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Paper 4.

Measuring the size of the non-observed economy in Mongolia using some indirect methods

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1. BACKGROUND

The United Nations recommended to its member countries to include the value added created by non-observed economy in the estimates of GDP according to revised version of the 1993 System of National Accounts.

Point 1.5.1 of the Government of Mongolia’s *Action Plan of the Government Program on Good Governance for Human Security* announced plans to measure the size of non-observed economy. However, it has not yet been implemented in full.

The results of the *Informal Sample Survey* which was conducted in 2000, showed that value added created by this sector measured approximately 13 percent of the official GDP.

From the above it can be concluded that the Non-observed economy has been contributing significantly to GDP in Mongolia as a transition country. Unfortunately, besides the small informal sector surveys conducted in 1997 and 2000, no serious study and research of the Non-observed economy has carried out in Mongolia.

Mongolia’s official GDP estimates do not yet include estimates for value added in the non-observed economy.

2. OBJECTIVES OF THE STUDY

This study is different from traditional studies because it tries to measure the size of Non-observed economy in Mongolia using some indirect methods.

Therefore the main objective of study is make experimental estimates of the size of Non-observed economy in Mongolia using some indirect methods.

3. RESEARCH PROBLEM

The problems of my research are as follows:

- Each method for estimating NOE has disadvantages and the different estimates must be cross-checked and compared. Clearly, the estimates given here are experimental first estimates.
- In the transition countries such as Mongolia, many data are of poor quality.
- No previous information for NOE in Mongolia so there is no reference point for my estimates.

4. FRAMEWORK OF THE STUDY

The basic assumptions and work methods are as follows:

- Total nominal GDP, currency circulation and demand deposits include both official and unofficial transactions.
- The Non-observed economy consists of three main types: underground or hidden production, illegal production and informal sector activities
- The Non-observed economy transactions tend to be in cash.
- Consumption is relatively more accurately measured than value added.

Data generation: Quantitative continuous variables, secondary data , time series data such as annual, documentary sources:

1. Estimates based on Supply and Use table and the Input and Output table for 2000. Here the dependent variable is the discrepancy between Total Supply and Total Uses. The independent variables are Total Supply or GDP by production and Total uses or GDP by expenditure
2. Estimates based on a Monetary methods namely one using an equation with annual time series data. Here the dependent variable is the size of the non observed economy. The independent variables are currency circulation, demand deposit and income velocity.
3. Estimates based on the Electricity consumption method based on an equation. Here the dependent variable is size of Non- observed economy. Independent variables are growth rate of electricity consumption and official GDP, GDP at current prices and elasticity of output with respect electricity consumption

5. THE METHODS TO ESTIMATE THE SIZE OF NON-OBSERVED ECONOMY

Measuring non-observed economy is not an easy task. How can a researcher estimate or measure something which is hidden? In general, there are two approaches that use different assumptions in case of measuring non-observed economy. These two approaches are called direct and indirect approaches.

5.1 Direct approaches

These approaches are also called micro approaches since they use well-designed surveys and samples based on voluntary replies or tax auditing. Surveys were used in many studies. But it has a big disadvantage. The reliability of survey results completely depends on respondents' answers. If respondent answers the questions without fraud, surveys can yield reliable conclusions. But if respondent does not answer the questions correctly, it yields misleading conclusions. This method can yield detailed information about non-observed economy when detailed questions are answered honestly. This is the biggest advantage in favor of the direct method.

5.2 Indirect approaches

On the contrary to micro approaches, indirect approaches are macroeconomic approaches. These approaches are also called indicator approaches since they employ many economic indicators that give information about development of the non-observed economy over time. Indirect approaches consist of Gross Domestic Product (GDP) approach, employment approach, monetary approach and electricity consumption approach. In this study only indirect methods have been used

6 THE EXPERIMENTAL ESTIMATES THE SIZE OF NON-OBSERVED ECONOMY IN MONGOLIA USING SOME INDIRECT METHODS

6.1 ESTIMATES BASED ON SUPPLY AND USE TABLE, INPUT AND OUTPUT TABLE FOR 2000

A. Supply and use table

Supply table

The main purpose of Supply table is to determine volume of supply of goods and services by type of product. Supply table consists of two components: domestic output and imports. Matrixes for output and imports have the same structure of rows /by products of goods and services/ but columns vary.

Output matrix is very important for Supply table. Here output of the economy has two dimensions. Goods and services by product types are presented in rows and industries in columns. Whole table presents goods and services by type of products produced by the industries.

Goods and services of Output matrix are valued at basic prices. Here taxes, subsidies, trade and transport margins are excluded.

The imports are also presented by type of commodities and services.

Use table

Use table consists of two parts: intermediate and final consumption by industries /in columns/ and value added by industries.

Intermediate and final consumption are both presented by goods and services. Final consumption is presented by exports, household consumption, government consumption, and NGO's consumption, gross capital formation, changes in inventories and valuables.

The matrix can be constructed as following;

- a. Part for intermediate consumption
- b. Part for final consumption
- c. Part for value added.

Intermediate and final consumption are valued at purchaser's prices.

The rows of supply and use tables should be the same.

Total supply, at purchaser's prices = Total use, at purchaser's prices

Gross output, by industries, at basic prices = Total intermediate consumption at purchaser's prices, by industries + value added by industries

Use table consists of intermediate consumption by industries, final consumption of Households, General government and NGO's, gross capital formation, inventories, valuables/ and exports. They are all valued at purchaser's prices.

The discrepancy between supply and use are estimated at purchaser's prices. It shows the weaknesses of data coverage that are used for compilation of GDP.

The estimates of total use and supply for SUT 2000 differs considerably. Total use exceeds total supply by 164.9 bln.togrog or 5.5 percent

Certain estimates of SUT and GDP are shown in the following table:

Table 1. Comparison of estimates of GDP
(production approach)

bln. Togrog

	Actual GDP for 2000	SUT compiled by actual 2000	Comparison between SUT, GDP estimates (%)
1. Gross output (at producer's prices)	2089.7	2153.1	103.0
2. Intermediate consumption (at purchaser's prices)	1070.8	1085 .8	101.4
3. GDP (at producer's prices)	1018.9*	1067.3	104.8

Note: * This estimates includes value added of informal sector which resulted from the informal sector sample survey conducted in 2000. It is approximately 11 percent of the official GDP for 2000.

Data sources: 1. Annual estimates of GDP for 2000 and Compilation of SUT for 2000. NSO of Mongolia , Dec.2003

Above table shows that GDP for 2000 compiled by production approach has a discrepancy from value added of SUT 2000 at producer's prices by 4.8 percent.

Table 2. Value added estimated by SUT that are not covered in GDP annual compilation (production approach) bln.tog

1. Discrepancy between total supply and use or gross output that are not covered by GDP estimates (at producer's prices)	164.9
2. Intermediate consumption derived from above gross output	84 .5
3. Value added that are not covered by GDP estimates (as a difference from SUT)	80.4
4. Percentage share of value added that are not covered by GDP 2000	7.9

Data sources: Compilation of SUT for 2000. NSO of Mongolia , Dec.2003

The discrepancy between total supply and use is considered to be gross output not covered by GDP. After deducgting intermediate consumption the total value added that is not covered by GDP stands at 7.9 percent of GDP.

As we add 4.8 percent, from the table 2, which is the discrepancy between GDP and SUT estimates, it can be summarised that value added of 12.7 percent of GDP is not covered in the annual estimates of GDP for 2000.

The results of the experimental estimates on SUT for 2000, showed that value added created by non-observed economy of Mongolia measured approximately **13 percent** of the official GDP.

B. Input and output table

In several developed countries the size of the non-observed economy and its sector composition has been estimated using IOT (data of same year that IOT has been compiled). The IOT is compiled according to “cost and products” general methodology and it is considered as a basic model of the IOT.

The IOT is particularly valuable because it provides a basis to assess production and expenditure approach differences by industries. Furthermore, it gives a frame and base to conduct informal sector survey. According to the IOT table for 2000 gross output was 353 billion togrogs higher than the gross output calculated in the official GDP figures for that year. If this is assumed to be all due to the non-observed economy, gross output in the NOE amounts to 17 percent of gross output.

Certain estimates of IOT and GDP for 2000 are shown in the following table:

Table 3. Comparison of estimates of GDP
(production approach)

	bln..togrog		
	Annual estimates for 2000	Estimates of IOT for 2000	Comparison between IOT, GDP estimates (%)
1.Gross output (at producer's prices)	2089.7	2442.7	116.7
2. Intermediate consumption (at purchaser's prices)	1070.8	1255.8	117.3
3.GDP (at producer's prices)	1018.9*	1186.9	116.5

Note: *-This estimates covered by value added of informal sector which is result of informal sector sample survey conducted in 2000. It is approximately 11 percent of the official GDP for 2000.

Data sources: 1.Annual estimates of GDP for 2000 and Compilation of IOT for 2000. NSO of Mongolia , Dec.2003

The above table shows that GDP for 2000 compiled by production approach has a discrepancy from value added of IOT 2000 at producer's prices by 16.5 percent. Thus the results of the experimental estimates on IOT for 2000, showed that value added created by non-observed economy of Mongolia measured approximately **17 percent** of the official GDP.

6.2 ESTIMATE BASED ON ON SIMPLE CURRENCY RATIO METHOD

Simple currency ratio method was applied for the period between 1989-2002 for Mongolia. Data was examined for period 1989-2002 due to the structural economic changes occurred after 1989. Therefore, the year 1989, where the ratio of currency in circulation to deposits is minimum as 0.444, is selected as the base year.

In order to estimate the size of the non-observed economy, it is necessary to choose a base year. Namely, it is assumed that there is no non-observed economy in 1989. This is the year that transition began in Mongolia and so the assumption is that NOE is mainly a feature of market economies.

By using this method, the following results are obtained for Mongolia :

Table4. Compilation of Simply currency ratio method

	Currency in circulation (mln.tog) (C)	Demand deposit (mln.tog) (D)	C/D= k	GDP (mln.tog) Y _r	Income velocity ($V_r = Y_r / (C_r + D_r) = V_u$)	Size of NOE (mln.tog) $Y_U = Y_r \frac{(C - k_r D)}{(k_r + 1)D}$	NOE/Official ($Y_u * 100 / Y_r$)
1989	581.1	1309.1	0.444	10730.9	5.677	0	0
1990	742.1	883.2	0.84	10465.0	6.439	2871.6	27.4
1991	2003.0	2601.1	0.77	18909.6	4.107	4269.8	22.6
1992	2896.4	5412.1	0.535	42298.0	5.091	2670.6	6.3
1993	10786.1	24215.8	0.445	194835.9	5.566	191.0	1.0
1994	21804.8	43905.8	0.497	324400.7	4.937	11822.8	3.6
1995	29755.7	59408.1	0.501	754442.6	8.461	21670.8	3.9
1996	46095.6	64093.7	0.719	646559.3	5.868	123218.3	19.0
1997	56816.5	93956.6	0.605	832635.6	5.522	92688.2	11.1
1998	61754.2	84667.6	0.729	817393.4	5.582	161538.4	19.8
1999	91576.5	105341	0.869	925345.8	4.699	272563.0	29.4

2000	107394.0	128068	0.839	1018886.0	4.327	278408.6	27.3
2001	119206.0	174909	0.682	1115641.0	3.793	183518.0	16.4
2002	134643.0	282398	0.477	1240787.0	2.975	28170.8	2.3

Data sources: Statistical bulletin, Mongol bank Dec.2002

The results of the experimental estimates based on Simply currency ratio method for 1989-2000, showed that value added created by non-observed economy of Mongolia measured approximately **27 percent** for 2000, but annual average approximately **20 percent** / $(27.3+16.4)/2$ / for 2000-2001 of the official GDP.

Note that these experimental estimates on the Simple currency ratio method for 1989-2000 depend on the ratio of currency circulation to demand deposits in the base year as 1989.

6.3 ESTIMATES BASED ON ELECTRICITY CONSUMPTION METHOD

Using 1990 as the base year, let us now estimate the shares of the official and non-observed economies of Mongolia with the following assumptions.

First, let us assume that the share of the non-observed economy in 1990, the base year, in Mongolia was 15%, while the official economy's share was 85%. Originally, in the estimates by Kaufmann and Kaliberda (1996), they assumed that the base year's share of the non-observed economy in European transition economies would be 12 % of the overall economy. However a more recent study such as Schneider and Enste (2000) estimated that the average share of the non-observed economy in European transition economies during the period of 1989-90 would be 15 % of the overall economy.

Even though there exists a wide range of differences for these economies, let us take average value cited by Schneider and Enste (2000) and assume that 15% of the overall economic activities were carried out by non-observed economy in Mongolia in 1990.

Second, among the three scenarios of electricity/GDP elasticity, we assume that Mongolian output elasticity of electricity consumption would be 1.15, which means that electricity consumption elasticity of output would be 0.87.

It is a well-known fact that the Mongolian industrial structure has been built in a way that uses energy inefficiently. Therefore, it would be more realistic to assume that Mongolia fell in the growth of energy-inefficient countries, which has a lot elasticity of

output with respect to electricity consumption, than to assume that Mongolia has unitary electricity/GDP elasticity.

With these assumptions, the relative size of the Mongolian non-observed economy can be estimated according to the following equations.

$$(1) \quad Y(t) = Y_o(t) + Y_U(t)$$

(Where Y is the size of the overall economy, Y_o is the size of the official economy and Y_U is the size of the non-observed economy)

$$(2) \quad Y_U(t) = [1 + \epsilon * G_E(t)] \cdot Y(t-1) - [1 + G_o(t)] \cdot Y_o(t-1)$$

(Where ϵ is elasticity of output with respect to electricity consumption, G_E is the growth rate of electricity consumption, and G_o is the growth rate of official GDP,

$$Y(t-1) = Y_o(t-1) / 0.85$$

Using these assumptions and equations, the relative share of the Mongolian official and non-observed economies can be estimated as time series from 1990 estimated,

The results of the experimental estimates on the electricity consumption method for 1990-2002 showed that value added by the non-observed economy of Mongolia measured approximately **17 percent** of the official GDP in 2000. This is the same result as was obtained using the IOT for 2000.

7. SUMMARY AND IMPLICATIONS

In the literature, non-observed economy is also called second, parallel, unofficial, shadow, underground, black and irregular economy. There is also no agreement on the definition of the non-observed economy and on its measurement approaches as it has many different names. Therefore, there are many definitions for the non-observed economy and its measurement approaches.

When the literature for non-observed economy is analyzed, some basic definitions are observed.

- “Non –observed” does not mean “not measured”.

- In “Measuring the Non-observed Economy –A Handbook” (2002) the groups of activities that are *underground, illegal, informal sector, or undertaken by households for their own final use* and activities that are missed due to the *deficiencies in the basic statistical data collection programme* are collectively said to comprise the non-observed economy (NOE)

Bearing in mind the above mentioned international concepts and definitions, I find it more useful to consider that there are three components of the non-observed economy (NOE) in the Mongolia case. These are as follows:

1. Hidden activities (underground production + Production missed due to deficiencies in data collection programme)
2. Informal sectors activities (informal sector + Household production for own final use)
3. ILLegal poduction

Although non-observed economic activities have long been a fact of life and are now increasing around the world almost all societies try to control their growth because of the potentially serious consequences :

- A prospering non-observed economy makes official statistics (on unemployment, official labor force, income and consumption) unreliable. Policies and programs that are framed on the basis of unreliable statistics may be inappropriate and self-defeating.
- The growth of the non-observed economy can set off a destructive cycle. Transactions in the non-observed economy escape taxation, thus keeping tax revenues lower than they otherwise would be. If the tax base or tax compliance is eroded, Governments may respond by raising tax rates encouraging a further flight into non-observed economy that further worsens the budget constraints on the public sector.
- A growing non-observed economy may provide strong incentives to attract domestic and foreign workers away from the official economy.

There are many obstacles to be overcome in measuring the size of Non-observed economy and analyzing its consequences for official economy.

The results in this research show that an increasing burden of taxation and social security payments, combined with rising state regulatory activities are the major driving forces behind the size and growth of non-observed economy.

From the extensive literature on this subject, it is clear that it is difficult to estimate the size of non-observed economy. However, I have demonstrated that there are various indirect methods available (e.g. the discrepancy between National expenditure and income statistics, monetary approach and electricity consumption approach). There is no best or commonly accepted method of estimating the size of Non-observed economy, each approach has its own strengths and weaknesses and yields its own insights and results.

Therefore, this study is different from traditional studies because it tries to measure the size of Non-observed economy in Mongolia using some indirect methods.

In previous Sections, I tried to estimate the size of the Mongolian non-observed economy as of 2000 by relying on three different methods. But the method based on the discrepancy between National expenditure and income statistics provides two separate estimates – one based on results of Supply and Use table for 2000 and the other based on results of Input and Output table for 2000.

General compilation of the Supply and Use table is similar to that of the Input and Output table. But the main difference between Input and Output table and the Supply and Use table is the supply table. Therefore, Input and output table is alternative method that has been recommended to use for estimating the size of Non-observed economy.

The results of the experimental estimates based on above mentioned three different methods are following:

1. The method of the discrepancy between National expenditure and income statistics

1.1 ESTIMATES ON SUPPLY AND USE TABLE FOR 2000

The results of the experimental estimates on Supply and Use table for 2000, showed that value added created by Non-observed economy of Mongolia measured approximately **13 percent** of the official GDP

1.2 ESTIMATES ON INPUT AND OUTPUT TABLE FOR 2000

The results of the experimental estimates on IOT for 2000, showed that value added created by Non-observed economy of Mongolia measured approximately **17 percent** of the official GDP.

2. Simple currency ratio method as monetary approach

The results of the experimental estimates on Simply currency ratio method for 1989-2000, showed that value added created by non-observed economy of Mongolia measured approximately **27 percent** for 2000, but annual average approximately **20 percent** $(27.3+16.4)/2$ for 2000-2001 of the official GDP.

The experimental estimates based on the Simply currency ratio method for 1989-2000 depends on the ratio of currency circulation to demand deposits in the selected base year -1989.

3. Estimates based on electricity consumption method

The results of the experimental estimates on the electricity consumption method for 1990-2002 showed that value added by non-observed economy of Mongolia measured approximately **17 percent** of the official GDP. It is same results of the Input and Output table for 2000.

Whichever method we adopt in the end , all three estimation methods gave us approximately 17-20 percent of the official GDP for 2000, as the final figure for the size of non –observed economy of Mongolia.

However ,all of these three estimations are based on several assumptions, some of which have to be studied further in the future.

In the Mongolian case, may be Input and output table is the best method to use for estimating the size of Non-observed economy, but we need to use other methods such as Electricity consumption method as well to cross-check results from the Input and output tables.

After measuring the size of the Mongolian non-observed economy, I have to figure out its implication for policy makers. In order to do that, we need to know the effect of the non-observed economy on the official and overall economic activities.

Normally, its effect on the overall economy can be negative in most of the market economies. For example, it can reduce tax income and thus impair Government's ability to provide services and much needed infrastructures. Also, it can divert resources from the official sector to the non-observed sector and as a result, it can crowd out the official production.

Even major reductions in tax rates will not substantially shrink the non-observed economy, but they may be able to stabilize it.

Marginal tax rates are more relevant to peoples non-observed economy work decisions than are average tax rates, so that replacing direct taxes with indirect taxes is unlikely to improve tax compliance. More frequent tax audits and heavier penalties for tax evasion may reduce the size of non-observed economy.

The measurement of the non-observed economy is a difficult and delicate matter. It is not just a question of making quick-fix adjustments to the national accounts but will often involve a major overhaul of procedures for collecting, processing and editing the basic economic statistics on which they are based.

We need to compile and process data related to the Non-observed economy on a regular basis and we must use indirect methods (such as Input and output tables and Electricity consumption method) and model approaches jointly for estimation the size of Non-observed economy.

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