

지하경제의 국제간 비교: 미시자료를 사용한 실증결과

International Comparison of the Size of the Black Economy: Empirical Evidence using Micro-level Data

현진권(Jin-Kwon Hyun)*

ABSTRACT

An international comparison of the size of the black economy is one of the most popular approaches to evaluate the seriousness of the black economy for each country. We estimated the size of the black economy for comparative analysis by using LIS data as well as Korean National Survey of Family Income and Expenditure data. We define the black economy as the difference between reported income and real income for the self-employed group.

The size of the black economy is indicated as 20.31% in Korea. Taiwan, Germany, and Italy show smaller sizes. However, Spain, Israel, Russia, and Hungary show larger size. The countries in transitional economies, especially, show relatively high levels of black economy. This empirical evidence is in line with general intuition. The high income self-employed group shows more serious underreporting behavior than the low income group. The level of black economy can be explained by GDP per capita. Our empirical finding is that as an economy grows, the level of black economy decreases.

한 국가의 지하경제 규모를 평가하기 위한 대표적인 방법이 국제간 비교이다. 본 논문은 미시자료를 사용하여 우리나라 지하경제 규모를 국제간 비교하였다. 사용한 자료는 우리나라의 경우에는 통계청 1996년 가구소비실태조사 자료를 사용하였고, 다른 국가들에 대해서는 LIS 미시자료를 사용하였다. 분석의 편의상 지하경제는 자영업자 계층의 신고소득과 실제소득 간의 차이로 정의하였다.

한국의 경우 지하경제는 20.31%로 추정되었으며, 대만, 독일, 이태리는 다소 낮은 추정치를 보여주었다. 그러나 스페인, 이스라엘, 러시아, 헝가리는 상대적으로 높은 추정치를 보여주었다. 특히 사회주의에서 자본주의 체제로 변화하는 국가들의 지하경제 수준이 매우 높게 나타났다. 고소득 자영업자 계층이 저소득 계층보다 신고율이 상대적으로 낮은 것으로 나타났으며, 이는 일반적인 인식과 같다. 지하경제 규모를 국제간 비교한 결과, 일반적으로 경제가 발전한 나라일수록, 지하경제 규모는 감소하는 추이를 보여주었다.

* 조세연구원 연구위원

I. Introduction

It is an internationally recognized fact that "black economies" exist in which unregulated underground economic activities occur. However, by their very nature, they are extremely difficult to identify and locate. As such, these "black economies" have become the subject of much interest by economists, and the challenge for researchers has been to quantify their size with some degree of accuracy.

Black economies take a variety of forms and differ significantly from country to country. In some countries, the black economy might constitute a smaller portion of the overall economy than in other countries, depending on prevailing conditions such as the existing tax system and penalties on unpaid tax liabilities. Studies aimed at making international comparisons of the sizes of these black economies may provide useful information in understanding their serious nature and the extent to which they impact upon the rest of the economy.

The black market existing in Korea has, in particular, been recognized as being greater than those of advanced economies. Since the onset of the current financial crisis in Korea, it has become imperative for the Korean government to increase the transparency of the market economy. Government policies are directing themselves towards identifying the extent to which these black economies exist and attempting to dissolve them, especially through tax policies. To this end, studies attempting to quantitatively define the exact size of the black market in Korea through international comparisons will provide policymakers with useful information in formulating their policies.

International comparisons of the black economy should be based on a consistent methodology using the same data. Otherwise, the results of such international comparisons using different methodologies with different data may be misleading. There are presently several methodologies used to estimate the size of the black economy. The most popular are the monetary approach and the income-expenditure approach. The monetary approach estimates the size of the black economy by using national accounts of monetary transactions. This method has been popularly used because of the simplicity with which it can be applied. However, this approach has been criticized for its inaccuracy, the results often being quite unreliable. The income-expenditure approach estimates the size of the black economy by using micro-level data, that is, a household or individual income and expenditure survey. This approach is widely recognized as being more reliable since it reflects the

characteristics of income and expenditure patterns of each household or individual.

In this paper, an international comparison of black economies is made using the Luxembourg Income Study (hereafter called LIS) data. As the LIS does not include Korean data, the family income-expenditure survey data, similar to the LIS data, has been used. In estimating the size of the black economy, the so-called income-expenditure method, one of the non-monetary approaches in the estimation of black economies, was used. Two income groups were assumed: salary paid employees, who report their incomes honestly; and the self-employed group, who underreport their incomes. However, the reported expenditures are assumed to be correct for these two groups. The consumption function, which shows the relationship between income and expenditure, was estimated for the salary paid group. As it is assumed that the two groups have the same consumption function, the true income of the self-employed group can be estimated by using the estimated expenditure of the self-employed and the consumption function of the salary paid group. The difference between the underreported income and the true income, using the income-expenditure approach for the self-employed group, is interpreted as the size of the black economy.

This paper is structured as follows. In Section II, we discuss the methodology to estimate the size of the black economy with reference to existing literature. Section III shows our methodology and data to estimate the size of the black economy. Section IV shows our empirical evidence, and Section V presents our conclusions.

II. Measuring the Size of the Black Economy

Black economy can be defined in various ways.¹⁾ In general, it is accepted that the black economy is composed of legitimate activities between individuals which are hidden from the authorities, principally the tax authorities. As criminal activities are not included in the definition of the black economy, the black economy might be synonymous with tax evasion. Thus, activities in the black economy are undertaken with a view to evading the payment of various direct and indirect taxes.²⁾

There are many elements to the black economy, for example, interest, wages and

1) There are several terms to describe the black economy, such as the submerged economy, the hidden economy, the underground economy, the subterranean economy, etc..

2) See Pyle (1989), and Tanzi (1982) for details on the definition of the black economy.

salaries, self-employment income, etc. It is well recognized that self-employment income has been heavily underreported, since the actual self-employment income cannot be systematically determined by the tax authorities. Given this circumstance, self-employment income might be a big source of the black economy.

The size of the black economy might be a most important figure, even though its measurement is difficult. Many studies have tried to measure the size of the black economy around the world.³⁾ There are two approaches to measure the size of black economy in empirical estimation. One is a direct method of measurement. This approach can be satisfied by an intensive audit of a sample of taxpayers, so that it gives a relatively reliable estimate.⁴⁾ The other is an indirect method of measurement. Most popular types of indirect methods are the expenditure-income discrepancy method and monetary aggregate method.

The expenditure-income discrepancy method is based on the assumption that, although income may be concealed, expenditure will eventually show up. Thus the discrepancy between reported income and real income from the consumption pattern can be interpreted as the size of the black economy. Monetary aggregate methods, which are the most frequently used, are those based upon monetary indicators, in particular, the amount of currency in circulation. This approach is based on the assumption that transactions in the black economy are funded largely by cash in order to reduce the chances of detection.

Since the information available through the direct method is so limited, indirect methods have been popularly used. The monetary aggregate approach is the most popularly used, as its tractability is so simple (e.g. Tanzi: 1982, Spiro: 1994). The expenditure-income discrepancy model is usually based on micro-data, and its estimate is relatively reliable (e.g. Pissarides and Weber: 1989, Yoo: 1997).

Black economy has a large impact on various levels of the economy. One obvious consequence of the black economy is the loss of tax revenue. It also gives us an information bias about the indicators of economic activities. There are many studies to show the effects of black economy on the socioeconomic environment (Cowell: 1990, Pyle: 1989). Alm (1985) found that the welfare cost is large and growing in absolute and relative terms over time in the American economy.

3) Cowell (1990) showed existing literature about empirical estimates of the black economy for each country and their methodologies.

4) A typical one is the Taxpayer Compliance Measurement Program (TCMP) data in the U.S.A. This data uses a sample of taxpayers for intensive audits, and shows the difference between the real income and reported income.

As it is well known that black economy has a negative effect on the economy, most countries have used various policy tools to prevent the black economy, especially tax audits and penalty fees. The measurement of the size of the black economy might be the first step for policy issues related to the black economy. It is most important to estimate the size of the black economy to recognize how serious it is.

All countries have a black economy, even though each country has a different level of black economy. The international comparison for the size of the black economy might give us useful information to evaluate whether each country has a negligible or influential size of black economy.

There are several studies that try comparative analyses of black markets, for example, Frey and Weck-Hanneman (1984) and Schneider (1997). Those studies applied the indirect method to estimate the size of the black economy. Frey and Weck-Hanneman (1984) is based on a regression model, which used three indicators (the direct tax share, the share of public sector jobs in total employment, and the index of tax mortality) to determine the size of the black economy. Schneider (1997) applies the monetary aggregate method to estimate the size of the black economy in western European countries.

Our study uses a different methodology, the expenditure-income discrepancy method, to estimate the size of the black economy for comparative analysis. Our empirical evidence will give us supplementary information about the size of the black economy for each country.

Our study uses the expenditure-income discrepancy method to estimate the size of the black economy for each country. The expenditure-income discrepancy method should be based on micro-data on a household or individual level. International comparisons of the black economy should be based on a consistent methodology using the same data. Thus, the application of the expenditure-income discrepancy model might be possible, when micro-data is available for all countries.

Micro-data for all countries was limited, until the Luxembourg Income Study data was produced for comparative analysis. The Luxembourg Income Study (hereafter the LIS) was conducted in 1983 to provide micro-data of households or individuals for comparative research in the social sciences. The LIS databank has a total of over 70 data sets, covering more than 30 countries. The LIS includes income-expenditure survey data from advanced economies, developing economies, and eastern European economies. The LIS databank was developed using a standardized definition of each survey variable and as such, it provides an ideal data set for conducting comparative research of black economies over several countries.

III. Model

We may divide all income earning groups into two groups; one is salary paid employees, and the other is the self-employed group. We assume that salary paid employees honestly report their income, since their incomes are easily and systematically examined. However, members of the self-employed group do not report their incomes honestly, since they can easily hide their true incomes. We define the black economy as the gap between true income and reported income for the self-employed group.

The consumption function, which shows the relationship between income and expenditure, is well known to explain the consumption behavior for each individual. The level of consumption is also determined by other factors, the most important being the demographic and wealth factors. The level of expenditure is sensitively dependent upon the number of persons in each household, and upon the level of wealth. Thus the level of expenditure for each household can be described by using some functional form, f , as follows:

$$\text{Expenditure} = f(\text{Income, Household Size, Wealth})$$

We assume that the consumption behaviors are the same for the two groups. This assumption is not very strong, since there is only one piece of empirical evidence for this assumption. Lee (1998) tested this assumption by using the first difference equation with panel data, and found that the patterns of consumption between the two groups are the same. Since his study is limited to the Korean case, these tests should be extended for international comparison. However, we assume the same consumption pattern for all countries.

We also assume that salary paid employees are honest in reporting their incomes as well as the level of expenditures, but the self-employed group is honest only in reporting their level of expenditures. These assumptions were popularly used by several studies (e.g. Yoo and Na; 1991).

Under these assumptions, we can estimate the real income of the self-employed group through the consumption function of salary paid employees. The difference between real income and reported income for the self-employed group shows us the level of black economy for each country. This estimate might give us different figures,

as other studies show the size of the black economy with respect to GNP.

First, we estimate the consumption function for salary paid employees. The level of consumption (C) is determined by the type of housing tenure (D), the size of a household (H), and the level of income (Y) as the following functional forms:

$$\ln C = \beta_0 + \beta_1 D + \beta_2 \ln H + \beta_3 \ln Y + \mu \quad (1)$$

Where D is a dummy variable which has the value of one for owning housing and zero for rental housing. $\beta_0, \beta_1, \beta_2, \beta_3$ are parameters to be estimated and μ is an error term. We use equation (1) to estimate the real income of the self-employed group, as their expenditure level is already known. We calculate the difference between estimated income \hat{Y} and reported income, (Y) and get the size of unreported income with respect to real income for the self-employed group by summing up the entire self-employed group as follows:

$$\text{The size of black economy} = \frac{\sum \hat{Y} - \sum Y}{\sum \hat{Y}} \quad (2)$$

The size of the black economy might be different for different characteristics of each household. It is generally inferred that the high income group underreports more of their income than the low income group. Thus, we empirically test this assumption by using the following equation:

$$W = \beta_0 + \beta_1 \ln \hat{Y} + \mu \quad (3)$$

Where W is the size of the level of unreported income, and \hat{Y} is the projected real income for each household. We estimate β_0, β_1 of equation (3) for all countries.

It might be an interesting research topic to determine why the levels of black economy differ from each other. As we estimate the size of the black economy by equation (2) for each country, we examine the relationship between the size of the black economy and economic factors. One of most important variables to explain the level of the black economy might be GDP per capita. Since countries with advanced economies usually have lower levels of black economy, we simply test this relationship by using simple regression.

IV. Empirical Results

We use LIS data to apply our model for international comparison. LIS data has a lot of information about income and expenditure for households or family units. Even though LIS has data for more than 20 countries, many countries do not have enough information to determine income and expenditure. We cannot include many countries due to incomplete data, so 7 countries have been selected for this study. They are Taiwan, Germany, Italy, Spain, Israel, Russia, and Hungary.

As Korea did not provide micro-data for the LIS, we tried to get data similar to the LIS. Korea has several data sources which are similar to LIS. We used "National Survey of Family Income and Expenditure" data for the comparative analysis, as this data has the largest sample size and enough information about income and expenditure. Ideal data for comparative analysis is data for the same year, since it should be compared with the base of a specific period. However, LIS data does not use the same year in the survey periods. We used the most updated survey data for each country, so there is a variation in research periods. We use 1996 data for Korea, for example, and 1983 data for Germany. Thus, empirical results by using our data include the effect of the difference in research periods. This might be due to data limitation for comparative analysis.

Table 1 shows the comparisons of average income for salary paid employees and the self-employed group. We standardized the level of the salary paid group's income with the value of 100, and got the relative size for the self-employed group. For example, the level of the self-employed group's average income is 139.86, which is relatively higher than that of salary paid employees. Most of the countries, except countries with transitional economies like Russia and Hungary, show that the self-employed group has higher income than salary paid employees. In Germany, which has the largest difference, it has twice the income. Taiwan shows a similar level between the two groups. For the expenditure level, the same pattern as in the income level appears for the difference between the two groups.

Table 2 shows the estimates of the consumption function for salary paid employees. The income variable estimate indicates the elasticity of consumption with respect to income. For example, if one unit of income is increased, 0.74 units is increased in Korea. These estimates are statistically significant for all countries. The estimates show lower values in Taiwan, Germany, and Italy, and higher values in the other countries.

In particular, Hungary shows a value higher than one, that is, 1.36. Household size is another important variable to determine the level of expenditure. Korea has the highest value of 0.23, which implies that household size is relatively important. It shows that housing tenure is another important variable. Korea and Israel have the highest value of 0.05 compared to other countries. However, several countries do not show any statistical significance, so their housing tenure is not as important as in Korea.

Table 3 shows the empirical results of the size of the black economy for each country. This estimate is the ratio of the difference between real income and reported income with respect to real income. Thus, it should be carefully interpreted, as most studies show this size in comparison to GNP. The total number of the self-employed group should be considered to be compatible with GNP, as each country has different figures for the self-employed groups. For example, a country might have a low level of black economy, even though it shows a relatively high level in the difference between real income and reported income. In this case, the proportion of the self-employed group would be very low.

Empirical results of the size of the black economy show 20.31% in Korea. Germany shows the lowest level of 8.09%, even though the research period of 1983 is very different from those of the other countries. Transitional economies have relatively larger sizes of black economy, 74.94% for Russia and 56.86% for Hungary.

Table 4 shows the estimates of equation (3) for each country, to test whether the high income group underreports their income more. The estimate of β_1 shows a positive value for all countries except Israel, which shows statistical insignificance. Thus, we may insist that high income households show more serious underreporting than low income households. The level of underreporting is different for each country. From the comparisons of the absolute value of β_1 , we find that Korea shows a relatively high level of underreporting behavior for the high income household group.

We examine whether the level of the black economy has a relationship with the level of economic growth. Since the data of each country covers a different time period, we need to standardize the GDP per capita by one benchmark period. We calculate the relative size of the GDP per capita for each country, with a base of 100 for Korea's GDP per capita. Figure 1 shows this relationship. We find that this relationship between two variables is negative, rather than positive. We statistically test this relationship by the following simple regression. It indicates that more advanced economies generally have lower levels of black economy.

$$W = 65.75 \cdot 0.26 \text{ GDP}, R^2 = 0.5$$

$$(t = -2.46)$$

Where W is the level of black economy and GDP is the standardized GDP per capita for each country.

<Table 1> Average Values for the Two Groups

Country	Year	Sample Size	Average income(%)		Average expenditure(%)	
			Salary paid	Self-employed	Salary paid	Self-employed
Korea	1996	24,274	100	139.86	100	122.92
Taiwan	1995	14,527	100	106.26	100	100.91
Germany	1983	41,479	100	207.25	100	138.58
Italy	1995	7,283	100	160.28	100	117.70
Spain	1990	16,757	100	111.69	100	102.04
Israel	1992	4,188	100	149.15	100	132.35
Russia	1995	2,421	100	73.46	100	88.34
Hungary	1994	1,204	100	55.18	100	76.10

<Table 2> Empirical Results for Consumption Function

Country	Sample size	R2	Constant	Housing tenure	Household Size	Income
Korea	14,662	0.74	1.76 (37.11)	0.05 (8.35)	0.23 (36.95)	0.74 (142.77)
Taiwan	7,051	0.75	3.09 (38.00)	0.03 (3.66)	0.19 (27.08)	0.72 (115.31)
Germany	25,001	0.69	2.72 (65.18)	-0.01 (-1.66)	0.21 (60.76)	0.69 (173.18)
Italy	3,006	0.63	3.29 (32.22)	0.03 (2.80)	0.20 (16.52)	0.62 (61.67)
Spain	2,970	0.76	1.46 (10.28)	-0.01 (-0.76)	0.19 (14.81)	0.86 (86.47)
Israel	758	0.89	0.27 (2.32)	0.05 (2.57)	0.06 (3.82)	0.94 (67.97)
Russia	296	0.74	0.95 (2.73)	0.01 (0.10)	0.04 (0.60)	0.88 (27.86)
Hungary	531	0.29	-5.08 (-4.12)	-0.16 (-0.91)	-0.22 (-1.75)	1.36 (14.15)

Notes: Values within the parentheses by the estimated coefficients denote the t values.

<Table 3 > Empirical Results for Black Economy

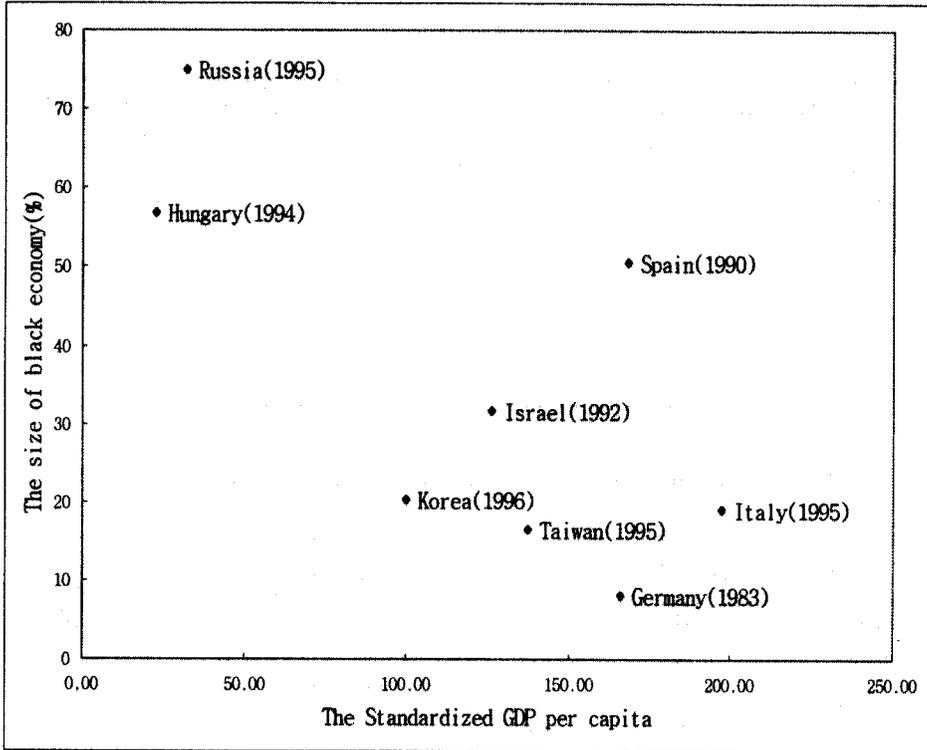
(Unit: %)

Country	Year	The size of black economy
Korea	1996	20.31
Taiwan	1995	16.52
Germany	1983	8.90
Italy	1995	19.16
Spain	1990	50.54
Israel	1992	31.68
Russia	1995	74.94
Hungary	1994	56.86

<Table 4> The Relationship between Total Income and the Level of Unreported Income

Country	Sample size	β_0		β_1	
		Estimate	t-value	Estimate	t-value
Korea	7,009	-5.35	-48.25	0.51	47.52
Taiwan	4,295	-2.09	-13.72	0.16	14.11
Germany	2,572	-0.81	-3.63	0.08	3.81
Italy	1,473	-5.29	-13.97	0.50	13.97
Spain	4,055	-5.38	-33.36	0.38	35.56
Israel	666	0.51	3.71	0.02	-1.34
Russia	559	-0.57	-2.14	0.11	4.62
Hungary	94	-280.39	-13.09	21.25	13.02

<Figure 1> The Relationship between GDP per capita and Black Economy



V. Conclusions

The estimation of the size of the black economy is important information for policymakers. There are several methodologies to estimate the size of black economy, including the monetary approach and the income-expenditure approach. The income-expenditure approach is based on the relationship between income and expenditure, and gives us relatively reliable estimates. However, this approach requires micro-level data about household or family units. That is why empirical evidence was not as popular as the monetary approach.

An international comparison of the size of the black economy is one of the most popular approaches to evaluate the seriousness of the black economy for each country. We estimated the size of the black economy for comparative analysis by using LIS data as well as Korean National Survey of Family Income and Expenditure data. We define the black economy as the difference between reported income and real income for the self-employed group.

We find that the average income of the self-employed group is higher than that of salary paid employees for most countries, except Russia and Hungary, which are transitional economies. In particular, Germany shows the biggest difference between the two groups. The consumption function indicates that income, household size, and housing tenure are important determinants for most countries.

The size of the black economy is indicated as 20.31% in Korea. Taiwan, Germany, and Italy show smaller sizes. However, Spain, Israel, Russia, and Hungary show larger size. The countries in transitional economies, especially, show relatively high level of black economy. This empirical evidence is in line with general intuition. The high income self-employed group shows more serious underreporting behavior than the low income group. The level of black economy can be explained by GDP per capita. Our empirical finding is that as an economy grows, the level of black economy decreases.

The comparative analysis for black economy should be extended to many more countries, to examine the relationship between the size of the black economy and the economic situation. However, more reliable micro-level data is required for each country, and this is left as an area for further research.

References

- Alm, James, "The welfare cost of the underground economy," *Economic Inquiry*, Vol. 23, April, 1985.
- Carson, Carol, "The underground economy: an introduction," *Survey of Current Business*, May and June, 1984.
- Cowell, Frank, *Cheating the Government*, The MIT Press, 1990.
- Frey, B. and Weck-Hanneman, H., "The hidden economy as an unobserved variable," *European Economic Review*, Vol. 26, 1984.

- Lee, Chul-In, "Panel data estimation on the extent of under-reported incomes of the self-employed," *Korean Journal of Public Economics*, Vol. 3, No. 1, 1998 (in Korean).
- Pissarides, Christopher and Guglielmo Weber, "An expenditure-based estimate of Britain's black economy," *Journal of Public Economics* 39, 1989.
- Pyle, David, *Tax Evasion and the Black Economy*, The Macmillan Press, 1989.
- Schneider, Friedrich, Empirical Results for the Size of the Shadow Economy of Western European Countries over Time, mimeo, 1997.
- Spiro, Peter, "Estimating the underground economy: a critical evaluation of the monetary approach," *Canadian Tax Journal*, Vol. 42, No. 4, 1994.
- Spiro, Peter, "Evidence of a post-GST increase in the underground economy," *Canadian Tax Journal*, Vol. 41, No. 2, 1993.
- Tanzi, Vito, *The Underground Economy in the United States and Abroad*, Lexington Books, 1982.
- Yoo, Ilho, An Estimate of the Tax Evasion in Korea: Income and Value Added Taxes, working paper 97-03, *Korea Institute of Public Finance*, 1997.
- Yoo, Jong Goo and Seong Lin Na, "An estimation of the incomes of self-employed urban households in Korea," *International Economic Journal*, Summer, 1991.