDP growth per capita has a negative impact on the level of the informal economy

8) The level of Internet use has an inverse effect on the level of the shadow economy.

The basic regression model we use is as follows:

**Regression model is[1]**

$$SE_{it}=\beta_0 + \beta_1 GDP_{it} + \beta_2 TB_{it} + \beta_3 UR_{it} + \beta_4 TO_{it} + \beta_5 GDPg_{it} + \beta_6 SB_{it} + \beta_7 IU_{it} + \beta_8 INFL_{it} + \beta_9 PS_{it} + \beta_{10} GE_{it} + \beta_{11} RL_{it} + \beta_{12} CC_{it} + \theta_i + \delta_t + \varepsilon_{it}$$

**Table-1 An overview of the factors affecting the underground economy[2]**

| INDICATORS | ECONOMIC MEANING | EXPECTED RESULT |
|---|---|---|
| **The level of the hidden economy** | The level of the hidden economy<br>Unit of measurement: percentage of GDP<br>Source: Medina and Schneider (2017) | + |
| **TAX** | This represents the total tax burden in the state<br>Unit of measure: percent<br>Source: World Bank data | + |
| **GDP per capita** | This indicator shows how developed the country is<br>Unit of measure: USD<br>Source: World Bank data | - |
| **Unemployment** | It shows the amount of official unemployment in the economy<br>Unit of measure: percent<br>Source: World Bank | + |
| **Trade openness** | It represents the country's openness to foreign trade.<br>Unit of measure: percent<br>Source: World Bank | + |
| **Population using the Internet (in % of the total population)** | The ratio of the population with access to the Internet to the total population<br>Unit of measure: percent<br>Source: World Bank | + |
| **Inflation** | It is represented by the increase in the price of products in the consumer basket<br>Unit of measure: percent<br>Source: World Bank data | + |
| **GDP per capita growth rate** | Represents annual growth rate | - |

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[1]Developed by the author
[2] Formed by the author

| | |
|---|---|
| | Unit of measurement: in percent<br>Source: World Bank |
| **Doing Business rating** | This indicator is a combination of several indexes and shows how easy it is to start a business in the country<br>Unit of measure: in tenths<br>Source: Doing Business reports |

**Table-2 Statistical description of factors influencing the hidden economy[3]**

| Variables | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| The level of the hidden economy (in GDP) | 850 | 29.67081 | 13.00663 | 8.19 | 71.95 |
| GDP per capita | 834 | 8065.544 | 11952.61 | 137.1683 | 57562.53 |
| Tax burden | 594 | 12.05729 | 5.895554 | 0.085815 | 28.70997 |
| Unemployment rate | 850 | 5.239574 | 4.105613 | 0.398 | 19.7 |
| Trade openess | 811 | 49.85599 | 36.31628 | 0.064705 | 221.01 |
| GDP growth per capita | 842 | 2.865718 | 5.577578 | -45.3251 | 43.37773 |
| DBrating | 376 | 70.98503 | 17.96215 | 11.55 | 97.69 |
| Internet user population (in %) | 728 | 19.16392 | 24.53368 | 0 | 93.4783 |
| Inflation | 788 | 11.60506 | 68.90148 | -18.1086 | 1877.372 |

Table 2 is a statistical description of the data included in the econometric analysis. In it we can see indicators of data completeness and standard deviation.

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[3] Calculated by the author using STATA 15 software

**Table-3 Correlation matrix[4]**

|  | SE | GDP | Tax burden | Unem. rate | Trade openness | GDPg | DB score | Ind.in. usage | Inflation |
|---|---|---|---|---|---|---|---|---|---|
| SE | 1.0000 |  |  |  |  |  |  |  |  |
| GDP | -0.4484 | 1.0000 |  |  |  |  |  |  |  |
| Tax revenue | 0.1918 | -0.1265 | 1.0000 |  |  |  |  |  |  |
| Unem.rate | 0.1351 | 0.1022 | 0.4604 | 1.0000 |  |  |  |  |  |
| Trade openness | -0.1740 | 0.2921 | 0.1037 | -0.0510 | 1.0000 |  |  |  |  |
| GDPg | 0.1759 | -0.3632 | 0.1873 | -0.0286 | -0.0059 | 1.0000 |  |  |  |
| DB score | -0.0652 | 0.4473 | 0.3718 | 0.2623 | 0.2373 | -0.2060 | 1.0000 |  |  |
| Ind.in.usage | -0.3933 | 0.8357 | 0.0258 | 0.0060 | 0.2844 | -0.3734 | 0.5060 | 1.0000 |  |
| Inflation | 0.0869 | -0.4402 | 0.0328 | 0.0129 | -0.1599 | 0.1861 | -0.1425 | -0.4899 | 1.0000 |

Correlation results show that there is a positive correlation between some indicators. The existence of a correlation between two variables causes the problem of mollicorlinearity, which can directly affect the regression results. Therefore, in order to avoid such problems, we examine the correlations and effects using multiple regression.

**Table-4  RESULTS OF REGRESSION[5]**

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[4]Calculated by the author using STATA 15 software
[5]Calculated by the author using STATA 15 software

| VARIABLES | (1) Model | (2) Model | (3) Model | (4) Model | (5) Model | (6) Model |
|---|---|---|---|---|---|---|
| LnGDPpercapita | -4.421*** | -4.588*** | -3.589** | -3.994*** | -4.127*** | -3.569* |
|  | (1.487) | (1.470) | (1.319) | (1.402) | (1.447) | (1.529) |
| Tax Revenue | -0.292*** | -0.301*** | -0.219** | -0.228*** | -0.123** | -0.208* |
|  | (0.101) | (0.0984) | (0.104) | (0.0823) | (0.0593) | (0.0755) |
| Unemploymentrate | 0.694** | 0.729** | 0.532* | 0.659** | 0.506* | 0.591* |
|  | (0.293) | (0.281) | (0.298) | (0.305) | (0.255) | (0.227) |
| Tradeopenness | -2.526* | -2.629* | -2.671* | -2.345 | -3.013** | -2.135 |
|  | (1.421) | (1.414) | (1.325) | (1.383) | (1.348) | (1.262) |
| GDPpercapitagrowth | -0.0549 |  | -0.0594 | -0.0567 | -0.0721* | -0.0449 |
|  | (0.0447) |  | (0.0389) | (0.0426) | (0.0424) | (0.0397) |
| Scorestartingabusiness | -0.0221 | -0.0183 | -0.0210 | -0.0137 | 0.00160 | -0.0143 |
|  | (0.0253) | (0.0271) | (0.0273) | (0.0235) | (0.0236) | (0.0244) |
| IndividualsusingtheInternet | 0.0494* | 0.0537* | 0.0378 | 0.0568** | 0.0631** | 0.0481 |
|  | (0.0279) | (0.0268) | (0.0281) | (0.0250) | (0.0238) | (0.0238) |
| Inflation | 0.119** | 0.115** | 0.0874* | 0.100* | 0.108* | 0.109* |
|  | (0.0532) | (0.0531) | (0.0482) | (0.0509) | (0.0567) | (0.0557) |
| PoliticalStabilityandAbsence |  |  | -1.949* |  |  |  |
|  |  |  | (0.992) |  |  |  |

**Debate.** Analyzing the results of this study, GDP per capita, tax burden, unemployment rate, trade openness, percentage of Internet users, inflation rate, and all indicators of governance are statistically significant for the scope of the shadow economy in a given country. However, indicators such as GDP per capita growth and business start-up are not statistically significant at the level of the informal economy.

GDP per capita has a negative effect on the scope of the informal economy, which supports the first hypothesis. Therefore, if people have a high standard of living, there is no reason to transfer their income from the formal economy to the informal economy.

Tax revenues have a negative effect on the level of the shadow economy, so when tax revenues increase, the level of the shadow economy decreases. A high tax burden encourages businesses to operate in the shadow economy, because if the after-tax income is not sufficient to run the business effectively, they will move to the informal sector due to the burden.

The unemployment rate has a directly proportional effect on the level of the existing underground economy in the country. This means that as the unemployment rate rises, the shadow economy grows.

Trade openness has an inverse effect on the level of the shadow economy. If the country is more engaged in foreign trade, that is, the share of imports and exports in GDP is high, this will lead to a decrease in the shadow economy. Moreover, it supports the initial hypothesis.

The percentage of the population using the Internet has a positive effect on the underground economy. Nowadays, people have more job opportunities due to the ease of access to social

networks and the Internet. For some people, it can be an additional source of income, but for others, it can be the main source of income. For example, those who earned money on YouTube, Instagram, Facebook and other social networks do not pay taxes. Another example is that income from some online stores, freelancers' jobs are also tax-free. This means that access to the Internet increases the level of the underground economy in the country.

The level of inflation has a direct proportional effect on the level of the informal economy.In fact, the interest rate, the real rate of return and the inflation rate are closely related. In particular, the increase of inflation directly affects both. Once inflation rises, the government may raise interest rates because businesses are less profitable and may turn to the shadow economy to avoid their burdens.

**Conclusion**.An increase in GDP per capita indicates that a country is developed, and it is difficult to conduct informal activities in developed countries. A 10% increase in GDP per capita reduces the level of the informal economy by about 4%.

An increase in tax revenue means a decrease in the level of the shadow economy. There is also a reverse effect. Therefore, it shows the correlation between the variables. Another explanation is that once tax rates are increased, regulations and taxation controls are tightened to implement these policies, forcing businesses to move their informal operations into the formal economy.

The unemployment rate reflects the percentage of the labor force that is not working in the formal economy. A lack of job offers in the formal labor market or high personal income taxes can encourage people to work in the informal economy.

Export and import transactions are difficult to carry out in an untraceable economy because these transactions are regulated and controlled by the government. A 10 percent increase in trade openness reduces the size of the shadow economy by 25 percent.

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