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Taxing the Underground Economy: The Case of Indonesia

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Abstract
This study examines the relationship between economic factors, particularly tax variables and the growth of underground economy in Indonesia. The study also examines the size of underground economy and loss in tax revenue. The approaches which were selected in this study to estimate the underground economy were based on tax audit and Multiple Indicator and Multiple Cause. The research finding suggests strong evidence that underground economy increases significantly in response to individual tax policy changes and the rise in the unemployment rate. Furthermore, an increase in tax awareness to pay and submit the tax returns were also confirmed would minimize the growth of the underground economy in Indonesia. As a last finding on the study, the size of underground economy in Indonesia between 2000 and 2008 were estimated on average at 20% of GDP.
Keywords: Underground Economy, Tax Evasion, Indonesia, GLLAMM

1. INTRODUCTION

This paper draws on the growing body of literature in tax policy studies to resolve the queries which originated from the growth of underground economy in Indonesia. The main questions are as follows:

a) What is the relationship between economic factors, in particular tax variables and the growth of the underground economy?
b) How big are the underground economy and the loss in tax revenue?

By answering these questions, this paper is expected to contribute in enhancing Indonesia's taxpayer compliance and reducing the growth of the underground economy.

This study is based on econometric analysis. The econometric analysis is based on data that covers the period between 2000 and 2008 in nine primary business sector bases. The taxation data is mainly collected from the Directorate General of Taxes (DGT) unpublished database and the general data is from the Central Bureau of Statistic (BPS). Other sources such as the World Bank Database, the International Monetary Fund, the Asian Development Bank and the Bank of Indonesia are also used.

The structure of the paper is as follows. First, in section two (literature review) we will present a brief theoretical framework of the underground economy and the empirical literature used in measuring the size of the underground economy. Past studies that had been carried out in an attempt to measure the underground economy in Indonesia are also presented. In section three (an overview of Indonesia's underground economy) will discuss the existing underground economy based on parameters tax audit results and multiple indicator and multiple causes analysis (MIMIC). The econometric analysis (MIMIC) is to investigate the causal variables that have influenced the underground economy indicators, and then try to estimate the size of the underground economy in Indonesia. The paper ends with section four (conclusion).

2. LITERATURE REVIEW

2. 1 Underground Economy

The nature of the underground economy appears to mean different things to macroeconomists, labor economists, criminologists, taxation specialists and national revenue accountants. In several languages, the term most often used is "black" economy (le travail au noir, Schwarzarbeit, svarta sektor).(Schneider and Enste, D, 2000). Obviously, no single definition or name of the underground economy is applicable and no consensus has been reached on the details.

The general definition employed in this paper for an underground economy is market economy activities that are parts of the informal economy and not included in the measured national income accounts. Moreover, in this study we emphasize only those underground economies which are related to tax evasion and not to criminal activities. This definition has been employed in other works by De Soto (1989) and Portes et al (1989).

2.2 Approaches in Measuring the Underground Economy

In the last twenty years, the quest to measure the size of the underground economy or to measure the invisibles has led to various measurement methods (Bajada, and Schneider,2005; Williams and Colin.C,2006). The different techniques that have been developed by scholar to estimate the level of underground economy would be as follows voluntary survey and samples; tax auditing; labor force estimates; very small enterprise approach;

electricity demand; income/expenditure discrepancies; indirect monetary approach; large denomination notes; the cash deposit ratio; currency demand; and the model approach - Multiple Indicator Multiple Cause (MIMIC)
A wide range of approaches in estimating the size of the underground economy gives us a choice to select the most appropriate approach for Indonesia's cases. We employ the direct approach and indirect approach in the estimation process. For the direct approach, we have selected the tax auditing approach, despite the fact that the tax audit selection is not based on a random and controlled sampling process. We believe that the estimation results are still reliable and able to see the nature of underground work in Indonesia.

The MIMIC was chosen as the comprehensive approach to estimate the underground economy in Indonesia. This approach would enable us to demonstrate reliable estimations because of two reasons. First, the MIMIC model increased the reliability, because it became possible to use information contained in multiple indicators of the underground economy, for example, monetary indicator and GDP per capita, through a single estimation process. Second, we could investigate the significances of the estimated effect of causal variables in the process of measuring the size of the informal sector. Moreover, in the MIMIC model, it became possible to investigate the different types of causal variable, for example, tax burden and intensity of regulation, in the estimations process.

2.3 Past Studies on Indonesian Underground Economy

Even though, studies of existence and growth of underground economy specifically in Indonesia are very limited, there are some past studies that are related to this subject. Wibowo, H Sasmita (2005) employed currency demand to estimate the size of underground economy in Indonesia. Schneider (2002, 2003) estimated the size of underground economy for 110 countries in 2002 and 145 countries in 2003. Schneider, Buehn and Montenegro (2010) estimated the size for 162 countries in 2010. The currency demand and MIMIC were employed in 2010. The latest cross countries analysis using currency demand approach was estimated by Embaye (2007).

The past studies had been measuring the underground economy in Indonesia by using macroeconomics and survey data. As a result, the nature of the underground economy in Indonesia was addressed in a general manner and therefore it was difficult to construct effective policy measures based on this estimate. For example, the enforcement as causal variables, Schneider (2010) used government effectiveness data from a survey data on perceptions and quality of public service. On the other hand, Embaye (2007) used measurement of the quality of bureaucracy and the rule of law from International Country Risk Guide. However, both indicators were too broad because enforcement activities in capturing the underground economy were mostly handled by tax authorities (conceal of income) and police (illegal transactions). Moreover, tax burden as one of the important causal factors in both studies was measured by the ratio of total tax revenue to GDP, which does not reflect the true effective tax rate because it still includes the penalties and interest from enforcement activities.

This study tries to fill the gap from previous studies in order to construct a reliable estimation for the Indonesian case. Closing the gap would allow us to draw some specific policy measures especially in tax area to reduce the growth of the underground economy. In a comprehensive model (MIMIC), the causal factors would be mostly draw from the taxation database.

3. AN OVERVIEW OF THE UNDERGROUND EKONOMY IN INDONESIA

3.1. Tax Audit

Through tax audit method, we try to estimate the size of the underground economy which can be reflected from the amount of tax gap revealed by audit results. Ideally, the tax gap investigation is based on a random and controlled sampling process. If the sampling process was random, it is straightforward to extrapolate the information retrieved in the tax audits to the whole population. Using sample weights according to tax payer characteristic, the information gained from the audit and non-compliance behavior of the randomly drawn taxpayer sample is then extrapolated to the rest of the population and aggregated.

The DGT in Indonesia, however, never employed such kind of program in order to measure the size of non-compliance taxpayers. The selection of taxpayers (tax return) to be audited in Indonesia is generated by two cases. The first case is mandatory by tax law in respect to the taxpayer's rights and obligations described as routine audit[1], and the second case audit which is performed when DGT has detected a risk or tax gap from specific business sectors or taxpayers described as risk based audits. Risk based audits are generated by bottom-up risk analysis[2] and top-down risk analysis[3].

Figure 1 provides an estimate for the underground economy generated from audit results between the period 1996 and 2008. The estimated underground economies were produced from tax assessment letter results during these periods with an average number of 50,000 letters per year. The underground economies during those periods were estimated to be at the level between 0.7% (1998) and 3.4% (2005) as a percentage of GDP. Given the previous studies of the size of the underground economy in Indonesia[4], these results strengthen the argument that this method suffers from underestimate problems because of un-randomly selected sampling data in measuring the level of tax compliances[5]. These results also having weaknesses because they lead only to point

of estimates, since it are unlikely that tax audits capture all underground economy activities. Moreover, tax audits are currently unable to provide estimates of the development and growth of the underground economy over a longer period of time.

3.2 Multiple Indicators And Multiple Causes Analysis

3.2.1 The Econometric Strategy

The MIMIC is a model in estimating the value of "unobservable parameters" which are called by scholars as "latent variables". The method examines the relationship among variables that are influencing a single latent variable and see the impact of these variables on the variables that are influenced by them. In this study, the underground economies are treated as a latent variable and are assumed to be influenced (caused) by parameters such as tax burden, unemployment, the intensity of the regulation, morality and enforcement (structural model). Because the underground economy developments are unobservable, these developments are assumed to be reflected in the developments in two indicators, namely GDP growth and money demand (measurement model). The details of the model are presented in Figure 2.

We estimate our model in STATA with Generalized Linear Latent and Mixed Models (GLAMM). GLAMM is a class of multilevel latent variable models for (multivariate) responses of mixed type including continuous responses, counts, duration/survival data, dichotomous, ordered and unordered categorical responses and rankings. The latent variable can be assumed to be discrete or to have multivariate normal distribution. Rabe-Hesketh et al (2004a,b) would provide further detail.

The basic assumptions for the possible cause and indicator of the underground economy are following Schneider and Bajada (2005, Page 81). In this study, the causal variables considered are as follows:

a) The burden of direct and indirect taxation, measured by the effective tax rate;
b) The burden of regulations measured by the number of tax regulation
c) The tax morality measured by the number of individual taxpayers submitting tax returns and tax enforcement activities;
d) The formal economy measured by the unemployment rate and foreign direct investments.

A change in the size of the underground economy may be reflected in the development of monetary indicators: if activities in the underground economy increase, additional monetary transactions are required, particularly if cash is used to avoid detection and growth in GDP per capita.

3.2.2. The Cause of Unreported Income

This section will consider a variety of theories and country specific data for the cause of the assumed rise in the unreported fraction of total income, bearing in mind the observation of Duncan (1975), who pointed out that "The meaning of the latent variable depends completely on how correctly, precisely and comprehensively the causal and indicator variables correspond to the intended semantic content of the latent variable". Table 1 presents the descritive statistic of the parameters during the period of observation.

3.2.2.1 Tax Burden

In existing literature, the most popular determinants of tax evasion are tax rates. A common hypothesis is that an increase in tax burden would raise the marginal benefits of evasion more than the marginal costs, and therefore encourage increased evasion (Cagan, 1958). Moreover, higher taxes encourage a shift of resources to the underground sector (Gutmann, 1977 and Feige, 1980).

In our econometric analysis, total tax burden is measured by the ratio of tax to net taxable income for corporate and individual taxpayers and the share of tax revenue as a percentage of gross domestic products. We collected data from Corporate Tax Return and Individual Tax Return classified in business sector with the time frame of 2000 – 2008. In the estimation process, the tax burden is expected to have a positive sign, which means that increasing the burden would create incentives to switch to the underground economy.

3.2.2.2 Intensity of Regulations

Another important factor, which limits the freedom of choice for individuals engaged in the official economy, is the increase of the intensity of regulations. Previous studies on underground economies have measured the burden of labor market regulations (e.g. minimum wages or dismissal protections), trade barriers (e.g. import quotas), and labor market restrictions for foreigners (e.g. restrictions regarding the free movement of foreign workers). Johnson, Kaufmann, and Zoido-Lobatón (1998b) have found significant overall empirical evidences of the influence of labor regulations on the shadow economy. This impact is clearly described and theoretically derived in other studies as well, e.g. for Germany (Deregulation Commission 1990/91). Their empirical evidence supports the model of Johnson, Kaufmann, and Shleifer (1997), which predicts, inter alia, that countries with more general regulation in their economies tend to have a higher share of the unofficial economy to total GDP. Friedman et al. (2000) reached a similar conclusion. In their study, every available measure of regulation is significantly correlated with the share of the unofficial economy and the estimated sign of the relationship between their measures of regulation and the shadow economy is unambiguously positive: more regulation is associated with a larger shadow economy.

In this study, we employ the same spirit as those of previous studies; namely, the burden of tax regulation is used as the variable that causes the growth of underground economy. The tax regulations are measured by the number of Tax Law, the Ministry of Finance Decree, and Director General of Taxes circular letter that influence taxpayer behavior. The variable measure in the econometric analysis that is denoted with "Taxrules" is the number of regulations that was published in the period of observation. We counted the number of regulation with respect to specific business sector but also considered general regulations that are applied to all taxpayers.

3.2.2.3 Tax Morale

Tax morale can be defined as a moral obligation to pay taxes, a belief to contribute to the society by paying taxes. Tax morale is also closely linked to what have been termed as taxpayer ethics, "the norms of behaviour governing citizens as taxpayers in their relationship with the government" (Song and Yarbrough, 1978, p. 443). Values and attitudes can affect individual behavior (Ajzen and Fishbein 1980 and Lewis 1982). Spicer and Lundstedt (1974) argued that the choice between tax compliance and evasion does not result only from sanctions but also from a set of attitudes and norms. A reduction in tax morale reduces the moral costs of behaving illegally and increases the incentives to work in the underground economy. Alm, Martinez-Vazquez, and Schneider (2004) argued that the size of the underground economy can serve as a useful, if somewhat imperfect, measure of the extent of tax evasion, so that a negative correlation between the size of the shadow economy and tax morale indicates the extent to which individuals' revealed actions are related to their attitudes about paying taxes.

Variables employed in measuring tax morality are the ratio of number of taxpayers who do not submit individual income tax returns to the total number of individual taxpayer within the business sector and the tax assessment growth. Since morality is articulated by individual ethics given the tax rules and regulations, in this study, we used individual income tax return data.

In this paper, the tax authority enforcement is measured through the growth of the number of tax assessments produced during the period of observation. Tax assessment letters are legal output products from tax audit activities. In particular, through this variable, we would like to see taxpayers' perception of the probability of being audited.

3.2.2.4 Official Economy

As demonstrated in a number of studies (Bajada and Schneider, 2005, Schneider and Enste,2006, and Feld and Schneider, 2009), the situation of the official economy also plays a crucial role in people's decision to work or not to work in the shadow economy. In a booming official economy, people have a lot of opportunities to get a job and earn a good salary in the official economy. This is not the case in an economy facing a recession; difficulty in finding jobs and efforts to compensate their income losses in the official economy push people to work in shadow economy activities. In order to capture this, we will use the unemployment rate as variables.

Unemployment variables are obtained through the ratio of differences from the employment rate in the business sector (1 - employment/population in productive age). Although economic theory does not indicate whether the expected sign of this variable is positive or negative, we believe that there is a positive causal relationship between unemployment and underground economy, because unemployment is believed to increase when many workers have greater incentives to participate in the underground economy. Therefore, we expect a positive sign.

Another determinant that causes the growth of underground economy from official economy is foreign direct investment (Nikopour, et.al 2009). There are two perspectives in viewing this issue. First, the shadow economy could grow because of the shifting of tax burden from capital to labor and consumption in order to attract FDI because of threat in tax revenue as results from tax competition. The rise of the tax avoidance industry has coincided with a trend towards using tax competition as a strategy for attracting inwards investment, with widespread use of export processing zones, accelerated depreciation rates, fiscal subsidies, preferential tax terms and tax havens (Christensen and Kapoor, 2004).

In contrast to the first view, FDI would affect economic growth and government tax revenues positively in a variety of ways and ultimately decrease the shadow economy. FDI will foster greater activity in domestic firms participating in the production chain, and thus, higher productivity of these firms is expected to provide additional channels for tax revenues to increase. Vacaflores (2006), who studied the impact of FDI on tax revenue in Latin America during 1980- 2002, found that FDI had a positive effect on central government tax revenues.

Furthermore, in this study we believe there is a positive causal relationship between FDI and underground economy in Indonesia, because of the ineffectiveness of tax incentives given to foreign companies. Therefore, we expect a positive sign. The variable was measured by the ratio of total Foreign Direct Investment in Rupiah to GDP.

3.3 The Measurement Indicator

In this study, we use two indicators that best capture and reflect the characteristics of underground economy activities, because of the difficulty in measuring the underground economy directly.

3.3.1 Gross Domestic Product

In this study we use the change of GDP as one of the indicators for the growth of underground economy. The rationale is that a shadow economy represents a life jacket for firms and individuals in financial troubles and for that reason, it increases when the GDP decreases. In fact, Indonesia experienced this effect in 1998 when the Asian Economic crisis hit. The informal sector acted as a primary social safety net especially when government policies and formal economy lost their power in stabilizing the economy's downturn. The underground economy is also considered as a safety valve for the employment problem. It is especially true in Indonesia with large and rapidly increasing labor force, while its economy is still small. Furthermore, the hypotheses that supports the sign to be minus for the relation between underground economy and growth rate is accepted as more credible. Eilat and Zinnes (2000), summarized a broad empirical literature and special attention was paid to previous studies in which a model approach was used. In previous literature, there is no agreement about the effects of the underground economy on economic growth.

3.3.2 Monetary Indicators

The rationale behind using monetary variables as indicators of the growth of underground economy is that many of the activities in it involve cash payments in order to avoid leaving traces which could lead to detection by tax authorities. Therefore, if this rationale is accepted, it is possible to estimate the underground economy by comparing the actual demand for cash with demand that could be expected if there were underground economy. In particular, the currency-ratio method estimates the changes in the currency compared to a wider monetary aggregates. In this study, we use M2 as a monetary indicator. M2 is the total of currencies, checking account deposits and savings account deposits.

3.4 The Methodology

In the previous section, variables for the causal factor of underground economy and the observable macroeconomic indicators have been discussed and specified. To further explain the relationship between the causal factors and the latent variable as well as the links among indicators used in the equation system for the estimation process, an analytical representation of the model are presented as follows:

The Structural Model

$$\Delta UG = \alpha_1.\Delta CITFIS + \alpha_2.\Delta PITFIS + \alpha_3.\Delta RevWitHoldTax + \alpha_4.\Delta VAT + \alpha_5.\Delta Unemployment + \alpha_6.\Delta Tax\ Rules + \alpha_6.\Delta UITR + \alpha_7.\Delta TAG + \alpha_8.\Delta FDI + \in \quad (1)$$

The structural coefficients are transformed in a first difference in order to be more stationary. Therefore, the latent variable also estimated in the same form of transformation.

The Measurement Model

$$\log(GDP) = \beta_1.\Delta UG + u_{GDP} \quad (2)$$

$$\log(Money\ Demand) = \beta_2.\Delta UG + u_{M0} \quad (3)$$

Where:

CITFIS	=	Tax burden as shown by the effective corporate income tax rate measured by corporate income tax paid divided by net fiscal income
PITFIS	=	Tax burden as shown by the effective individual income tax rate measured by individual income tax paid divided by net fiscal income (net income deduct with non taxable income, zakat)
RevWitHoldTax	=	Additional tax burden for individuals and corporate measured by the total withholding tax revenue divided by GDP
VAT	=	Additional tax burden for individuals and corporate measured by the total value added tax revenue divided by GDP
Unemployment	=	The rate of unemployment in the population age 15 - 65 year, measured by the differences of employment rate (1-employment /population in productive age)
Tax Rules	=	The intensity of regulations measured by the number of tax rules (Tax Law, the Ministry of Finance Decree, and Director General of Taxes circular letter)
UITR	=	Un-submitted individual income tax returns measured by the ratio of submitted individual tax returns divided by the number of individual taxpayers
TAG	=	The tax authority enforcement activity measured by the rate of growth of tax assessments
FDI	=	Foreign direct investment in Indonesia measured in the Indonesian Currency (Rp)

The following discussion is based on several statistical assumptions. The vector of all exogenous variables and disturbances is assumed to have a zero mean and to be identically and independently multi normally distributed across observations. The parameters would be estimated by maximum-likelihood techniques. By substituting the structural model into measurement model, we can derive a model which is no longer a function of the latent variable. This model is a system with right hand sides restricted to be proportional to each another. The proportionality restrictions constraint the structure to be a "one factor" model of the latent variable; with the additional of normalization, we achieve identifications of the parameter.

3.5 Regression Results

In order to obtain stable and robust estimation results, the identification procedure starts from the most general specification and continues by leaving out variables which are not statistically significant. Tax burden form corporate income tax (CIT), value added tax (VAT), the intensity of regulation (Tax Rules) and the tax incentives in the form of foreign direct investment (FDI) were dropped from the final model used for estimation because of statistically insignificance in initial regression results. All variables in the model were statistically significant. Furthermore, the model was well identified because it has relatively small condition number (107. 7) [6] and relatively high R squared in the fixed effect (0.49). The regression output is reported in Table 2.

As discussed in the previous section, the models were estimated by the maximum likelihood techniques, using GLLAMM that running in STATA ver.10 computer program. In GLLAMM the initial value for the fixed effect are estimated using conventional logistic regressions. Between Newton-Raphson steps to update the parameters, it goes through a set of iterations (six iterations to converged) to recalculate the adaptive quadrature location and weights for the new parameter values. Details of this implementation of adaptive quadrature are given in Rabe-Hesketh, Skrondal and Pickles (2005).

Most of the variable in Table 2 are statistical significant and behave consistently with the economic theory. The unitary appears in the tax morality variable, which can be interpreted that the effect of the variables on underground economy (latent variable), changes at about the same percentage. The estimated effect of changes in personal income tax, morality and unemployment are positive as predicted. Moreover, the tax enforcement variable is negative, also consistent with the prediction. The result contrary to expectations was the estimated negative coefficient for withholding's taxes. The fit of this equation is also very high in the model.

The burden from personal income tax (statistically significant at 0.1%) has the highest coefficient. An one percent change in the effective tax rate would increase taxpayers incentives to move to the underground economy by 17.5%. The results strongly suggested that direct taxes, especially for individuals supported the underground economy. The result implied that individual taxpayers are sensitive to the changes in tax policy. For example, an increase in individual income tax rates, would give more incentives to the taxpayer to shift to the underground economy. In contrast, the burdens of withholding taxes (statistically significant at one percent) are estimated to be negative (-9.112). The results have suggested that there are possible rooms to increase the burden of withholding taxes. The intensifications and expanding the tax base would be one of the policies that could be taken by the authorities in obtaining more tax revenue.

Other tax variables, namely tax morality and tax enforcement, have behaved as expected and have been statistically significant at five percent level. The tax morality measured by the submission of individual taxpayer tax returns suggests that people's willingness to report their income would be an important factor to consider. Taxpayer education and awareness are becoming more important aspects in building tax compliance society. The importance of simplicity of the tax system for taxpayers in reporting their income to tax authorities is also shown in the estimation result. Therefore, a reduction of tax morale reduces the moral costs of behaving illegally and increases the incentives to work in the underground economy (Spicer and Lundstedt, 1974).

Turning now to the tax enforcement, as presented in previous discussions, we measured this variable by the growth of tax assessment letters. The results suggested that even though statistically significant, when the tax authority increased their enforcement activities by one percent, taxpayers would change their behavior to comply and move from the underground economy only by 0.3%. The low magnitude of the taxpayer response as estimated in the equations could also be the results of un-random audits in measuring tax compliance.

Unemployment is also statistically significant as factors supporting the growth of the underground economy in Indonesia. An increase in unemployment rate by one percentage point would increase the underground economy by 8.8%. The results support Indonesia economic condition after the crisis condition, whereas the growth of informal sector business was enormous and able to generate economic growth of 4-5%. This estimate strongly suggests that the availability of job vacancy in Indonesia would be crucial and need to be tackled. Moreover, the Government of Indonesia should also give proper attention to the development of informal sector business, for example, through facilitation as much as formal business, in order to minimize the incentive of being underground.

3.6 Estimating The Size of Underground Economy in Indonesia

In order to obtain the time series values of the underground economy expressed as a percentage of GDP for the period between 2000 and 2008, we incorporated the benchmark or base year period into the final equation. To ensure greater accuracy of the benchmark, the year 1999 was chosen as the base year because there are several estimates of underground economy in that year.

The method of converting the underground economy index into the estimated size of the underground economy as percentage of GDP followed the Dell'Anno (2003) model as follows:

$$\eta_t = \eta * + \eta_{t-1} + \alpha\Delta X \qquad (4)$$

Where $\eta *$ = the base year and $\alpha\Delta X$ = the vector of structural coefficient estimated by MIMIC multiplied by the value of causal variables in the specific year. The time series results of the estimated size underground economy in Indonesia is presented in Figure 5. The highest percentage of the underground economy was reported in 2001 with 30.5% of GDP, while the lowest point was reported in 2003 at 15.1%.

The overall trends confirms with our expectation and economic theory, which predicts that the underground economy would be negatively correlated with GDP growth (Frey and Weck-Hannemann, 1984; Loayza, 1996; Kaufmann and Kaliberda, 1996; Eilat and Zinnes, 2000). In 2002 and 2003, the results showed an increase in GDP growth and a downturn trend for the relative size of the underground economy. Period between 2004 and 2005 also reported a similar pattern. However, the period between 2005 and 2008 reported an interesting pattern, GDP growth was stable but on the other hand the underground economy reported different pattern. From 2005 to 2006, the underground economy showed a downturn pattern, however, in the period between 2006 and 2008 the underground economy increased to almost the same level as in 2004. Further investigation would be needed to identify the leading factor of different trend in those periods.

3.7 Consequences of the Existence of the Underground Economy

By extending the above analysis, in this section we will discuss the cost of the underground economy in three different areas. The first two parts, namely the business sector tax compliance and the tax revenue loss, would be examined largely from the taxation aspect. As a contribution to policy studies in this area some policy proposals to increase tax revenues are drawn.

3.7.1 The Business Sectors Tax Compliance

In this part, we examine the pattern of underground economy index [7] between 2000 and 2008, in nine primary business sectors. Figure 4 reported the patterns of this index for nine business sectors during the observation period. In interpreting the results we should keep in mind the converting method in Equation 10[8]. Positive index means that the value would be increasing the estimated size of underground economy. Negative index would mean to reduce the estimated size of underground economy. The level without existing underground economy is when the index for the base year of the underground economy ratio adds up with the positive/negative index to be zero. Given the base year underground economy ratio at 22.05%, the average theoretical amount in nine business sector that generated level without underground economy existed is at -2.45 percent (-22.05/9).

The first five figures reports indices for business sectors which have positive indices. Manufacturing and construction sectors have shown an increasing pattern until 2008. The results suggest that the magnitude of the underground economy would likely to be strengthened in these sectors. Manufacturing, although capital intensive, is an activity in which households are also engaged with employing less capital-intensive technology. The result showed that the development of household manufacturing activities that are not captured in the statistical survey activity. Furthermore, construction also suggested a similar pattern, although the development of the small scale operators may not be captured by regular statistical data collections.

"Wholesale trade, retail and restaurant" and "transportation, storage and communication" also on average have positive indices'. The results confirmed the development of small scale trade operators, undersize restaurant, other eating places, and lodging that are not captured in statistical survey activity. "Agricultural, forestry and fishery" reported the same patterns. Even though those three sectors suggested their support in the development of underground economy, in 2007 and 2008 the development pattern were showed the downward trend in different of scales. This was showed the sectors in those years likely to shift to the formal economy.

The last four figures are listed business sector which have negative average underground economy index. A typical model of these industries is capital intensive and performed by large enterprises that are comprehensively covered in the regular statistics. Moreover, in finance insurance and business service sectors, companies also have to comply with a lot of financial regulation requirements such as from the stock market in order to conduct their business. Personal service sector which consists of employees, workers and professionals are well covered by regular survey statistics.

3.7.2 Tax Revenue Loss

Turning to the effect of underground economy on tax revenue collected by DGT, we measured the potential tax ratio from the estimated results. In calculating the potential tax ratio, we used the average tax rate for individuals as a proxy to be multiplied by the estimated underground economy to GDP ratio. Comparing the trend of actual

and estimated tax to GDP ratio between the period of 2003 and 2008, we observe that the actual tax ratio trend seems to be more flat than the estimated tax ratio. Given the assumptions that there is no identified massive change in Indonesia economic development, this figure showed that there have been no major improvements in Indonesia tax policy and administration in reducing the growth of underground economy[9]. The average estimate of the tax to GDP ratio including the underground economy during the period of observation is 15.6%, whereas the actual ratio according to World Bank database is only 11.8%, which leave the gap for 3.8%.

The estimates of the indicators are consistent with the hypothesis. Estimates of the causal equations showed that the unemployment rate and personal income tax burden have been the most important factors contributing to the growth of underground economy in Indonesia. Simulation with the model permits construction of a time series estimation of the size of the underground economy, as a percentage of GDP.

3.7.3 Possible Ways to Increase Tax Revenue

The deterioration of tax revenue due to un-captured underground economy activities should be discontinued by the implementation of specific fiscal policy options. Given the regression results that the burden of personal income taxes is sensitive to tax policy changes, while there is a clear need to increase tax revenue in Indonesia, the implementation of a single identification number seems to an appropriate policy choice, from the following reasons.

A single identification number would be a solution in strengthening individual taxpayer compliance without putting extra tax burden. Individual economic activities such as saving, spending and investing would be identified by the authorities. Moreover, the advantage of forcing the implementation of a single identification number in the tax system would be as follows:

a) The program would be able to merge all the economic activity data into single observation in measuring the taxpayer compliance level.
b) There would be less administration burden for taxpayers.

Increasing the objectivity and efficiency of selecting particular taxpayers for enforcement. A single identification number would provide an answer to how to select a particular taxpayer through a comprehensive database that enables tax authorities to make comparison among taxpayer compliance parameters.

The regression result for the tax burden proxy with withholding taxes was reported to have negative impact and was statistically significant. This result suggested that withholding taxes should be strengthened in order to reduce the magnitude of the underground economy in Indonesia. The enforcement through a comprehensive audit, especially for the withholding agents, coupled with tax base expansion would be expected to shrink the underground economy and increase tax revenues.

The analysis of the business sector that have greater risks of supporting the underground economy development has suggested that manufacturing and constructions are the sector that have increasing patterns of the underground economy index. The withholding tax Article 23 is largely subjected in these sectors[10]. As a result, DGT should strengthen the level of business sector compliance in these sectors. The obstacle to enforcement of policy efforts in this area is the human resource constraint. The DGT do not have enough number of auditors in the last five years after the modernization program started.

Turn into tax morale, regression results have suggested that an increase in the number of individual taxpayers not submitting tax returns would increase the underground economy. The data also implied that an increase in the public awareness of voluntary tax reporting and paying would increase the compliance level which would result in an increase in Indonesia tax revenue. Building public or national awareness should start by constructing high compliance taxpayer communities through enforcement, education and service program. How to make enforcement tools as policy options has already been discussed in the previous part, so the next part would discuss how to build an effective education and service program as a policy option.

Account Representative (AR)[11] plays a major role in the community based education programs. However, they had been given the contrary task based on the standard operating procedures which are monitoring and counseling. Removing the monitoring task to an automated system would be an effective policy options to strengthen the AR role of education part in building compliance in the community. This is because the increase of tax compliance would be more sustainable through changing the taxpayer mindset and attitude, than fear of punishment.

Nevertheless, the nationwide effort of building public awareness should be well planned. The DGT "marketing" program through public accountability report would also be needed build positive national perceptions of the tax laws and tax administrators.

4. CONCLUSION

The first finding of this study is related to the nature of the underground economy in Indonesia. Our analysis using Multiple Indicators and Multiple Causes (MIMIC) suggests strong evidences that the tax burden from personal income taxes and the unemployment rate play major roles in inducing underground economy in Indonesia. More precisely, we showed that the underground economy would increase significantly by individual

tax policy changes and by raising the unemployment rate.

The role of morality, proxied by the ratio of number of taxpayers who do not submit individual income tax returns, and tax enforcement, proxied by the growth of number of tax assessments, even though with less magnitude, are confirmed as having significant impact to the underground economy. An increase in tax awareness combined with tax enforcement would minimize the growth of underground economy in Indonesia. Interesting evidence found in tax burden from withholding tax, suggested possible rooms for expanding the tax base. Furthermore, the expansion would increase the tax revenue without enlarging the magnitude of the underground economy in Indonesia.

Our next findings suggested that the SME's in the manufacturing and construction business sectors are more likely to be in the underground economy. This result was obtained through the analysis of the underground economy indexes, which showed positive impact in both sectors and showed an escalating pattern during the observation's periods. The results were also confirmed by the electricity demand approach where the consumption patterns of the segment, comprised with SME's, have had the largest underground economy gap.

The final research questions to be addressed are concerns to the size of underground economy and its effect on tax revenues in Indonesia. Based on the estimation results, we find that the size of the underground economy in Indonesia would be negatively correlated with GDP growth. Given the base year in 1999, the results showed that in 2001 when the GDP growth reached the lowest point in the observation period, while the underground economy reached its peak level. The development of underground economy during the observation period showed a relatively downturn pattern.

This study also addressed the consequences of the underground economy development to the level of tax compliance for the business sector, the extent of tax revenue loss and the impact on the employment issue. We found that the higher risks in evading tax are observed in manufacturing and constructions. The conclusions were based on the underground economy indexes that were differentiated in nine primary business sectors. In particular, both of the sectors which showed a positive support for the underground economy development and showed the escalating pattern. Examining the impact of loss in tax revenue, we found that the underground economy had substantially deteriorated tax revenue collection. The uncollected tax revenue is confirmed to be on average at 3.8% GDP during the period of observation. In employment, the structure of labor force participation would be largely in the informal sectors.

REFERENCES

Aaron, Henry J, Slemrod, Joel (2004), *The Crisis in Tax Administration,* The Brooking Institution, Virgina

Allingham, M. G. And Sandmo, A. (1972), "Income Tax Evasion:A Theoritical Analysis", *Journal of Public Economics*, 1: 323-338.

Anderberg, Dan, Alessandro Balestrino and Umberto Galmarini(2003), "Search and Taxation in A model of Underground Economic Activities," *Journal Economic Inquiry* ,41:4, pp. 647-659.

Bhattacharyya, Dilip. K (1999),"On the Economic Rationale of Estimating the Hidden Economy," *The Economic Journal* ,109: June, pp. 348-359.

Bajada, Christopher and Friedrich Schneider (2005), *Size, Causes and Consequences of the Underground Economy: An International Perspective*, Ashgate Publishing Limited.

Becker, G.S (1968),"Crime and Punishment – An Economic Approach," *Journal of Political Economy* ,76:2, pp. 169-217.

Breusch, Trevor (2005), *Estimating the Underground Economy Using MIMIC Models*, The Australian National University.

Badan Pusat Statistik (2008), *Statistical Yearbook of Indonesia 2008,* Jakarta

Cowell, Frank A (1990), *Cheating the Government: The Economic Evasion*, MIT, USA.

Dabla Norris, Era and Andrew Feltenstein (2003), "An Analysis of the Underground Economy and Its Macroeconomic Consequences," *IMF Working Paper*, WP/03/23.

Dell'Anno, Roberto (2003), "Estimating the Shadow Economy in Italy: a Structural Equation Approach," *University of Aarhus Working Paper,* 2003 – 07.

Embaye, A (2007), "Underground Economy Estimates for non-OECD Countries Using Currency Demand Method, 1984 – 2005," *MPRA Paper*,20308, pp. 23-58.

Feige, Edgard.L (1979), "How Big is The Irregular Economy?," *Challenge*, 22, pp.5-13.

Feige, Edgard.L (1990), "Defining and Estimating Underground and Informal Economies: The New Institutional Economic Approach," *World Development*, 18, pp. 989 -1002.

Faal, Ebrima (2003), "Currency Demand, the Underground Economy, and Tax Evasion: The Case of Guyana," *IMF Working Paper*, WP/03/7.

Giles, EA David and Betty J Johnson (2002), "Taxes, Risk Aversion and The Size of The Underground Economy: A Nonparametric Analysis with New Zealand Data," *Journal Pacific Economic Review* ,7:1, pp. 97 – 113, Blackwell Publisher

Guttman, P.M (1977),"The Subterranean Economy," *Financial Analysts Journal*,33, pp.24-27.
Hamilton, Lawrence.C (2006), *Statistic with STATA: Updated for Version 9*, Thompson Brooks/Cole, Canada
Hill, Roderick and Mohammed Kabir (1996), "Tax Rates, the Tax Mix and the Growth of the Underground Economy in Canada: What Can We Infer?," *Canadian Tax Journal/Revue Fiscale Canadienne* , 4: 6, pp. 1552-83.
Joreskog K., Goldberger A.S. (1975), "Estimation of A Model with Multiple Indicators and Multiple Causes of A Single Latent Variable," *Journal of the American Statistical Association*, 70, pp. 631 – 639.
Loayza, Norman. V (1996), "The Economics of the Informal Sector: A Simple Model and Some Empirical Evidence from Latin America," *Carnegie-Rochester Conference Series on Public Policy*, 45, pp. 129-162.
OECD (2002), *Handbook for Measurement of the Non Observed Economy*, Paris.
Tanzi, Vito (1983), 'The Underground Economy in United States," *IMF Staff Paper*, 30, pp. 283-305,
Rabe-Hesketh, Sophia, Andreas Skrondal, and Andrew Pickles (2004a), "Generalized Multilevel Structural Modeling," *Psychometrika*, 69:2, pp. 167 – 190.
Rabe-Hesketh, Sophia, Andreas Skrondal, and Andrew Pickles (2004b), "GLLAMM Manual," *UC Berkeley Biostatistic Working Paper*, 160.
Rabe-Hesketh, S. and Skrondal, A. (2008), *Multilevel and Longitudinal Modeling Using Stata (Second Edition)*, College Station, TX: Stata Press
Sasmito H. Wibowo and Subhash C. Sharma (2005), "Estimating the size of Underground Economy in Indonesia," *Indian Journal of Economics*, 340, pp.1-12.
Schneider, Fr and Enste, D (2000), "Shadow Economies Around the World: Size, Causes and Consequences," *IMF Working Paper*, WP/00/26.
Schneider, Friedrich (2002), "Size and Measurement of the Informal Economy in 110 Countries Around the World," Paper Presented at Workshop of Australian National Tax Centre, Canberra.
Schneider, Friedrich (2003), "Shadow Economy of 145 Countries all over the World: Estimation Results over the Period 1999 to 2003", *IZA Discussion Paper*, 1431.
Schneider, Friedrich, Andreas Buehn and Claudio E.Montenegro (2010), "Shadow Economies All over the World New Estimates for 162 Countries from 1999 to 2007," *World Bank Policy Research Working Paper*, 5356.
Williams, Colin.C (2006), *The Hidden Enterprise Culture: Entrepreneurship in the Underground Economy*, Edward Elgar, UK
Wooldridge, Jeffrey. M (2009), *Introductory Econometrics: a Modern Approach*, South-Western, Canada

Notes

Notes 1. Routine tax audit cases are generated by tax returns declaring overpayments; tax returns declaring losses; and taxpayers who have exercised mergers, acquisitions, spin offs and liquidations.

Notes 2. Bottom-up risk analysis is a manual case selection system in risk based audit to indentify high risk non-compliance taxpayers performed by Small Tax Offices. The risk analysis is based on unusual conditions embedded in taxpayers that are found in tax return data, taxpayer compliance patterns and third parties information.

Notes 3. Top-down risk analysis is a computerized case selection system in risk based audit that was performed by Regional Tax Offices and the Headquarter. The system would extract non-compliance taxpayers based on scoring results that show high possibility of being tax evaders found from internal data elements (income tax and VAT return, withholding tax receipt, VAT invoice, etc), external data (custom and excise data, ownership of property, etc) and tax auditing history

Notes 4. In a previous study, one of the scholars, Schneider (2010), estimated the underground economy in Indonesia between 1996 and 2007 to be at the level of 19.9 %.

Notes 5. The largest tax audit assignments were from routine tax audits. As a result, routine tax audits that are performed to fulfill taxpayer rights (mainly tax refund), have produced tax assessments those are likely to be underestimates. These are because routine audit looses their element of surprise since taxpayers are aware of being audited in the following year as consequences of tax returns declaring overpayments.

Notes 6. The condition number would be enlarging when the Hessian Matrix is nearly singular (the model not well identified)

Notes 7. The underground economy index is the vector of structural coefficient estimated by MIMIC multiplied by the value of causal variables in specific period of year. In Equation 10 it is denoted as "$\alpha\Delta X$"

Notes 8. Equation 10 is the selected method in converting the underground economy index into estimated size of underground economy as percentage of GDP

Notes 9. Tax ratio indicates how far the government's ability to collect tax revenues. Logically, a country

with high tax ratio is representing an excellent performance of the country's tax collection

Notes 10. Almost all types of income (31 types) that are subjected to article 23 are in the manufacturing sector. For example, technical services, management services, manufacturing services, installation (electricity, machinery, etc), waste processing, etc

Notes 11. Account Representative is tax officials responsible for monitoring and counseling services directly to a particular taxpayer who has been assigned to him. The main duties of AR are monitoring tax compliance through cross check third parties data with DGT information systems, updating taxpayer profile, monitoring the audit and appeal process, assisting taxpayers in obtaining clarification or ruling regarding their case, informing taxpayers about the tax laws and regulations and answering taxpayer questions regarding tax issues.

Table 1: Descriptive Statistic, 2000 – 2008

Variable	Obsv	Mean	Standard Deviation	Minimum	25%	Median	75%	Maximum
Tax Burden								
CITFIS	81	0.873	1.835	0	0.269	0.349	0.515	13.061
PITFIS	81	0.024	0.018	0.0001	0.011	0.021	0.031	0.074
RevWitHoldTax	81	0.021	0.028	0.00006	0.003	0.011	0.023	0.119
VAT	81	0.025	0.021	0.00002	0.004	0.022	0.038	0.079
Intensity of the Regulation								
Taxrules	81	229	75.351	132	168	230	312	347
Tax Morale								
UITR	81	0.655	0.177	0.0898	0.571	0.667	0.749	0.967
TAG	81	0.149	0.508	-0.5	-0.11	-0.002	0.257	2.533
Official Economy								
Unemployment	81	0.03	0.036	0.0004	0.003	0.015	0.038	0.139
FDI	81	0.067	0.127	-0.0444	0.01	0.025	0.065	0.786

Table 2: Regression Results

Dependent Variable: UG	Coefficient	Standard Error	Z	P>|Z|
Personal Income Taxes (PITFIS)	17.468***	4.453	3.92	0.000
Withholdings Taxes (RevWitHoldTax)	-9.112**	3.346	-2.72	0.006
Unemployment (unemployment)	8.817***	2.428	3.63	0.000
Tax Morality (UITR)	1.180*	0.564	2.09	0.036
Tax Enforcement (TAG)	-0.328*	0.165	-1.99	0.047
Indicator - Money	1.105	0.055		
R-squared (Fixed Effect)	0.499			
RMSE (Fixed Effect)	0.751			
Log likelihood	-97.2			
Condition Number	107.714			

Notes: *** Statistically significant at 0.1%; ** significant at 1% and * significant at 5%

Tabel 3: The Size of the Indonesia Underground Economy in 1999 (as Percentage of GDP)

Researcher	Methods	1999
Schneider, Buehn and Montenegro (2010)	DYMIMIC	19.1
Wibowo and Sharma (2005)	MIMIC	25.0
Average		22.05

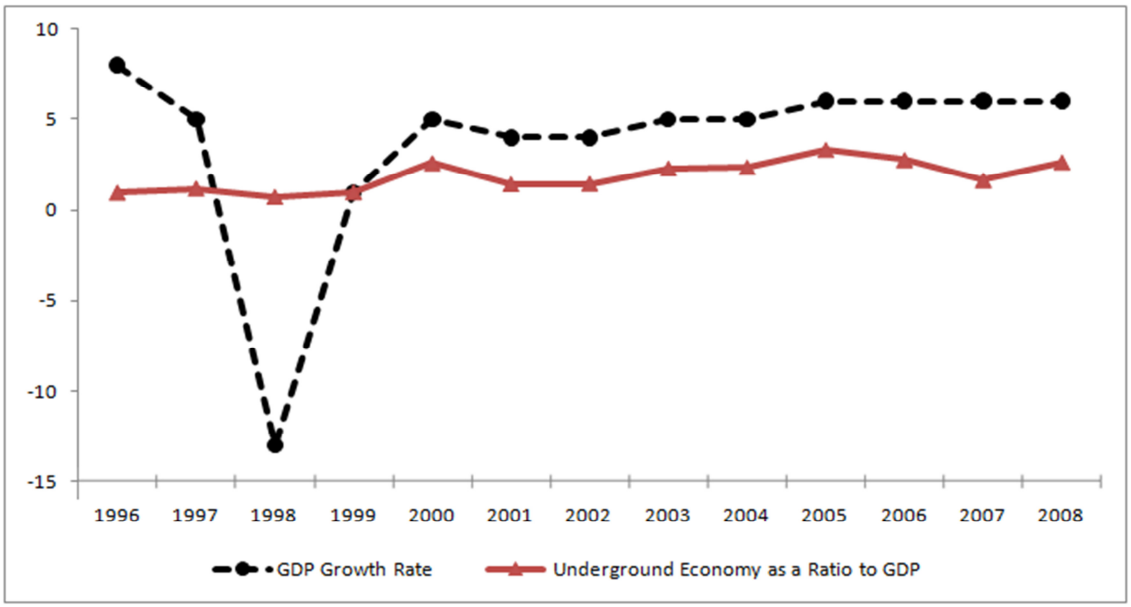

Figure 1: The Underground Economy, Estimated from Tax Audit Results (in Percentage)

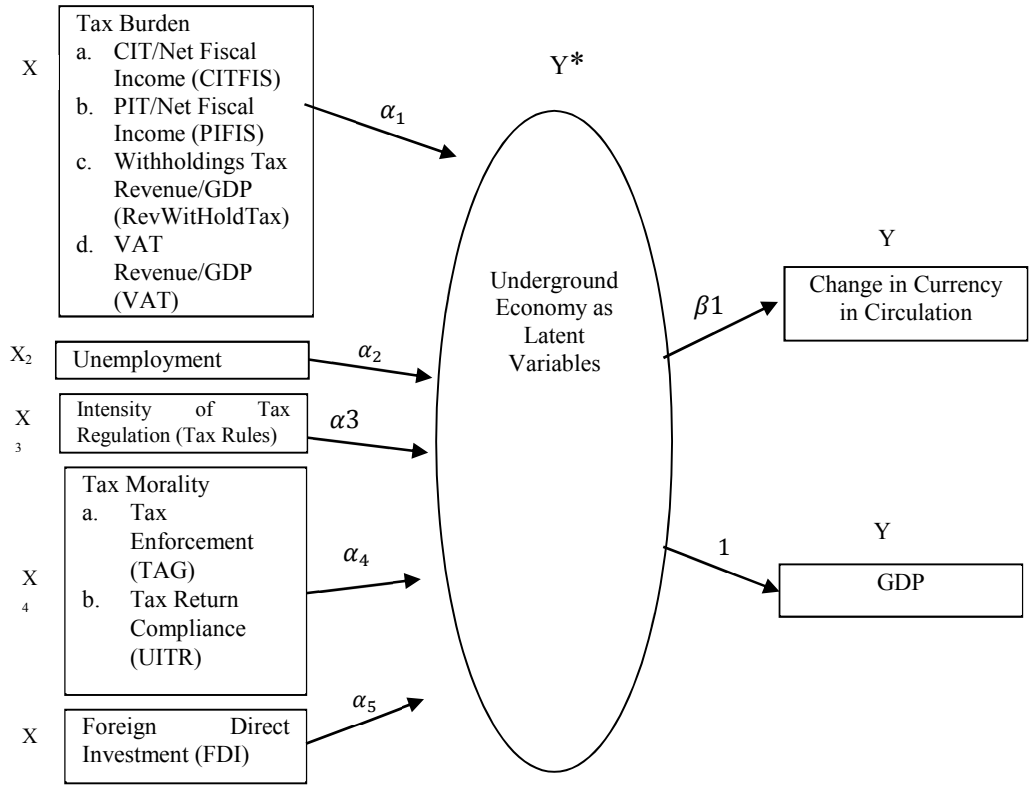

Figure 2: The Underground Economy Estimation Model

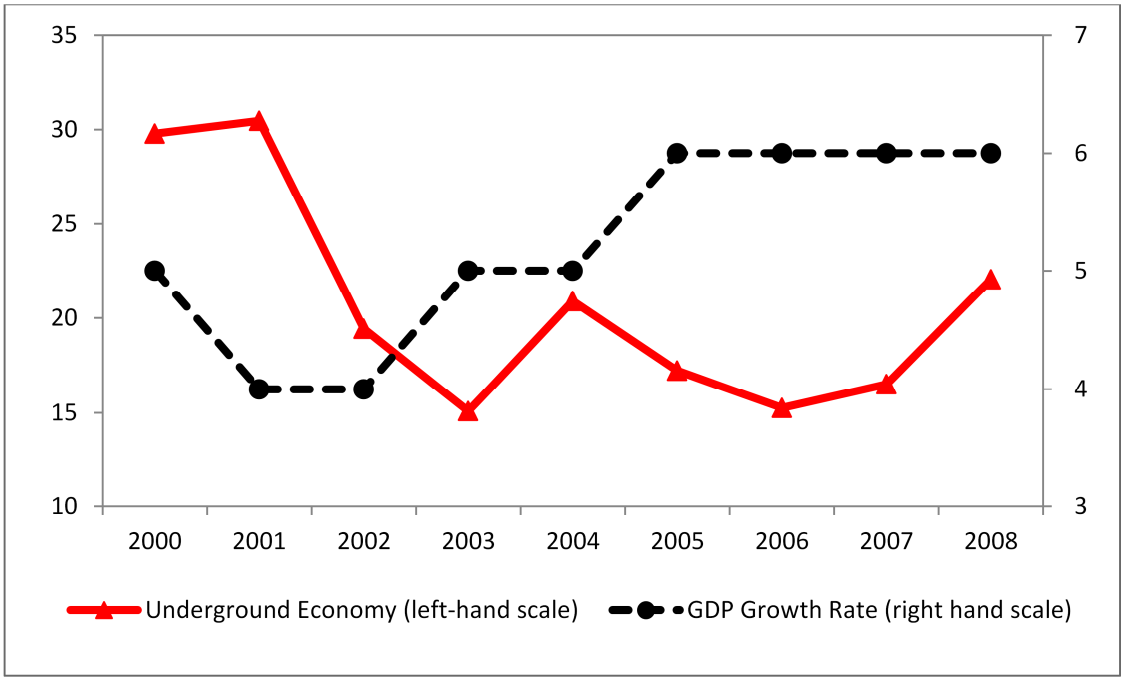

Figure 3: The Underground Economy, Estimated by MIMIC (in Percentage of GDP)

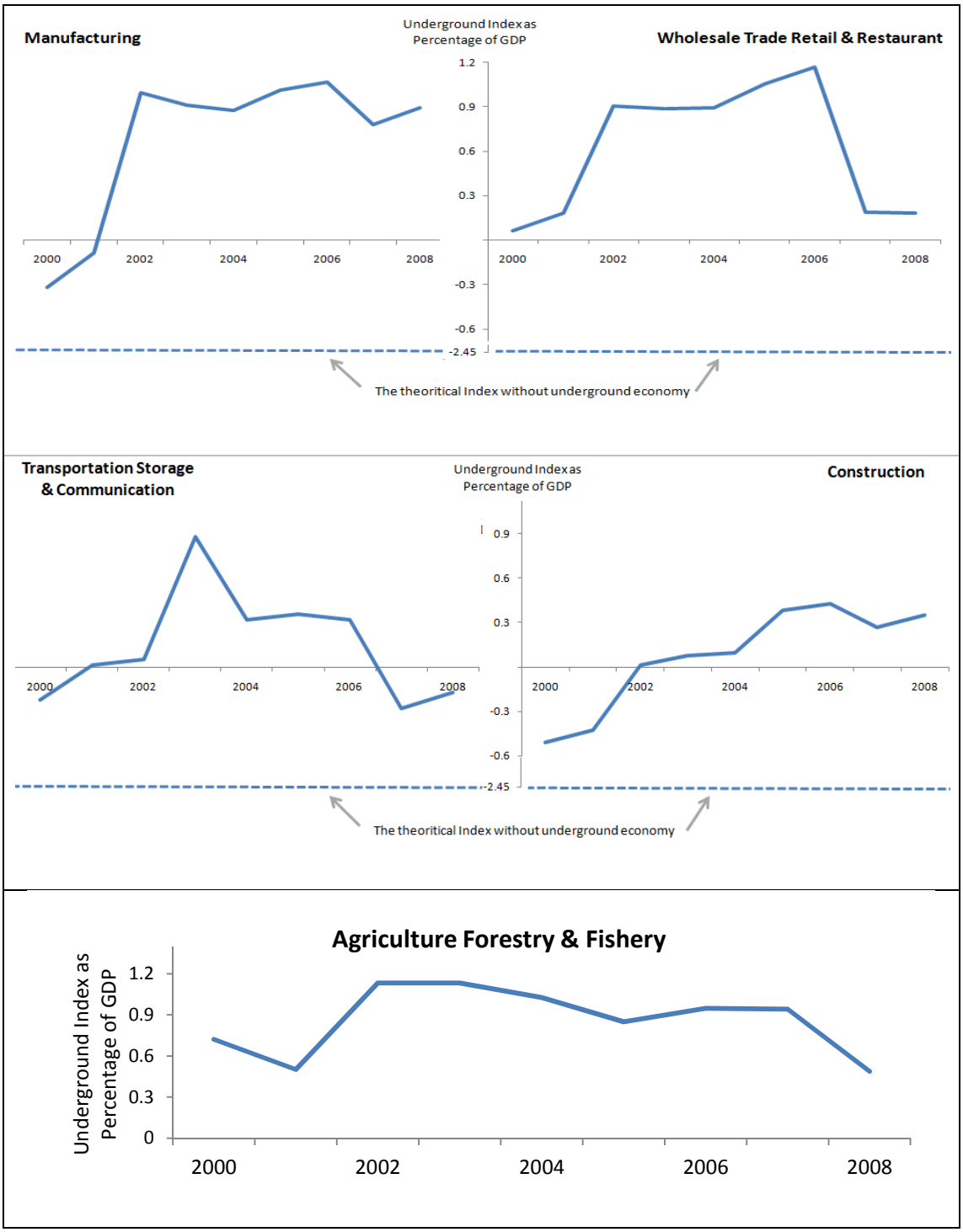
Manufacturing
Underground Index as Percentage of GDP
Wholesale Trade Retail & Restaurant
1.2
0.9
0.6
0.3
-0.3
-0.6
-2.45
2000
2002
2004
2006
2008
The theoritical Index without underground economy
Transportation Storage & Communication
Underground Index as Percentage of GDP
Construction
0.9
0.6
0.3
-0.3
-0.6
-2.45
2000
2002
2004
2006
2008
The theoritical Index without underground economy
Agriculture Forestry & Fishery
Underground Index as Percentage of GDP
1.2
0.9
0.6
0.3
0
2000
2002
2004
2006
2008

Figure 4 - *Continued*

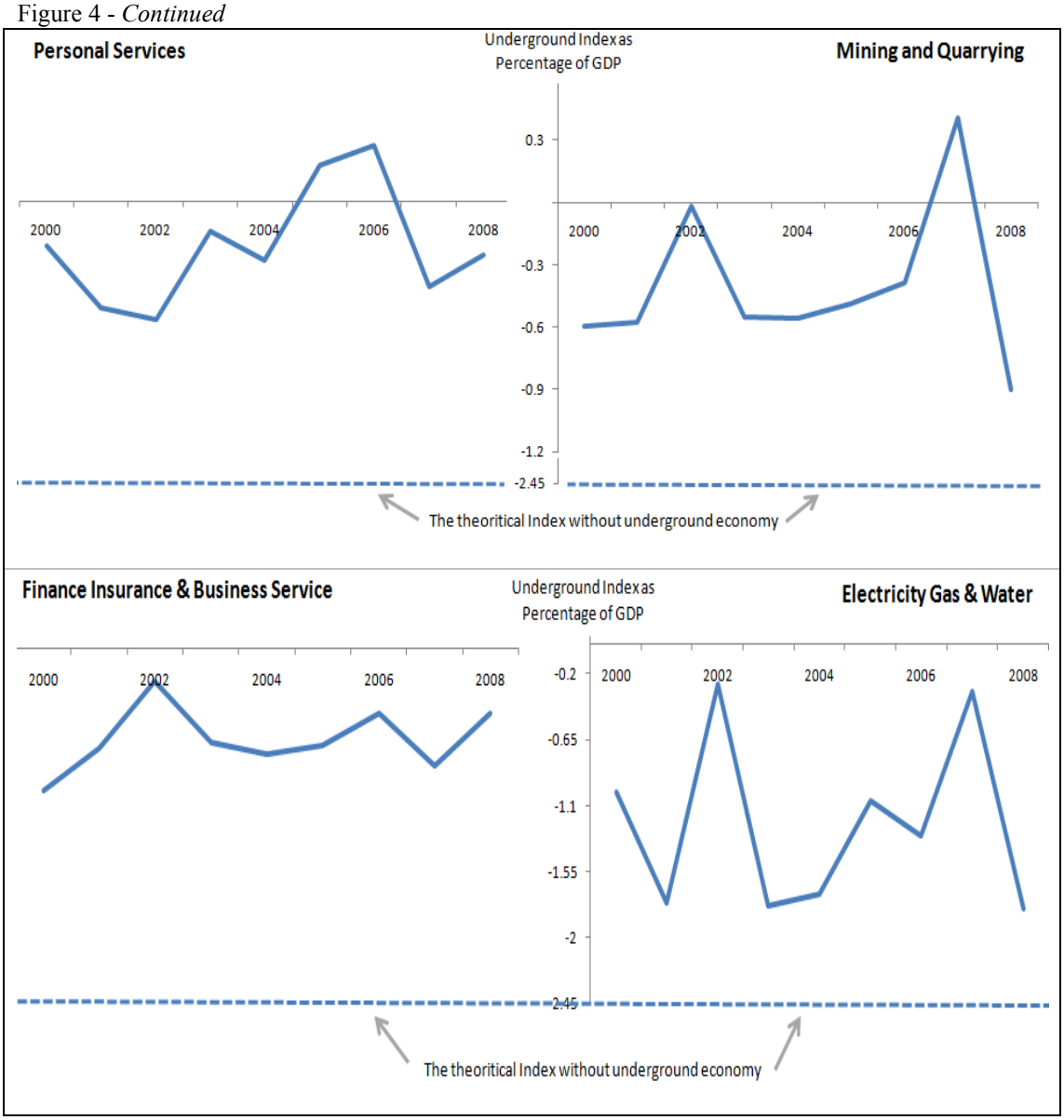

Figure 4: The Business Sector - Underground Economy Index

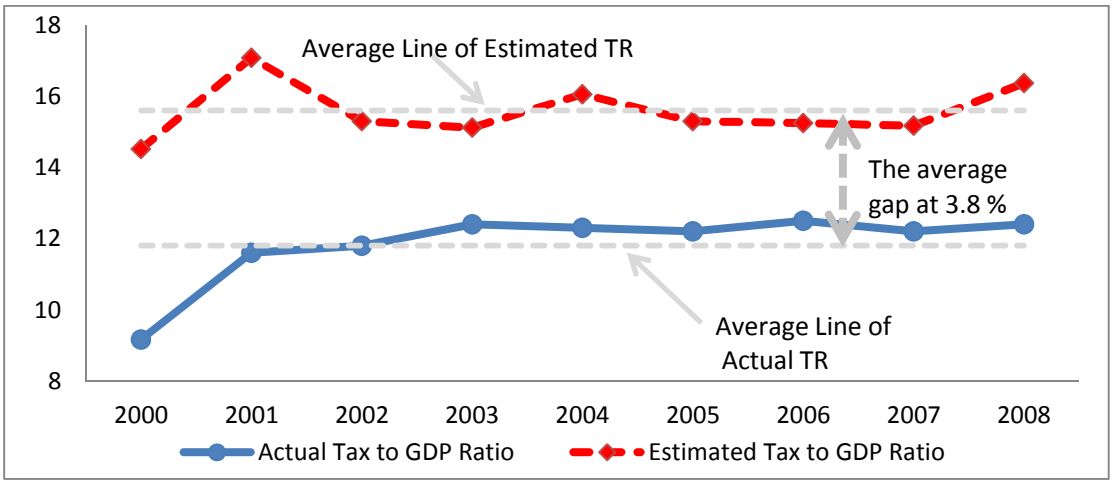

Figure 5: The Tax to GDP Ratio

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