

**ESTIMATION THE SIZE OF UNDERGROUND
ECONOMY AND TAX POTENTIAL LOSS IN
INDONESIA FROM 2000 – 2017**

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ESTIMATION THE SIZE OF UNDERGROUND ECONOMY AND TAX POTENTIAL LOSS IN INDONESIA FROM 2000 – 2017

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ABSTRACT

Gross Domestic Product (GDP), is often considered the best measure of how well the economy is working. However, the weakness of GDP is that it does not include the underground economy in its calculations. This study attempts to measure the size of the underground economy and tax potential loss in Indonesia by using currency demand approach (CDA) method from 2000 to 2017, also to see how effective the tax amnesty policy in reducing the underground economy activity and tax potential loss in Indonesia.

The average size of the underground economy in Indonesia from 2000 to 2017 is around IDR 528 trillion or 7,58 percent of GDP annually. While the average tax potential loss obtained from the underground economy activity is IDR 56,23 trillion per year or 0,95 percent of GDP. The results of tax amnesty policy implementation showed a decrease in the magnitude of the underground economy activity and tax potential loss, a decline of 4 percent in the underground economy activity in 2016-2017 and a decrease of 8 percent in tax potential loss in 2016 and 3 percent in 2017.

Keywords: GDP, underground economy, tax potential loss, tax amnesty policy, currency demand approach

A. INTRODUCTION

Background of the Study

Gross domestic product (GDP), is often considered the best measure of how well the economy is performing. The goal of GDP is to summarize economic activity in units of certain money values over a period of time. One of the weaknesses in the GDP calculation is that the underground economy does not include or accounted for by GDP. If it is not recorded in the calculation of GDP, the underground economy will endanger the country because it can eliminate tax revenues. So that, it can be said that underground economy activities not only affect the economy of a country in terms of GDP but also from the side of the state budget or state revenues (Purnomo, 2010).

By its definition, the underground economy is an activity which all of the perpetrators tend to do their economic activity under cover. Therefore, it is very difficult to get accurate information about underground economy in every aspect of economic activity because people engaged in this activity do not wish to be identified. That is why, it is difficult to explain the absolute definition of underground economy. Many economists still do not agree on the underground economy definition. In most cases, there is no consensus on the definition of the underground economy the definitions and concepts of the underground economy. However, the measure of the underground economy size usually depends on the method chosen to measure the estimation.

Schneider, Buehn, and Montenegro classified the size of the underground economy into three groups, namely developing countries, transition countries, and OECD countries out of 162 countries in the world shown in Figure 1.1. Transition countries have the largest shadow economies (with an average of 37%) followed by the developing countries (with an average of 26.9%). At the bottom of the distribution, they found the OECD countries with an average of 13.7%, which is consistent with the fact that richer economies have lower informality rates.

Indonesia experienced large underground economic activities. Faisal Basri has also conveyed a similar estimation around 30% - 40%, which comes from business activities that do not pay taxes, corruption, or businesses clandestinely or in the informal sector so that they are not recorded as one of the contributors to GDP (Gunadi, 2004). Another research also tried to estimate the size of underground

economy in Indonesia by using currency demand approach (CDA). Purnomo and Muhammad (2011), estimated the size of the underground economy is about IDR 164,4 trillion per year on average. While, the potential tax loss due to the activity estimated at Rp20,6 trillion on average per year.

According to Tax Justice Network (2011), Indonesia place second in ASEAN country after Thailand who in the first place with the total amount of US\$25.81 billion in tax evasion due to the underground economic activity. From the eight ASEAN countries, the total amount of Indonesia Tax evasion is US\$17.76 billion. This should become a concern because most of the national budget funding derives from tax and tax are the sum of compulsory payment that taxpayers should pay the government. Indonesia has tried to innovate its tax collection process by releasing the tax amnesty policy. With the main purpose to attract more citizens to submit more tax to the government, so the Indonesia tax ratio can increase in the short mean time. The reasons behind the existence of tax amnesty policy mainly because the ratio of tax to Indonesia's PDB still considerably low compared to the other countries. The tax amnesty policy made an excellent performance in the short period meantime. It is barely seen that the increase of overall tax revenue from 2016 to 2017 approximately 14% annually, which is bigger than the percentage increase in 2015 to 2016 which is only 3%. This big improvement on the tax absorption still did not meet government expectation, because although it has bigger notable increase from 2015-2016 to 2016-2017, the tax to GDP ratio from 2015-2016 to 2016-2017 did not change gradually.

Surprisingly, Indonesia overall tax to GDP ratio is the lowest compared to the other ASEAN country. The author tries to compare Indonesia to the other four ASEAN countries: Malaysia, Philippines, Singapore, and Thailand. Indonesia ranked the lowest with all overall tax to GDP ratio below 12% while the other country exceeded above 12%. This should be concerned to the government because conceptually tax to GDP ratio often become a proxy to measure how much a nation's governments control its economic resources. This should be concerned to the government because conceptually tax to GDP ratio often become a proxy to measure how much a nation's governments control its economic resources. Tax revenues are the income collected by governments through taxation. According to International Monetary Fund IMF-World Bank Group Annual Meetings in Nusa Dua Bali, since Indonesia's tax-to-GDP ratio is less than 11 percent way below the 15 percent threshold needed to stimulate growth – the country cannot fully harness the potential of its 5,4 percent economic growth (Jakartapost.com). Based on the explanation about the size of the underground economy, potential tax loss, and tax to GDP ratio, the author tries to estimate the size of the underground economy in Indonesia by using Demand Approach modeled by Vito Tanzi (1980).

Statement of the Problem

The author wants to know how much is the potential underground economy in Indonesia and how much the tax potential loss. Second, the author wants to know how significant do the tax amnesty policy affect the volatility of this underground economy activity and tax potential loss. Last, the author wants to know the variable that will use to estimate the size of the underground economy in Indonesia work significantly either negative or positive relation towards each variable based on its theory.

Purposes of the Research

Based on the problem of the statement above, it is important to be able to give an exact value of the underground economy and potentially tax loss size in Indonesia. How much tax amnesty affects change in the underground economy and tax potential loss. Also, it is important for each variable later who will define the size of underground economy work significantly

B. LITERATURE REVIEW

GDP Conceptual Calculation

The goal of GDP is to summarize economic activity in a certain value of money over a period of time (Mankiw, 2016). There are two ways to see GDP statistics. First, is look at GDP as the total income of everyone in the economy. Second, GDP is the total expenditure on the output of economic goods and services. GDP is an indicator of the level of economic growth and welfare in a country. However, GDP still considers as a not perfect measure for economic welfare, for several reasons, such as first, GDP calculations ignore the reduction of resources and the environment; second, not paying attention to the

inequality in GDP income distribution; third, does not include non-material activities; last, ignore underground economy activity.

Money Demand Theory

The quantity theory of money is the classical money demand theory represented by Irving Fisher. The starting point of the quantity theory of money is the insight that people hold money to buy goods and services. The more money they need for such transactions, the more money they hold. Thus, the quantity of money in the economy is related to the number of money exchanged in transactions (Mankiw, 2016). The relation between money and transactions named in the quantity equation $MV=PT$. The right-hand side of the quantity equation tells us about transactions made at any given period, while the left-hand side of the equation tells us about the money used to make the transactions.

Keynes explained how the interest rate is determined in the short run and rejects the assumption of Classical economists who claim that the velocity of money is constant. According to Keynes, the motive for money demand driven by three main important things: Transactions motive, Precautionary Motives, and Speculative motive. Keynes explanation called the theory of liquidity preference, the supply and demand for real money balances determine what interest rate prevails in the economy. That is, the interest rate adjusts to equilibrate the money market

Keynes had designated the transactions to demand money as due to the transactions motive but had not provided a theory for its determination. In particular, he had assumed that this demand depended linearly on current income but did not depend on the interest rate. Other explanation by Baumol and Tobin model in the 1950s established the theory of the transactions demand for money. This explanation showed that this demand depends not only on income but also on the interest rate on bonds. Further, there are economies of scales in money holdings (Handa, 2009).

Underground Economy, Cause and Effect

There is still a question about the exact definition towards the underground economy. The definitions and concepts of the underground economy, however, depend on the chosen estimation methods and measurements (Schneider and Enste, 2000). Feige (1990) further classified the underground economy into 4 (four) groups, namely: (1) Illegal economy; (2) Un-reported economy; (3) Unrecorded economy; (4) Informal economy. The existence of the underground economy will have causes and several effect as derive from the underground economy phenomenon. Several factors cause the emergence of underground economy activities, namely (Schneider, Buehn and Montenegro, 2010): (1) The burden of taxes and social security; (2) Increasing the intensity of government regulation; (3) Public sector services; (4) Official economic activity (official economy).

Some serious policy issues might arise due to the growth of underground economy activities (Schneider and Enste, 2000), namely: (1) Tax evasion caused by high tax rates will erode revenue making it difficult to impose a higher tax rate; (2) Opportunities to participate in underground economy activities represent a form of "subsidies" for certain economic activities because of the ease of tax evasion; (3) Underground economy causes official government-issued statistics on economic growth to be less consistent (unreliable); (4) The underground economy makes conditions unfair competition in the sector and does not follow regulations set by the government and does not pay taxes.

Underground Economy Measurement Method

Several approaches can be use to calculate the estimation of the underground economy. Among these methods three approaches are most often used, namely: direct approach, indirect approach, an approach to the model formation (Schneider and Enste, 2000)&(Tanzi, 2002):

Direct Approach

This direct approach uses well-designed surveys and samples on detecting the right measurements of the underground economy. This survey tries to measure the size of the underground economy by voluntarily find the right surveyors voluntarily report their tax system or tax auditing system and another compliance method

Indirect Approach

1. Discrepancy Between National Expenditure and Income Statistic

This approach based on a statistical discrepancy between GDP calculated by the expenditure and GDP approaches calculated through the income approach

2. The Physical Input (Electricity Consumption) Method

Assumed that electric-power consumption is regarded as the single best physical indicator of overall economic activity. Overall, (official and unofficial) economic activity and electricity consumption have been empirically observed throughout the world to move in lockstep with an electricity/GDP elasticity usually close to one

3. Currency Demand Approach (CDA)

Underground economy activities measured by the sensitivity of the demand for currency (currency demand). The reason for using currency and not the other types of money is because economic actors prefer to use cash in making transactions. The goal is that the activities carried out are not easily traced or detected by the government, especially the tax authorities. This method developed by Vito Tanzi who used it to estimate the underground economy in the United States. Tanzi defined the underground economy as income derived from unreported economic activities and or not recorded in the tax authority with the intention of avoiding taxes. According to Tanzi, the tax burden is a contributing factor to underground economy activities(Tanzi, 1980).

Literature Study

One breakthrough research about the underground economy by using the currency demand approach has been done by Ebrima Faal (2003). He estimated the size of the underground economy in Guyana from 1964-2000 with attempts to estimate the magnitude of, and changes to the underground economy in Guyana as well as its adverse effect on tax collection during this period. Assuming that the velocity of circulation of money is the same in both the official and underground economies, the size for the underground economy was obtained as the product of estimated underground currency holdings and the calculated velocity. The size of the underground economy is 54,06% respectively to the total of GDP, and the average of potential tax loss is 19,58% from GDP.

Vito Tanzi on his paper presented the result of the size of the underground economy in the United States from 1930-1980 by using monetary approach, currency demand approach. Currency Demand Approach (CDA) has several basic assumptions such as: First, the underground economy exists because of the high rate of tax fare imposed to taxpayers; Second, underground economy activities mainly involve currency as their medium of transaction. With using this method, the result of the underground economy in the United States of America is: (1) The size of the underground economy in the USA from 1930-1980 approximately from 2,79% - 4,24% of GNP (Gross National Product); (2) b. The potential tax loss from this underground economic activity that is being measured by multiplied with tax ratio is US\$ 1,66 billion – US\$ 2,45 billion.

C. RESEARCH METHODOLOGY

Type, Source of Data, and Data Collecting Method

The author uses a quantitative method for this study. Quantitative method analyzes the data in the numerical form later can be produced as a problem solver that can be measured numerically. A secondary data type used for this research because conceptually all of the data were collected from its resources. Secondary data mainly used for the quantitative method because of the easiness access towards author's analysis. The data is taken manually from 2000-2017, the data also collected with time series based. The source of data mainly collected from Bank Indonesia (BI), Central Statistical Agency (BPS), Indonesia Financial Department, and International Financial Statistic under International Monetary Fund (IMF).

Research Variable and Operational Definition

Variable	Definition
Currency in Circulation (Cr)	The value of the currency used is the demand for real currency, which is the nominal currency, which has been adjusted to the general price level, in this case, reflected in the GDP deflator
Disposable Income (Y)	The data used as a proxy for disposable income is Nominal GDP minus Direct Tax (PPh and PBB), which then adjusted to the GDP deflator

3-Month Deposit Rate (R3)	The interest rate will become an opportunity cost. Since the incentive of saving will be higher when the interest rate is high, the amount of money circulation will be less since the incentive of saving is higher. The 3-month interest rate will be used in this variable. Based on 90-day treasury bills by (Faal, 2003)
Inflation (In)	Inflation used in this variable based on the consumer Price Index (CPI)
Financial Innovation (F)	This variable is the number of automatic teller Machine (ATM) and the number of existing bank branch offices (in this case, commercial banks)
Tax Burden (P)	This variable uses a proxy ratio of total tax revenue to nominal GDP (according to one definition of tax burden according to the Organization for Economic Co-operation and Development / OECD)

Analysis Method

The model used is a multiple regression model. While the quantitative analysis method used is the ordinary least squares (OLS) method. The model used to estimate the underground economy is a monetary approach, namely through an analysis of the sensitivity of demand for the currency. This approach, currency demand approach (CDA) based on the assumption that economic actors in the underground economy prefer to use cash to avoid being control by the government, especially the tax authorities. Through this model, the sensitivity of the public's desire to hold cash is measured against changes in tax rates or burdens. The incentive to avoid taxes by using more cash for transactions can influence people's desire to hold cash. The stages carried out in this study to obtain the value of underground economy activities are as follows:

Formula	Explanation
(Cr)	Currency in Circulation Estimation
$Cr_{UE} = Cr - Cr_Y$	Currency Circulating in Underground Economy
$V_{UE} = GDP / (M_1 - Cr_{UE})$	Velocity of Money in Underground Economy
$UE = Cr_{UE} \times V_{UE}$	Estimating the Size of Underground Economy
$Tax\ Loss = (UE) \times (Average\ Tax\ Rate)$	Estimating the Tax Potential Loss

Currency in circulation is part of overall money demand, both in official economy (OE) and underground economy (EU). Therefore, it is assumed that the currency in circulation (C) is influenced by the tax burden (T), inflation (I), 3-month deposit rate as opportunity cost (O), and disposable income. Another factor that is also influential as mentioned by Faal (2003), is the people's preference for holding currency, which is represented by a variable of financial innovation and banking development (F). In summary, the overall demand for currency can be written in the regression function as follows:

$$\ln(Cr) = \beta_0 + \beta_1 \ln(Y) + \beta_2(R3) + \beta_3(In) + \beta_4 \ln(F) + \beta_5(P) + \mu \quad (1)$$

Cr	= Currency in Circulation
Y	= Disposable Income
R3	= 3- Month Deposit Rate (Opportunity Cost)
In	= Inflation
F	= Financial Innovation
P	= Tax Burden
β_0	= Constants
$\beta_1, \beta_2, \beta_3$	= Regression Coefficient
μ	= Error Term

Statistic Test

Unit Root Test

To find out whether the time series data used in this study has unit root problems (data not stationary), used test root through the Augmented Dickey-Fuller test (ADF-test). If a time series data not stationary at zero order I (0) or level, then data stationarity it can be searched through various orders so that the level is obtained stationarity on the nth order.

Co-integration Test

This test developed based on the perception of data models that are not individually stationary but linear combinations between two or more time series data can be stationary. It was done by examining the Engle Granger method with the Augmented Dick Fuller Test to find out the result. The testing method is better known as the Cointegration Test. The variables in the model are cointegrated. So, it can be interpreted that the combination of two or more in regression is stationary.

Error Correction Model

ECM is a technique for correcting short-term imbalances towards long-term equilibrium and can explain the relationship between modifiers tied to the independent variable at present and past time. ECM modeling requires the requirement for co-integration on a group of non-stationary variables. The equation of the ECM model shown as follows:

$$D(\text{LnCr}) = \beta_0 + \beta_1 D(\text{LnY}) + \beta_2 D(\text{R3}) + \beta_3 D(\text{In}) + \beta_4 D(\text{LnF}) + \beta_5 D(\text{P}) + \mu \quad (2)$$

D = Difference

Test of Classical Assumptions of the Linear Regression Model

The basic assumption of this classic assumption is done as a parameter to measure whether the data used in this study is BLUE (Best Linier Unbiased Estimator) or not. The basic assumption test is used to determine the pattern and variance and linearity of a population (data) is normal or not.

D. FINDINGS AND DISCUSSION

Model Test

Stationary Test

Table 1: Stationary Test

Level I(0) - Level				Level I(1) – First Difference			
Variable	Constant Without Trend	Constant With Trend	Without Constant and Trend	Variable	Constant Without Trend	Constant With Trend	Without Constant and Trend
Lncr	-0.024	-2.231	1.736***	D(Lncr)	-8.691**	-8.803**	-8.176**
Lny	0.944	-1.645	3.292*	D(Lny)	-8.745**	-9.193**	-7.343**
R3	-2.807***	-4.088**	-1.067	D(R3)	-4.833**	-4.806**	-4.819**
In	-5.097*	-5.264*	-2.631*	D(In)	-7.455**	-7.399**	-7.504**
LnF	2.212	-0.965	3.859*	D(LnF)	-3.565**	-4.389**	-2.521**
P	-5.657*	-5.863*	-0.254	D(P)	-8.940**	-8.950**	-8.990**

Notes: *, **, and *** denote significant at 1%, 5%, and 10% significance levels, respectively. Processed by Author by using STATA 14

With all of the Augmented Dickey fuller models are being tested in this stationary test, we can see variable at level I(0) several variables are non-stationary or are partially stationary at one of the three models while only inflation variable that is stationary at level I(0). At first difference level I(1) we can see that all of the variables are stationary at all of the models.

Co-integration Test

Table 2: Co-integration Test

Variable	Augmented Dickey-Fuller (ADF)			
	ADF Test Statistic	ADF Test Value		
		$\alpha = 1\%$	$\alpha = 5\%$	$\alpha = 10\%$
Residual	-4.356**	-3.551	-2.913	-2.592

Notes: Processed by Author by using STATA 14

The ADF test statistic results are -4.356, which is greater than 5% significance ADF test value. This residual variable indicates stationary at level. It indicates that this variable in this model are co-integrated each other.

Regression Result

Table 3: Ordinary Least Square (OLS)

Variable	Coefficient	T-Statistic	Probability
Lny	1.086907	4.74	0.000
R3	0.0008221	0.17	0.862
In	0.0387422	1.98	0.052
LnF	-0.0337874	-0.45	0.656
P	0.01718	2.78	0.007
Cons	-2.288767	-2.46	0.017
R-squared	0.8931		
Adjusted R-Squared	0.8850		
F-Statistic	110.29		
Prob(F-statistic)	0.000		
Durbin Watson	0.9390		

Notes: Processed by Author by using STATA 14

$$(L \text{ } c_t) = -2.288 + 1.086(L \text{ } y_t) + 0.001(R3_t) + 0.038(I1_t) - 0.033(L \text{ } t) + 0.017(P_t) + \varepsilon_t \quad (3)$$

We need to see if this data is suffer from spurious regression by checking the autocorrelation. Which is this model suffer from spurious regression, to fix this spurious regression, therefore we need to conduct the Error Correction Model (ECM) by using Two-steps EG method. The first step is to calculate the residual value from the equation initial regression (OLS method). Then, the second stage is to do the analysis regression by entering the residual from the first step. Regression analysis with ECM technique shows the following result.

Table 4: Error Correction Model (ECM)

Variable	Coefficient	T-Statistic	Probability
D(Lny)	0.0002744	2.75	0.008
D(R3)	-0.00023	-0.03	0.979
D(In)	0.0305563	2.93	0.005
D(LnF)	-0.3193404	-1.50	0.138
D(P)	0.00225297	6.89	0.000
ECT	-0.425848	-4.56	0.000
Cons	0.0169426	1.63	0.108
R-squared	0.6652		
Adjusted R-Squared	0.6339		
F-Statistic	21.20		
Prob(F-statistic)	0.000		
Durbin Watson	1.9980		

Notes: Processed by Author by using STATA 14

$$D(L \text{ } c_t) = 0.016 + 0.0003D(L \text{ } y_t) - 0.0002D(R3_t) + 0.030D(I1_t) - 0.319D(L \text{ } t) + 0.002D(P_t) - 0.425E \quad (4)$$

Simultaneous (F-Test)

The result derived from error correction model (ECM) regression. In the short-run, the F-statistic is 21.20, and it is greater than the F-table at 5% significance level. It means our short-run independent variable has a significant result towards our dependent variable, which is a currency on demand

Partial (T-Test)

If the t-statistic is less than 5%, it means the variable is not significant or the coefficient is negative, then the hypothesis is denied If the t-statistic is more than 5% and the coefficient is positive meaning that the regression coefficient is significant, then the hypothesis is accepted

Table 5: Short-run and Long-run Model

Variable	T-Statistic	Conclusion	Variable	T-Statistic	Conclusion
D(Lny)	2.75**	Significant	Lny	4.74**	Significant
D(R3)	-0.03	Non-Sig.	R3	0.17	Non-Sig.
D(In)	2.93**	Significant	In	1.98**	Significant
D(LnF)	-1.50	Non-Sig.	LnF	-0.45	Non-Sig.

Notes: Processed by Author by using STATA 14

Determination Coefficient (R²) Test

Based on OLS and ECM regression, the result of R² is 0.89 and 0.66. It means that its independent variable can explain 89% of currency on circulation variable while with ECM regression is stated that 66% of currency in circulation can be explained by its independent variable and also residual (ECT)

Classical Assumption Test

Normality Test

Table 6: Jarque-Bera Normality Test

Variable	Skewness	Kurtosis	Jarque-Bera	Probability
Residuals	0.0040	0.0083	21.45	0.0020

Notes: Processed by Author by using STATA 14

The Jarque-Bera Probability value, which was valued at 0.0020. It means that the data residuals are not normally distributed at 5% α significance or 0.05 in decimal because the Jarque-Bera Probability value is less than the 5% α value. If it is expressed mathematically, the figure would show that p value < 0.05 (Gujarati, 2004). In this test, error terms within the ECM regression residuals are not normally distributed.

Multicollinearity Test

Table 7: Multicollinearity Result

Variable ECM	Centered VIF	1/VIF
D(Lny)	2.78	0.359919
D(R3)	1.06	0.947053
D(In)	1.32	0.757842
D(LnF)	1.04	0.964415
D(P)	3.05	0.327536

Notes: Processed by Author by using STATA 14

Result derives from the previous table shows multicollinearity result from ECM regression method. We can see that variance inflation factor (VIF) from all variable ECM is less than ten. It indicates that the ECM test is free from multicollinearity.

Heteroscedasticity Test

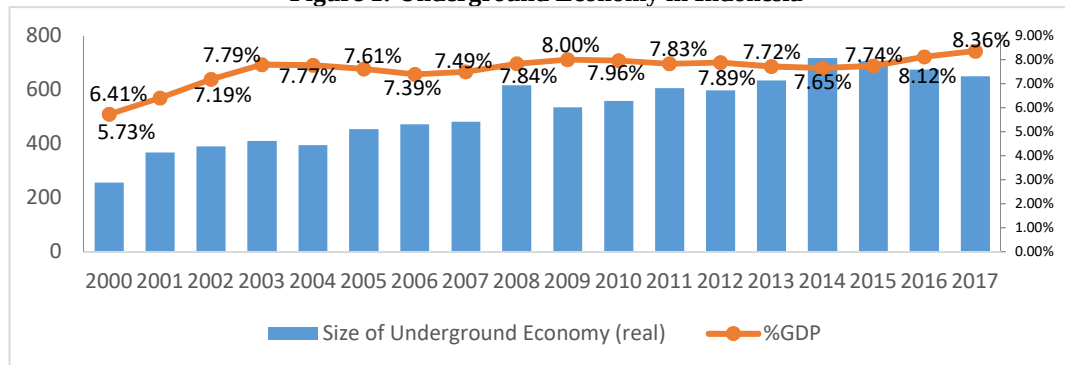
In order to fulfill one of the classical assumption tests which states that the data is homoscedastic, this model needs to pass the heteroscedasticity. White –Test is one of the methods used in this Heteroscedasticity test. Based on the results, we can see that the heteroscedasticity test is 0.5829. The value of probability is higher than 5% significance level. Therefore, ECM regression is homoscedastic and free from heteroscedasticity test.

Autocorrelation Test

Autocorrelation means that the errors of adjacent observations are correlated. If the errors are correlated, then least-squares regression can underestimate the standard error of the coefficients. Moreover, underestimated standard errors can make the predictors seem to be significant when they are not. Based on the Durbin-Watson statistic results, ECM Durbin Watson statistic value is 1.997958, which is lies between dU and 4-dU ($dU < DW < 4-dU$) it indicates that the ECM regression data do not suffer from autocorrelation.

Size of Underground Economy Results

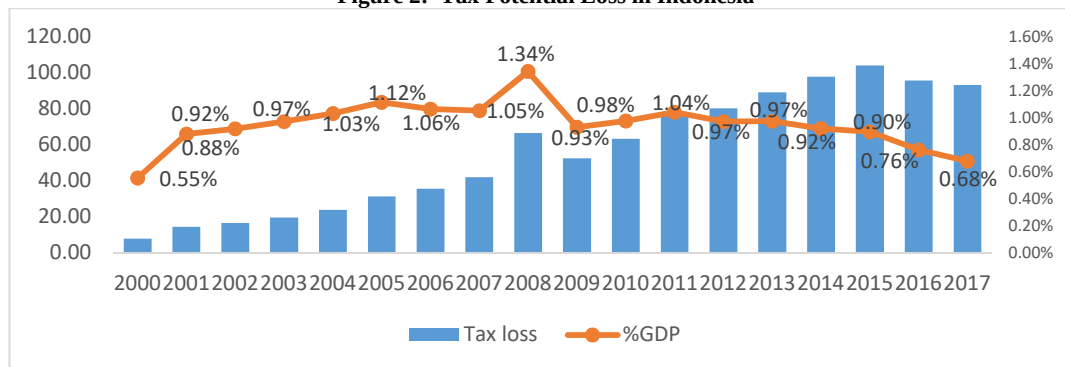
Figure 1: Underground Economy in Indonesia



Notes: Processed by Author by using Excel

The results of the size of the underground economy can be seen in Figure 4.10. Also, the underground economy to GDP ratio, which the author has summarized from quarter data to annual data from 2000-2017. The average size of the underground economy in Indonesia is 528 trillion rupiahs. Moreover, if we compare the size of the underground economy in Indonesia to GDP annually, the average amount of Underground Economy ratio to GDP is 7.58%.

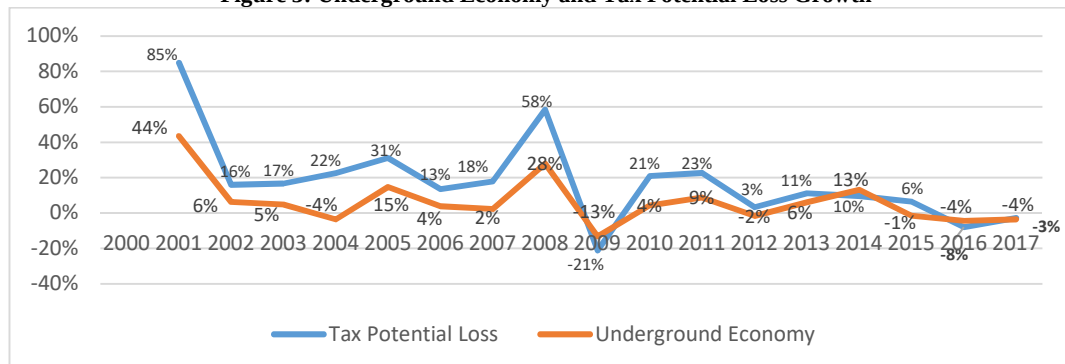
Figure 2: Tax Potential Loss in Indonesia



Notes: Processed by Author by using Excel

We estimate the size of tax potential loss by multiplying the size of the nominal underground economy to tax ratio. Then we can get the size of the possibly tax potential loss and tax potential loss to GDP ratio in figure 2. The average tax potential loss annually around 56.23 trillion rupiahs, and the average of tax potential loss to GDP ratio is 0.95%.

Figure 3: Underground Economy and Tax Potential Loss Growth



Notes: Processed by Author by using Excel

There is a shock happen in an underground economy activity which grows about 44% and tax potential loss grows about 85% from 2000 until 2001, while in 2008, the growth size of the underground economy approximately 28% and the size of tax potential loss grows approximately 58%. In 2001 there are changes in tax policy and rules made by the government. At that time, government issues several changes in tax regulatory form such as law number 16 of 2000 regulates about general provisions and taxation procedures, law number 17 of 2000 governing tax income, and law number 18 of 2000 regulates about value-added tax. The tremendous growth of underground economy activity happens for the second time in 2008. In this year, for the 4th time government has made an amendments change towards tax policy and system based which is law number 28 of 2007 concerning to its original law number 6 of 1983 regulates about general provisions and taxation procedures.

The tax amnesty program is designed for nine months since being implemented in July 2016. After the enactment of law number 11 of 2016 concerning tax amnesty, it is emphasized that tax amnesty is the elimination of taxes that should be owed, not subject to tax administration and criminal sanctions in the taxation field, by disclosing assets and paying ransoms as arranged. Since 2016, both the underground economy and tax potential loss have shown a decreasing trend until 2017. The biggest decline occurred in 2016, where 8% decreases in tax potential loss, while in 2015 tax potential loss has increased by approximately 4%. This data shows that the tax amnesty program implemented by Indonesia government give positive results by showing a decreasing trend in both underground economy activity and possibly tax potential loss. This results in line with the author main hypothesis on author statement of the problem by trying to see if the tax amnesty policy has a significant result towards volatility in the size of underground economy and tax potential loss in Indonesia.

Implication

1. The lack of tax amnesty participant mainly because of the misperception towards who should participate in the tax amnesty. Therefore, more socialization need to be done.
2. By conducting big analytical data, the government can analyze its tax absorption by gathering and forecasting the real data.
3. It is important for the government to increase its technological advance also increase its efficiency and effectiveness towards our payment instruments. An increase in technological advance can force its financial payment infrastructure system to become more advance and made electronic payment system easier to conduct.
4. Government can make a new formula regarding the potential investment list for tax amnesty participant.
5. Government need to Increase the regulations for new companies or start-up companies. According to Indonesia creative economy body (BEKRAF) survey on Startup Indonesia Mapping & Database 2018, medium to large scale of startup company are expecting for government to be able to create an effective and efficient regulation(BEKRAF, 2018).

E. Conclusion

Main Conclusion

1. Tax ratio variable used in this model shows significant results and have a positive coefficient. This indicates that estimating the size of underground economy by using currency demand approach (CDA) can be conducted.
2. The size of underground economy and tax potential loss from 2016 to 2017 shows a positive results reacting towards tax amnesty policy. This phenomenon indicates that the government has succeed implies new policy to increase tax revenue and lower the size of underground economy.
3. Based on the regression results conducted by the author, in the short-run, by using error correction model (ECM) there are two variables shows insignificant results. Both 3-month deposit rate and financial innovation show insignificant results while the other variables show significant results. While in the long-run, using ordinary least square (OLS) shows the same regression results that occur in short-run model.

Author's Recommendation

1. Because of this research conducted based on secondary data, it is necessary for data the provider to be able to provide the exact data.
2. According to Tanzi (2002), many researchs have tried to discover the size of the underground economy by using currency demand approach. Moreover, as time changes, its original theory has almost lost its essence due to some innovations change that have been made by several researchers. That is why, it is important to maintain its original currency demand approach conducted by Tanzi (1980).
3. for the future researchers, it is really important to find any other variable options that can be conducted to underground economy. So, the results later will not be only determined by tax ratio, but can be determined by using the other variable.
4. author believe for future research, another researcher can try to innovate the financial innovation variable by adding new measurements such as internet banking, mobile banking, and also electronic payment to made the measurements more predictable and more precise.

BIBLIOGRAPHY

- Ardizzi, G. *et al.* (2011). Measuring the Underground Economy with the Currency Demand Approach. At the 52nd Annual Conference of the Italian Economic Association in Roma Tre University. Italy.
- Ariefianto, M. D. (2012). *Ekonometrika Esensi dan Aplikasi Dengan Menggunakan E-Views* (5th ed.). Jakarta: Penerbit Erlangga
- Ariyo, A. and Bekoe, W. (2010) 'Currency Demand, the Underground Economy and Tax Evasion: The Case of Nigeria', *Journal of Monetary and Economic Integration*, Vol.11, No, pp. 129–157.
- Azwar and Mulyawan, A. W. (2017) 'Analisis Underground Economy Indonesia dan Potensi Penerimaan Pajak', *Jurnal Info Artha*, 1, pp. 60–78. Available at: www.jurnal.pknstan.ac.id/index.php/JIA.
- Bank Indonesia. (2018). Data Terkini Statistik Ekonomi dan Keuangan Indonesia (SEKI). Sektor Moneter. Uang Beredar dan Faktor-Faktor yang Mempengaruhinya. Retrieved from www.bi.go.id/seki/tabel/TABEL1_1.xls
- Bank Indonesia. (2018). Data Terkini Statistik Ekonomi dan Keuangan Indonesia (SEKI). Sektor Riil. Produk Domestik Bruto Menurut Jenis Pengeluaran Atas Dasar Harga Berlaku. Retrieved from www.bi.go.id/seki/tabel/TABEL7_3.xls
- Bank Indonesia. (2018). Data Terkini Statistik Ekonomi dan Keuangan Indonesia (SEKI). Sektor Riil. Laju Implisit (Deflator) Produk Domestik Bruto . Retrieved from www.bi.go.id/seki/tabel/TABEL7_6.xls
- Bank Indonesia. (2018). Data Terkini Statistik Ekonomi dan Keuangan Indonesia (SEKI). Sektor Riil. Indeks Harga Konsumen Gabungan di 82 Kota. Retrieved from www.bi.go.id/seki/tabel/TABEL8_2.xls
- Basri, F. (2017). Prospek Penerimaan Pajak Pasca Tax Amnesty. Retrieved May 1, 2019, from <https://faisalbasri.com/2017/04/01/prospek-penerimaan-pajak-pasca-tax-amnesty/>
- Bhattacharyya, D. K. (1999). On the Economic Rationale of Estimating the Hidden Economy. *The Economic Journal*, 109(456), F348-F359. Retrieved from <http://www.jstor.org/stable/2566008>
- Bhattacharyya, D. K. (1998) *The Hidden Economy Estimates and Their Implications for Government Expenditure*. 1. London.
- Bhattacharyya, D. K. (1990). An Econometric Method of Estimating the 'Hidden Economy', United Kingdom (1960-1984): Estimates and Tests. *The Economic Journal*, 100(402), 703-717. doi:10.2307/2233655
- Bisnis Finansial. (2014). Bunga Deposito Bank rata-rata lampau Batas Penjaminan LPS. Retrieved May 1, 2019, from <https://finansial.bisnis.com/read/20140807/90/248419/bunga-deposito-bank-rata-rata-lampau-batas-penjaminan-lps>
- Centre for Indonesia Taxation Analysis. Kekecewaan di Balik Tax Amnesty yang Disebut Tersukses di Dunia. Retrieved May 1, 2019 from <https://cita.or.id/news/citax/kekecewaan-di-balik-tax-amnesty-yang-disebut-tersukses-di-dunia/>
- Committee for Economic Development (CED). (2018). Big Data's Economic Impact. Retrieved May 1, 2019, from <https://www.ced.org/blog/entry/big-datas-economic-impact>
- Detik Finance. (2017). Bunga Simpanan di Bank Terus Menurun Sejak 2014. Retrieved May 1, 2019, from <https://finance.detik.com/moneter/d-3511426/bunga-simpanan-di-bank-terus-menurun-sejak-2014>
- Domowitz, I. and Elbadawi, I. (1987) 'An Error-Correction Approach To Money Demand The Case of Sudan', *Journal of Development Economics*, 26, pp. 257–275.
- Faal, E. (2003). *Currency Demand, the Underground Economy, and Tax Evasion: The Case of Guyana*. International Monetary Fund Working Paper. WP/03/7. Guyana.
- Feige, E. L. (1990) 'Defining and Estimating Underground and Informal Economies: The New institutional Economics Approach', *World Development*, 18(7).
- Ferwerda, J., Deleanu, I. and Unger, B. (2010) *Revaluating the Tanzi-Model to Estimate the Underground Economy*. Netherlands. Available at: www.uu.nl/rebo/economie/discussionpapers.
- Gaspareniene, L., Remeikiene, R. and Heikkila, M. (2017) 'Evaluation of the impact of shadow economy determinants: Ukrainian case', *Intelektine Ekonomika*, 10(2016), pp. 108–113. doi: 10.1016/j.intele.2017.03.003.
- Gujarati, N.Damodar. 2003. *Basic Econometrics*. 4th Edition. McGraw-Hill. Inc. NY
- Gunadi, Aloysius. (2004). *Krisis dan Underground economy di Indonesia*. Badan Perencanaan dan Pembangunan Nasional
- Handa, J. (2009) *Monetary Economics*. 2nd Editio. Canada: Routledge Taylor & Francis Group.
- Hill, R. and Kabir, M. (2000) 'Currency demand and the growth of the underground economy in Canada , 1991-1995', (August), pp. 183–192. doi: 10.1080/000368400322877.
- Indonesia Investment. (2017). Indonesia Tax Amnesty Program has Ended, What are the Results. Retrieved May 1, 2019, from <https://www.indonesia-investments.com/finance/financial-columns/tax-amnesty-program-indonesia-ended-what-are-the-results/item7719?>
- International Monetary Fund. (2018). International Financial Statistic. Data Tables (Interest Rates). Retrieved from data.imf.org/regular.aspx?key=61545855

- Jakarta Post. (2018). Indonesia Low Tax to GDP Ratio. Retrieved March 10, 2019 from <https://www.thejakartapost.com/academia/2018/10/11/indonesias-low-tax-to-gdp-ratio.html>
- Juli, S. and Samuda, A. (2016) 'Underground economy in indonesia', *Buletin Ekonomi Monevoter dan Perbankan*, Volume 19, pp. 39–56.
- Kementerian Keuangan. (2018). Portal Data APBN Kementerian Keuangan Republik Indonesia. Dataset Data. Data realisasi Triwulan APBN Tahun 1969-2000. Retrieved from <http://www.data-apbn.kemenkeu.go.id/Dataset/Details/1022>
- Kementerian Keunagan. (2018). Portal Data APBN Kementerian Keuangan Republik Indonesia. Dataset Data. Data realisasi Triwulan APBN Tahun 2000-2016. Retrieved from <http://www.data-apbn.kemenkeu.go.id/Dataset/Details/1023>
- Keuangan Kontan. (2012). Ekspansi ke Timur, BRI bakal Agresif di Papua. Retrieved May 1, 2019, from <https://keuangan.kontan.co.id/news/ekspansi-ke-timur-bri-bakal-agresif-di-papua>
- Kireenko, A. and Nevzorova, E. (2015) 'Impact of Shadow Economy on Quality of Life: Indicators and Model Selection', 25(15), pp. 559–568. doi: 10.1016/S2212-5671(15)00770-4.
- Mankiw, N. G. (2009) *Macroeconomics*. 7th Edition. New York. Worth Publisher.
- Mankiw, N. G. (2016) *Macroeconomics*. 9th Edition. New York. Worth Publisher.
- Medina, L. and Schneider, F. (2018). *Shadow Economies Around the World : What Did We Learn Over the Last 20 Years ?* International Monetary Fund Working Paper. WP/18/17.
- Nachrowi, D. (2006). *Ekonometrika Untuk Analisis Ekonomi dan Keuangan* (1st ed.). Jakarta: Lembaga Penerbit Fakultas Ekonomi Universitas Indonesia
- Network, T. T. J. (2011) 'The Cost of Tax Abuse A briefing paper on the cost of tax evasion worldwide'.
- Sekretariat Kabinet Republik Indonesia. (2015). Catatan Tentang Inflasi 2014. Retrieved May 1, 2019, from <https://setkab.go.id/catatan-tentang-inflasi-2014/>
- Nizar, M. A. and Purnomo, K. (2015) 'Underground Economy Activities in Indonesia', *Munich Personal RePEc archive (MPRA)*, 21(July). Available at: <http://mpa.ub.uni-muenchen.de/65608>.
- Purnomo, Kuntarto. (2010). Estimasi Underground Economy di Indonesia Periode 2000 – 2009 Melalui Pendekatan Moneter. Thesis Program Magister Perencanaan dan Kebijakan Publik. Fakultas Ekonomi Universitas Indonesia. Jakarta : Universitas Indonesia
- Schneider, F., Buehn, A. and Montenegro, C. E. (2010) 'New Estimates for the Shadow Economies All over the World New Estimates for the Shadow Economies all over the World', (December). doi: 10.1080/10168737.2010.525974.
- Schneider, F. and Enste, D. (2000) *Shadow Economies Around the World: Size, Causes, and Consequences*. Journal of Intenational Affairs, Vol.53 No.2, pp. 413-431.
- Smith, P. (1994) 'Assessing the Size of the Underground Economy : the Statistics Canada Perspective', *Statistic Canada*, Catalogue(13).
- Suherman (2003) *Estimasi Model Permintaan Uang Kartal Indonesia 1990:I - 2002:IV Error Correction Model*. Thesis. Magister Perencanaan dan Kebijakan Publik Fakultas Ekonomi. Universitas Indonesia.
- Suseno and Solikin. (2002). *Uang: Pengertian, Penciptaan, dan Peranannya dalam Perekonomian*. Seri Kebanksentralan Bank Indonesia No.1. Bank Indonesia.
- Tan, Y.-L., Habibullah, M. S. and Yiew, T.-H. (2016) 'The Shadow Economy in Malaysia : Evidence from an ARDL Model', *International Journal of Economics and Management*, 10(September), pp. 261–277.
- Tanzi, V. (1980) 'The Undergrounf Economy in the United States: Estimates and Implications'. Colorado, pp. 427–453.
- Tanzi, V. (2002). The Shadow Economy , Its Causes and Its Consequences. In International Seminar on the Shadow Economy Index in Brazil. Brazilian Institute for Ethics in Competition (ETCO). Rio de Janiero.
- Undang-Undang Republik Indonesia. Undang-Undang Nomor 6 tentang Ketentuan Umum dan Tata Cara Perpajakan (1983). Presiden Republik Indonesia
- Undang-Undang Republik Indonesia. Undang-Undang Nomor 16 tentang Ketentuan Umum dan Tata Cara Perpajakan (2000). Presiden Republik Indonesia
- Undang-Undang Republik Indonesia. Undang-Undang Nomor 17 tentang Pajak Penghasilan (2000). Presiden Republik Indonesia.
- Undang-Undang Republik Indoneisa. Undang-Undang Nomor 18 tentang Pajak Pertambahan Nilai (2000). Presiden Republik Indonesia
- Undang-Undang Republik Indonesia. Undang-Undang Nomor 28 tentang Ketentuan Umum dan Tata Cara Perpajakan (2007). Presiden Republik Indonesia.
- Undang-Undang Republik Indonesia. Undang-Undang Nomor 36 tentang Pajak Penghasilan (2008). Presiden Republik Indonesia
- Undang-Undang Republik Indonesia. Undang-undang Nomor 11 tentang Pengampunan Pajak (2016). Presiden Republik Indonesia

- Vo, D. H. and Ly, T. H. (2014) 'Measuring the Shadow Economy in the ASEAN Nations : The MIMIC Approach', *International Journal of Economics and Finance*, 6(10), pp. 139–148. doi: 10.5539/ijef.v6n10p139.
- Wahyudi, S. T. (2016). Konsep dan Penerapan Ekonometrika Menggunakan EViews (1st ed.). Jakarta: Raja Grafindo Persada. <https://doi.org/330.015.195>
- Widarjono, Agus. (2017). Ekonometrika Pengantar dan Aplikasinya Disertai Panduan Eviews. 4th penyunt. Yogyakarta: UPP STIM YKPN
- Zaman, G. and Goschin, Z. (2015) 'Shadow economy and economic growth in Romania. Cons and pros', *Procedia Economics and Finance*. Elsevier B.V., 22(November 2014), pp. 80–87. doi: 10.1016/S2212-5671(15)00229-4